LOOKING FORWARD: THE FUTURE OF AMERICA'S AVIATION MAINTENANCE AND MANUFACTURING WORKFORCE

(116–53)

HEARING

BEFORE THE

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AVIATION

OF THE

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TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

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FEBRUARY 7, 2020

SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Aviation
FROM: Staff, Subcommittee on Aviation
RE: Subcommittee hearing on "Looking Forward: The Future of America's Aviation Maintenance and Manufacturing Workforce"

PURPOSE

The Subcommittee on Aviation will meet on Tuesday, February 11, 2020, at 10:00 a.m. in 2167 Rayburn House Office Building to hold a hearing titled, "Looking Forward: The Future of America's Aviation Maintenance and Manufacturing Workforce." The hearing will examine the current state of the U.S. aviation manufacturing and maintenance workforce, challenges to ensuring this workforce can meet future industry demands and needs, and current Government and industry initiatives designed to address those challenges. The Subcommittee will hear testimony from the Federal Aviation Administration (FAA), U.S. Government Accountability Office (GAO), the Aviation High School, Long Island City, N.Y., Vaughn College, Delta Air Lines, Gulfstream Aerospace, and the LIFT Academy.

I. OVERVIEW

The U.S. aviation industry is in the midst of an economic renaissance. Just over a decade ago, the 2008 financial crisis led to an unprecedented wave of industry restructuring that ultimately resulted in a loss of more than 100,000 jobs.[1] The effect of the crisis was so profound that the industry did not return to pre-crisis payroll levels until November 2017.[2] Now, for the first time in history, U.S. carriers have recorded three consecutive years of record or near-record profits, largely due to low oil prices and more efficient operations.[3]

In 2014, aviation accounted for more than 5 percent of U.S. Gross Domestic Product (GDP), contributed $1.6 trillion in total economic activity, and supported nearly 11 million jobs.[4] Aviation manufacturing was and continues to be the Nation's top net export, accounting for 0.8 percent of the U.S. GDP in 2014.[5] Recent events have

[1] Gov't Accountability Office, GAO–14–237, *Aviation Workforce: Current and Future Availability of Aviation Engineering and Maintenance Professionals* p.1 (2014).
[2] Seth Borko. "10 Years Later: How the Travel Industry Came Back From the Financial Crisis", *Skift*, (Sept. 14, 2018), *available at*: https://skift.com/2018/09/14/10-years-later-how-the-travel-industry-came-back-from-the-financial-crisis/.
[3] Brianne Eby and Paul Lewis, "Aviation Workforce Challenges in the United States and the United Kingdom", *Eno Center on Transportation* (March 2019) p. 23 *Available at*: www.enotrans.org/wp-content/uploads/2019/03/3.26-US-UK-Aviation-Workforce__final.pdf.
[4] Federal Aviation Administration, "The Economic Impact of Civil Aviation on the U.S. Economy" (November 2016).
[5] *Id.*

affected U.S. manufacturing and the Secretary of Commerce has stated that U.S. GDP growth could be reduced by 0.5 percentage points.[6] These effects have also been felt down the supply chain including layoffs and costs to airlines could be more than $1 billion.[7]

The airline industry growth in recent years has driven production of new aircraft to record numbers, delayed retirements of older jets, and increased spending on aircraft maintenance, increasing demand for a skilled workforce in the aircraft maintenance and manufacturing fields.[8] But as the airline industry has grown in recent years, it has become more difficult to hire and train qualified workers to service, repair, and design an increasing amount of new aircraft and aviation products. For instance, in a recent survey by the Aeronautical Repair Station Association, 55 percent of its members reported having unfilled maintenance technician positions and 82 percent experienced at least some difficulty in finding qualified workers to fill open positions.[9]

Hiring difficulties during times of high growth and low unemployment is not uncommon among industries that depend on a skilled workforce. Additionally, the surging number of retirements among the baby boomer generation will likely make the problem much worse.[10] Without effective strategies to address these underlying workforce challenges, the aviation industry's economic growth and technological advances could be hampered in the future.

II. State of the U.S. Aviation Maintenance and Manufacturing Workforce

A. Occupational Profiles

The aviation maintenance workforce generally falls into two categories: (1) certificated mechanics and service technicians (repairman) and (2) avionics technicians.[11] FAA-certificated mechanics inspect and repair aircraft fuselages and wings (airframes) and engines (powerplants).[12] Generally, it takes between one and three years of education or training to become FAA-certificated and the worker can be certificated to repair airframes, engines, or both (A&P certificated).[13]

There are generally three ways to become eligible to take the test to become an FAA-certificated mechanic: (1) military training and experience; (2) aviation maintenance technician (AMT) schools; and (3) practical work experience under the supervision of a certificated mechanic.[14]

FAA-certificated repairmen service aircraft components and must be recommended for certification by their existing employer to perform specific tasks like welding or painting.[15] It generally takes a year to receive the necessary training or education to become a certificated repairman and, unlike mechanics, a repairman's certification is limited to the employer who issued it.[16] Mechanics and repairman who are not certificated may still perform repair work, but they must be supervised by an FAA-certificated mechanic or repairman. One of the primary differences between certificated mechanics and repairman is that only a certificated mechanic can approve an aircraft for return to service.[17]

Avionics technicians generally install, inspect, test, or repair avionics equipment, such as radar, radio, navigation, and missile control systems in aircraft and space vehicles.[18] There is no required test to become an avionics technician, but the technician may hold an A&P, repairman, or related FAA certificate.[19]

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[6] Anneken Tappe, "Boeing's 737 Max crisis will weigh on America's GDP growth in 2020", *CNN Business*, (December 19, 2019) *available at*: https://www.cnn.com/2019/12/18/economy/boeing-gdp-impact/index.html.

[7] Emma Newburger, "Boeing 737 Max crisis could slow US growth by a half point in 2020, Mnuchin says", *CNBC*, (January 12, 2020), *Available at*: https://www.cnbc.com/2020/01/12/mnuchin-says-boeing-737-max-grounding-could-slow-us-growth-by-a-half-point.html.

[8] *Id.*

[9] *Id.*

[10] Laura Schneider, "How Retiring Baby Boomers Affect the Job Market", *The Balance Careers*, (November 29, 2019), *available at*: https://www.thebalancecareers.com/retiring-boomers-affect-job-market-2071932

[11] Gov't Accountability Office, GAO–20–206, *Aviation Maintenance: Additional Coordination and Data Could Advance FAA Efforts to Promote a Robust, Diverse Workforce* p.5 (2020)

[12] *Id.* at 3.

[13] *Id.*

[14] *Id.*

[15] *Id.*

[16] *Id.*

[17] *Id.*

[18] *Id.* at 7

[19] *Id.*

Though the aviation manufacturing workforce contains mechanics and repairmen, it also includes a variety of other professions as well. These include business strategy, cyber security, data science, and direct manufacturing, among other things.[20] While all these professions support the aviation manufacturing industry, the profession that is most directly linked to the design of new aircraft is aerospace engineering. Aerospace engineers design, construct, and test aircraft and aircraft components to ensure they function according to design.[21] Most entry-level positions for professional aerospace engineers generally require a bachelor's degree, although some may require a master's degree or doctorate.[22]

B. Labor Shortage

Aviation maintenance and manufacturing companies are growing increasingly concerned about a labor shortage. The FAA predicts that more than 50 percent of the current science and engineering workforce is expected to soon hit retirement age.[23] Half of the 330,000 FAA-certificated mechanics and repairmen as of December 2018 were between 50 and 70 years old.[24] The problem is not limited to just retirements; for example, the number of students receiving degrees in avionics has significantly decreased in recent years.[25] The Aviation Technician Education Council (ATEC) estimates that while 30 percent of the current workforce is at or near retirement age, new entrants comprise only two percent of the workforce annually.[26]

A recent analysis by the GAO found that, while not definitive, there was evidence of hiring difficulties consistent with a potential labor shortage for aircraft mechanics and service technicians.[27] The same analysis found even stronger evidence of a labor shortage for aerospace engineers.[28]

Moreover, nearly 39 percent of aerospace companies predict an "extreme" effect on their business growth caused by a labor shortage.[29] A 2014 report estimated that U.S. manufacturers face reduced earnings of up to 11 percent due to revenue losses stemming from skills shortages.[30] And Boeing predicts that the aviation industry will require 754,000 new aircraft technicians over the next two decades.[31]

III. Key Challenges Affecting the U.S. Aviation Maintenance and Manufacturing Workforce

A. Retirement of "Baby Boomer" Generation

By the year 2029, a majority of Americans who were born between 1946 and 1964 will have retired, and nearly one-fifth of the U.S. population will be 65 or older.[32] And their retirements have already started. It is estimated that since 2011, nearly 10,000 baby boomers reach retirement age every day.[33] In terms of aviation, for example, Boeing estimates that nearly 10 percent of its U.S. workforce is eligible for retirement.[34] As the baby boomer generation continues to exit the workforce, it becomes even more vital for Government and industry to develop strategies that expand the pipeline of workers into the aviation maintenance and manufacturing industry.

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[20] Eno Center, *supra* note 3, at 41.
[21] GAO–14–237 at 4.
[22] Learn.org, *What Training Do I Need for a Career in Aerospace?*, *available at*: https://learn.org/articles/What_Training_is_Necessary_for_a_Career_in_Aerospace.html
[23] Federal Aviation Administration. "Aviation and Space Education". https://www.faa.gov/about/office_org/headquarters_offices/ang/offices/tc/education/aviation/?set=whycare.
[24] GAO–20–206
[25] GAO–14–237 at 16.
[26] Eno Center, *supra* note 3, at 27.
[27] GAO–20–206 at 29–30.
[28] *Id.*
[29] Aerospace Industries Association. "The Defining Workforce Challenge in U.S. Aerospace & Defense". *Available at*: https://www.aia-aerospace.org/wp-content/uploads/2016/09/STEM_Report_lowres_V11.pdf
[30] Accenture. "The Manufacturing Skills and Training Study". (2014) *Available at*: http://www.themanufacturinginstitute.org/Research/Skills-and-Training-Study/~/media/70965D0C4A944329894C96E0316DF336.ashx
[31] Leslie Josephs. "College of $70,000 a year? Aviation Industry scrambles for mechanics as retirements loom." (September 3, 2018), *Available at*: https://www.cnbc.com/2018/09/03/airlines-search-for-young-mechanics-as-retirement-wave-looms.html.
[32] Richard Fry. "Millennials Are the Largest Generation in the U.S. Labor Force". (April 11, 2018). *Available at*: https://www.pewresearch.org/fact-tank/2018/04/11/millennials-largest-generation-us-labor-force/ *Also*, Schneider, *supra* note 6.
[33] Schneider, *supra* note 6.
[34] Eno Center, *supra* note 3, at 41.

B. The Skills Gap

Many employers in the aviation industry express concern over the potential for a labor shortage, but when it comes to maintenance workers, employers are not concerned about just the supply of workers, but also the supply of qualified workers. For instance, according to a 2014 GAO report on the availability of aviation maintenance and engineering professionals, nearly 70 percent of employers interviewed by the GAO expressed some level of difficulty hiring workers with the desired experience levels.[35]

This "skills gap" stems from several causes. One cause is the limited supply of certificated maintenance workers compared to the larger aviation maintenance workforce. For instance, from fiscal year 2001 to 2012, about 16,000 workers trained in aviation maintenance related occupations separated from the military annually.[36] However, the vast majority of these workers will not obtain an A&P certificate before entering the civilian workforce, making them less desirable to employers.[37] Since the military serves as a primary source of workers for employers looking to hire mechanics and service technicians, the lack of certificated workers among separated service members could limit employers' hiring pools.

Another cause for the skills gap is the lack of skilled workers in positions requiring more than a high school diploma but less than a four-year college degree. In a 2014 report on the manufacturing industry, more than 75 percent of respondents cited a shortage of skilled workers, primarily in positions that only required an associate degree or other form of vocational training.[38]

The 2014 report echoes a more recent finding by the GAO that nearly 70 percent of employers in the aviation industry expressed hiring difficulties, specifically with respect to workers with craft skills—such as upholstery and cabinetry—which are typically gained through either technical training or community college programs.[39] In a white paper published last year, a U.S. aviation maintenance and repair company pointed to this workforce challenge as the primary reason the company had nearly 400 openings at its five U.S. facilities and two Canadian facilities.[40]

C. Outdated Curriculum for AMT Schools

Many aerospace employers are reluctant to hire recent graduates since their education alone may not prepare them to begin work in their specified field.[41] According to a GAO report, employers have expressed concern that the curriculum taught at AMT schools focuses too much on outdated technologies, such as aircraft built with dope and fabric, and not enough on modern technologies, such as composite materials, which are increasingly being used by manufacturers.[42] Additionally, researchers have identified other subjects, such as soldering and welding, as issues in the curriculum that could be completely eliminated or condensed.[43] The current AMT school requirements, which are prescribed through FAA regulations, do not always provide schools with the flexibility needed to control how these subjects are taught.[44]

The FAA is responsible for approving and overseeing AMT schools as well as establishing the minimum curriculum and training requirements students need to obtain before becoming eligible to take the FAA mechanic tests.[45] Due to rising concerns from industry and AMT schools that FAA curriculum and testing requirements are becoming obsolete, the FAA has recently proposed to modernize these requirements, which have remained largely unchanged for decades.[46] Unfortunately, there has been little progress since the FAA issued its proposed rule aimed at modernizing the AMT educational curriculum in 2015.

At the same time, AMT schools are increasingly pushing back against the Federally-mandated curriculum and training requirements. For instance, in 2018, Southern Utah University (SUU) unsuccessfully petitioned the FAA for exemption from the Federal training requirements of approved curricula.[47] In its petition, SUU

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[35] GAO–14–237 at 23.
[36] *Id.* at 18.
[37] *Id.*
[38] Accenture, *supra* note 26.
[39] GAO–14–237 at 23.
[40] Rob Mark. "AAR White Paper Focuses on Maintenance Technician Shortage". (February 5, 2019) Flying. *Available at*: https://www.flyingmag.com/aar-maintenance-technician-shortage/
[41] GAO–20–206 at 14.
[42] GAO–14–237 at 24.
[43] *Id.*
[44] *See* 14 CFR Part 147.
[45] GAO–20–206 at 6.
[46] *Id.*
[47] Eno Center, *supra* note 3, at 25.

claimed that FAA requirements severely limited the school's ability to design a program that met its students' needs and that the current rules required training on items that most AMTs will never utilize in their careers.[48] Many in industry assert that if AMT students were taught subjects more relevant to modern industry needs, employers would be more willing to hire applicants straight out of school.

D. Lack of Diversity

To meet industry demand for new, skilled aviation workers, employers will need to expand the pool of workers from which they traditionally hire. One way to expand this candidate pool is to recruit workers from historically underrepresented groups in the aviation industry. Currently, the percentage of female FAA-certificated A&P mechanics remains low at only 2.4 percent.[49] Only 13 percent of aerospace engineers are women, while 75 percent of aerospace engineers are white.[50] In contrast, women and minorities make up 50 and 40 percent of the U.S. population, respectively.[51] These significant discrepancies suggest that increased outreach to these underrepresented groups could expand the hiring pool and help alleviate a future labor shortage in the aviation maintenance and manufacturing industry.

E. The Glamour Gap and Industry Competition

Another reason the aviation maintenance and manufacturing industry is having hiring difficulties relate to the waning interest among younger generations to enter the aviation field, otherwise known as the "Glamour Gap."[52] For instance, enrollment at FAA-certificated AMT schools has decreased by 2 percent in recent years and AMT school programs are currently only operating at 50 percent capacity.[53] Several employers and stakeholders point to the declining number of "shop" classes in high school and the perception that well-paying professions can be obtained only through four-year institutions as leading causes of the growing disinterest among young people to seek jobs in the aviation maintenance and manufacturing fields.[54]

This trend appears to be made worse by industry competition. For instance, the lack of job security resulting from the cyclical nature of the aviation industry has made it harder for aviation companies to compete with other industries, such as the financial services or information technology industry, to attract and retain engineers and other professionals with similar skill sets.[55] In fact, 20 percent of graduates of AMT schools ultimately pursue careers in fields outside of aviation.[56]

IV. Key Initiatives Supporting the U.S. Aviation Maintenance and Manufacturing Workforce

A. Congressional Mandates and Initiatives

Aviation Maintenance Workforce Grants. Section 625 of the FAA Reauthorization Act of 2018 directed the Department of Transportation (DOT) to establish a grant program to "support the education and recruitment of aviation maintenance technical workers and the development of the aviation maintenance workforce."[57] The first-of-its-kind program is authorized at $5 million for each fiscal year through 2023. The program—delegated to the FAA—will provide grants for educational programs, scholarships, apprenticeships and other outreach initiatives to expand educational opportunities in the field of aviation maintenance.[58]

Student Outreach Report. Section 601 of the FAA Reauthorization Act of 2018 directed the FAA to submit a report to Congress describing the agency's outreach efforts to elementary and secondary students interested in STEM careers in order to prepare them for aviation- and aeronautical-related careers and mitigate the antici-

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[48] *Id.*
[49] GAO–20–206 at 28.
[50] Peter Dizikes, "Why Do Women Leave Engineering?". *MIT News* (June 2016). *Available at*: http://news.mit.edu/2016/why-do-women-leave-engineering-0615; *Also* Sophia Shaw, "75% of US Scientists and Engineers are White. We Need Diversity to Lead on STEM". *The Guardian* (June 2015). *Available at*: https://www.theguardian.com/commentisfree/2015/jun/02/75-per-cent-scientists-engineers-white-diversity-stem
[51] U.S. Census Bureau, "*Quick Facts*". *Available at*: https://www.census.gov/quickfacts/fact/table/US/LFE046218
[52] Jim Freaner, "Aerospace Skills Gap: Workforce Declines, As Talent Needs Increase". *Area Development*. *Available at*: https://www.areadevelopment.com/Aerospace/q3-2015-auto-aero-site-guide/Aerospace-Skills-Gap-Workforce-Declines-Needs-Increase-45711.shtml
[53] Eno Center, *supra* note 3, at 26.
[54] *Id.*
[55] GAO–14–237 at 16.
[56] *Id.*
[57] P.L.115–254, § 625 (2018).
[58] *Id.*

pated shortage of pilots and other aviation professionals.[59] The FAA completed the report and submitted it to Congress in September 2019. In the report, the FAA highlighted a 20 percent increase in the number of outreach representatives and a 50 percent increase in the number of its outreach events.[60]

Youth Task Force and Women in Aviation Advisory Board. The FAA Reauthorization Act of 2018 included several other provisions targeted toward recruiting more young people and women to pursue careers in the aviation industry.

- Section 612 of the Act directed the FAA to create the Women in Aviation Advisory Board, which is tasked with "promoting organizations and programs that are providing education, training, mentorship, outreach and recruitment of women in the aviation industry." The FAA solicited nominations for the board in October 2019 and anticipates selections to be announced in the spring of 2020.
- Section 602 of the bill directed the FAA to establish the Youth Access to American Jobs in Aviation Task Force. The task force is responsible for providing recommendations and strategies to the FAA that will facilitate and encourage high school students to enroll in high school career and technical courses that would prepare them for an aviation career or enroll in a course of study related to an aviation career, including aviation manufacturing, engineering, and maintenance.[61] The FAA solicited nominees for the task force in October 2019 and anticipates selections to be announced in the spring of 2020.

B. FAA Programs and Initiatives

FAA Office of Aviation and Space Education. The FAA's Science, Technology, Engineering, and Math (STEM) Aviation and Space Education (AVSED) program was created to expose students to aviation and aerospace careers, help recruit new workers into these fields, and promote STEM education to students at all levels.[62] For example, through the program, the agency works collaboratively with government and private sector entities to promote aviation-related STEM skills and grow the pipeline of students interested in working in these fields.[63] AVSED has produced promotional materials, such as brochures and DVDs, that it shares with college recruiters and guidance counselors and distributes at career fairs. Additionally, AVSED is also involved in initiatives such as the Real World Design Challenge, a high school engineering competition and the Build a Plane program, which provides schools with actual aircraft to be used as teaching tools.[64] The AVSED program has been in existence since 1961, but it has been criticized for not having a dedicated budget for these programs and not instituting mechanisms for evaluating the effectiveness of its outreach efforts.[65]

FAA Aviation Workforce Steering Committee. The FAA's Aviation Workforce Steering Committee (Steering Committee) was established in February 2019 to determine agency goals for addressing aviation workforce challenges, exploring options [for resolving those challenges], and facilitating cross agency strategic coordination.[66] The Steering Committee's charter emphasizes providing diverse populations with clear pathways into aviation careers to expand the talent pool from which both Government and industry may recruit.[67] While the Steering Committee considers all aviation professions, it identifies its immediate challenge is to focus on the shortage of pilots and technicians.[68]

AMT Curriculum and Testing Reform. In 2015, as mentioned earlier, the FAA issued a notice of proposed rulemaking (NPRM) to modernize and remove outdated portions of the curriculum to become a certificated AMT.[69] However, the rule did not move forward until April 2019, when the agency published a supplemental NPRM[70] in which the FAA proposed allowing AMT schools the option of including

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[59] P.L.115–254, § 601 (2018).

[60] Federal Aviation Administration, *Section 601 Youth in Aviation Student Outreach Report*, p.2, *available at* https://www.faa.gov/about/plans__reports/congress/media/Section__601__Youth__in__Aviation__Student__Outreach__Report.pdf

[61] P.L.115–254, § 602, 612 (2018).

[62] Federal Aviation Administration. *About STEM AVSED*. *Available at*: https://www.faa.gov/education/about/

[63] GAO–14–237 at 30

[64] *Id.*

[65] *Id.*

[66] Federal Aviation Administration. *Section 601 Youth in Aviation Student Outreach Report*. Pg. 15. *Available at*: https://www.faa.gov/about/plans__reports/congress/media/Section__601__Youth__in__Aviation__Student__Outreach__Report.pdf

[67] GAO–20–206 at 19.

[68] *Id.*

[69] GAO–20–206 at 23.

[70] *Id.*

certain competency-based training requirements and allowing satellite training locations, among other things, in an effort to provide AMT schools with more flexibility in teaching the curriculum.[71] Even with the additional flexibility, some still believe that the rule as currently proposed does not go far enough. For instance, ATEC—an organization that advocates on behalf of the aviation maintenance education community—has expressed concern that many of the new requirements in the proposed rule are duplicative and do not provide the flexibility needed to train the next generation of aviation technicians.[72]

The FAA has yet to issue a final rule for modernizing curriculum requirements, as required by section 624 of the FAA Reauthorization Act of 2018. According to the FAA, the final rule is scheduled for release by October 2020, with revised mechanic standards to be finalized soon thereafter.[73]

C. Other Government Initiatives

In addition to FAA-led efforts, there are several other Government programs that seek to help address the mounting need for aviation maintenance and manufacturing workers. For instance, in addition to the Joint Services Aviation Maintenance Technician Credentialing Council (JSAMTCC) bridge program, which allows military service members to take the A&P exam after completion, the Defense Department also administers the Credentialing Opportunities On-Line (COOL) program, which creates a pathway for service members to earn industry recognized professional certifications and licenses.[74] The program provided more than $5 million toward aviation maintenance-related credentials from 2015 through 2018 for more than 2,500 service members.[75]

The Department of Labor (DOL) also has programs directed towards growing the aviation maintenance workforce. The DOL's Registered Apprenticeship Program awards grants to provide employer-driven training opportunities that combine on-the-job learning with related classroom instruction.[76] The Labor Department has awarded nearly $3.8 million in grants and contracts from 2014 through 2018 to promote these apprenticeships for aviation maintenance workers.[77]

Further, over the course of the last decade, the Department of Education (ED) has also pursued a number of initiatives to promote aviation education and careers. For example, in June 2017, ED announced a new grant program, the High School Career and Technical Education (CTE) Teacher Pathway Initiative to address the shortage of CTE programs.[78] The ED has also partnered with the FAA to hold career fairs at colleges and universities, including Historically Black Colleges and Universities.[79] Across the aerospace industry, there is growing interest in and support for greater access to scholarships and student loan assistance for those attending technical colleges.

D. Industry Initiatives

Many companies are establishing their own training programs and outreach initiatives to further develop and maintain their workforce. Below are several examples of industry-led initiatives and partnerships.

- In an effort to hire 2,000 mechanics over the next decade, a major airline is providing $350,000 in grants to nine aviation high schools around the country in an effort to expand its workforce.[80]
- Another major airline is focusing on recruiting and developing its workforce internally, allowing its ramp workers to apprentice and become mechanics.[81]
- An aviation maintenance and repair company is creating a program at schools located near its repair stations to demonstrate how students can learn skills leading to multiple career paths at the company. The learned skills that stu-

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[71] 84 Fed. Reg. 15533 (April 16, 2019)
[72] ARSA, "Congress Fully Funds New Aviation Maintenance Workforce Grant Program". September 2019. https://www.atec-amt.org/part-147.html
[73] GAO–20–206 at 26.
[74] *Id.* at 15.
[75] *Id.*
[76] *Id.*
[77] *Id.*
[78] *See*: https://www.atec-amt.org/news/department-of-ed-announces-high-school-cte-teacher-pathway-initiative.
[79] *See*: https://sites.ed.gov/whhbcu/2014/01/29/the-federal-aviation-administration-faa-at-the-u-s-department-of-transportation-is-hiring/.
[80] Josephs, *supra* note 27.
[81] Eno Center, *supra* note 3, at 23.

dents develop within the program can then be used to pursue an A&P mechanic certificate.[82]

WITNESSES

PANEL 1

- Ms. Kate Lang, Senior Advisor for Aviation Workforce Outreach, FAA
- Ms. Heather Krause, Director, Physical Infrastructure Issues, GAO

PANEL 2

- Mr. Steven Jackson, Principal, Aviation High School, *accompanied by Mr. Mario Cotumaccio, Assistant Principal, Aviation High School*
- Ms. Sharon DeVivo, President, Vaughn College
- Mr. Joseph McDermott, Managing Director, Technical Operations, Delta Air Lines
- Mr. Jay Neely, Vice President of Law and Public Affairs, Gulfstream Aerospace
- Ms. Dana Donati, General Manager and Director of Academic Programs, LIFT Academy

[82] Rob Mark, "AAR White Paper Focuses on Maintenance Technician Shortage," FLYING. (Feb. 2019). *Available at*: https://www.flyingmag.com/aar-maintenance-technician-shortage/

LOOKING FORWARD: THE FUTURE OF AMERICA'S AVIATION MAINTENANCE AND MANUFACTURING WORKFORCE

TUESDAY, FEBRUARY 11, 2020

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m. in room 2167, Rayburn House Office Building, Hon. Rick Larsen (Chairman of the subcommittee) presiding.

Mr. LARSEN. Good morning, and I call this meeting of the Aviation Subcommittee hearing to order on "Looking Forward: The Future of America's Aviation Maintenance and Manufacturing Workforce."

I just want to—let's see, I think I just said the subcommittee will come to order. Maybe I didn't say it that way, but I said it.

I ask unanimous consent the chair be authorized to declare a recess during today's hearing.

Without objection, so ordered.

I also ask unanimous consent that Members not on the subcommittee be permitted to sit with the subcommittee at today's hearing and ask questions.

Without objection, so ordered.

So I want to thank today's witnesses for joining the Aviation Subcommittee discussion today on the future of America's aviation maintenance and manufacturing workforce.

At the beginning of the 116th Congress I set a forward-looking agenda for the subcommittee, "Aviation and Aerospace 2050," to focus on fostering technological innovation, ensuring safety, and improving the Nation's competitiveness in the global aviation and aerospace marketplace.

To ensure the U.S. remains at the forefront of aviation and aerospace, industry, Federal agencies, and Congress must continue to explore how to recruit and train the future aviation workforce. Maintenance and manufacturing are key reasons why the U.S. aviation and aerospace industry is such a powerful economic engine.

This topic hits particularly close to home for me. The Pacific Northwest is the aviation capital of the world. In my home State of Washington State, more than 136,000 highly skilled aviation workers produce an estimated 1,400 aircraft and unmanned aircraft systems, or UAS, each year. Snohomish County, where I was

born and raised, and I get to, in part, represent, is home to nearly 50 percent of the aviation and aerospace jobs in my State.

In 2018, Congress passed the longest Federal Aviation Administration reauthorization in decades. The bipartisan, 5-year law includes a comprehensive workforce development title to support important aerospace jobs across the U.S., and to help the aviation industry prepare and diversify its future workforce. Among its provisions, the law authorizes a key aviation maintenance workforce grant program to support the education and recruitment of aviation maintenance technicians; establishes a Women in Aviation Advisory Board to encourage women and girls to pursue rewarding aviation careers; and includes my provision to create a new Youth Access to American Jobs in Aviation Task Force to encourage high school students to enroll in aviation manufacturing, maintenance, and engineering apprenticeships.

And on today's first panel of witnesses are Kate Lang, the FAA's Senior Advisor for Aviation Workforce Outreach, and Heather Krause, the Government Accountability Office's Director of Physical Infrastructure.

So today, Ms. Lang, I expect your testimony will offer substantive updates on the Administration's efforts to swiftly implement the FAA reauthorization bill's workforce requirements, and other efforts to address aerospace workforce-related challenges.

And Ms. Krause, I look forward to hearing more about the barriers to enhancing the workforce development pipeline.

While globalization and the emergence of new markets present opportunities for American aviation, there are challenges. For example, according to the Aviation Technician Education Council, 30 percent of the aviation maintenance technician workforce is at or near retirement age. And although today's hearing focuses on the U.S. aviation maintenance and manufacturing workforce, the issues faced by U.S. aerospace employers are reflective of broader issues across the industry.

Witnesses on our second panel play an important role in the aviation maintenance and manufacturing pipeline, and I have seen firsthand how some of this Federal funding is having a positive impact on the recruitment of a more diverse aviation maintenance workforce in my State.

Women currently make up less than 3 percent of the aviation maintenance workforce nationwide. But with the aid of a National Science Foundation grant, Everett Community College's Advanced Manufacturing Training and Education Center, or AMTEC, is partnering with local school districts and the aviation industry to increase recruiting of women to its aerospace technicians program by 30 percent over the next 3 years.

I have also visited Edmonds Community College's Washington State Aerospace Training and Research, or WATR, Center, located at Paine Field in my district, where, with the help of GI bill benefits and other financial assistance programs, students learn the skills necessary for high-wage, high-demand aerospace and manufacturing jobs in just 12 weeks.

Aviation High School and Vaughn College in New York are here today, and are innovative educational leaders whose programs produce future aviation maintenance technicians and engineers. So,

Mr. Jackson and Ms. DeVivo, when you are on the panel, on the second panel, I look forward to hearing more about your efforts and what the FAA or Congress can do to improve outdated maintenance curricula, and to reduce the amount of debt for students.

Key employers like Delta Air Lines and Republic Airways will shed light on recruiting and retaining skilled workers. So, Mr. McDermott and Ms. Donati, I am interested in hearing more about your company's work to expand the pipeline of qualified workers, particularly to women, people of color, and other historically underrepresented groups.

And lastly, manufacturers like Gulfstream depend on a skilled workforce to remain competitive in the U.S. and abroad. So, Mr. Neely, when you are on the panel today, I look forward to hearing your recommendations on addressing the skills gap and what is on the horizon for the U.S. maintenance and manufacturing workforce.

The future of America's aviation maintenance and manufacturing workforce is bright, but it is clear Congress can do more to ensure the U.S. remains at the forefront of aviation and aerospace. Today's hearing does provide this subcommittee with the opportunity to reaffirm its commitment to supporting U.S. jobs and the aviation workforce. Improving skills training and diversifying the aviation workforce is an all-around win for employers, for job seekers, and for the aviation and aerospace sectors.

So I want to thank you again, give a thank-you again to today's witnesses, and I look forward to our discussion.

[Mr. Larsen's prepared statement follows:]

Prepared Statement of Hon. Rick Larsen, a Representative in Congress from the State of Washington, and Chairman, Subcommittee on Aviation

Good morning and thank you to today's witnesses for joining the Aviation Subcommittee's discussion on the "Future of America's Aviation Maintenance and Manufacturing Workforce."

At the beginning of the 116th Congress, I set a forward-looking agenda for this Subcommittee, "Aviation and Aerospace 2050," to focus on fostering technological innovation, ensuring safety and improving the nation's competitiveness in the global aviation and aerospace marketplace.

To ensure the United States remains at the forefront of aviation and aerospace, industry, federal agencies and Congress must continue to explore how to recruit and train the future aviation workforce.

Maintenance and manufacturing are key reasons why the U.S. aviation industry is such a powerful economic engine.

This topic hits particularly close to home for me.

The Pacific Northwest is the aviation capital of the world.

In my home state of Washington, more than 136,000 highly skilled aviation workers produce an estimated 1,400 aircraft and unmanned aircraft systems (UAS) each year.

Snohomish County, where I was born and raised and in part represent, is home to nearly 50 percent of aviation and aerospace jobs in Washington state.

In 2018, Congress passed the longest Federal Aviation Administration (FAA) reauthorization in decades.

The bipartisan five-year law includes a comprehensive workforce development title to support important aerospace jobs across the U.S., and to help the aviation industry prepare and diversify its future workforce.

Among its provisions, the law:

- Authorizes a key aviation maintenance workforce grant program to support the education and recruitment of aviation maintenance technicians,

- Establishes a Women in Aviation Advisory Board to encourage women and girls to pursue rewarding aviation careers, and
- Includes my provision to create a new Youth Access to American Jobs in Aviation Task Force to encourage high school students to enroll in aviation manufacturing, maintenance and engineering apprenticeships.

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Ms. Lang, I expect your testimony will offer substantive updates on the administration's efforts to swiftly implement the FAA reauthorization bill's workforce requirements and other efforts to address aerospace workforce-related challenges; and Ms. Krause, I look forward to hearing more about barriers to enhancing the workforce development pipeline.

While globalization and the emergence of new markets present opportunities for American aviation, there are challenges.

For example, according to the Aviation Technician Education Council, 30 percent of the Aviation Maintenance Technician workforce is at or near retirement age.

Although today's hearing focuses on the U.S. aviation maintenance and manufacturing workforce, the issues faced by U.S. aerospace employers are reflective of broader issues across the industry.

Witnesses on our second panel play important roles in the aviation maintenance and manufacturing pipeline.

I have also seen how federal funding is having a positive impact on the recruitment of a more diverse aviation maintenance workforce in Washington.

Women currently make up less than 3 percent of the aviation maintenance workforce nationwide.

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Lastly, manufacturers like Gulfstream depend on a skilled workforce to remain competitive in the U.S. and abroad.

Mr. Neely, I look forward to hearing your recommendations on addressing the skills gap and what is on the horizon for the U.S. maintenance and manufacturing workforce.

The future of America's aviation maintenance and manufacturing workforce is bright, but it is clear Congress can do more to ensure the U.S. remains at the forefront of the aviation and aerospace.

Today's hearing provides this Subcommittee the opportunity to reaffirm its commitment to supporting U.S. jobs and the aviation workforce.

Improving skills training and diversifying the aviation workforce is an all-around win for employers, job seekers and the aviation and aerospace sectors.

Thank you again to today's witnesses, and I look forward to our discussion.

Mr. LARSEN. And with that I want to now turn to the ranking member of the subcommittee, Mr. Graves, for an opening statement.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman. I am always offended every time I hear you come up here and talk about all the high-tech things you have going on up in the Pacific Northwest. We have Mardi Gras, alligators, king cakes. You don't hold a candle to us.

[Laughter.]

Mr. GRAVES OF LOUISIANA. That is right, we do claim Higgins, even, the "Cajun John Wayne." You all look that up on YouTube at some point. It is worth it.

As the chairman said, we had our opening hearing on Aviation and Aerospace 2050. It was a fascinating hearing, because we had the opportunity to truly look to the future of aviation. To sit and talk about aviation—supersonic passenger travel, to talk about the role of drones and other new technologies delivering everything from food to parcels to people in regard to urban aerial transportation, and, of course, commercial space travel, commercial passenger space travel, it really is extraordinary to think about the future.

The aviation industry today is the largest sector in terms of our net trade benefits. We do more exports of aviation materials or aviation-related technologies than any other sector. It is a very important part of our economy. In fact, according to a 2016 FAA study, it constitutes $1.6 trillion in annual economic activity, supporting millions and millions of jobs in the United States, and a couple of them are up in the Northwest, I believe.

Mr. LARSEN. A couple.

Mr. GRAVES OF LOUISIANA. So this is really important. But when you start projecting forward, the aviation industry has found that we are looking at shortages to the tune of 754,000 jobs over the next 20 years in terms of maintenance techs, and 790,000 jobs in terms of pilots. This doesn't even take into consideration the innovation that I noted.

So let me go back through that again. We have got this huge future in regard to the future of aviation, the innovation, the technology that is before us. We have the Nation that has led this, and it is a very important part of our economy, it is an important part of our exports in the United States. And—but we are looking, potentially, in some sectors of aviation, looking at over half of the workforce being proximate to retirement age.

So we have got to make sure that we are all collectively working together. And I want to emphasize that: all of us. Because this is not, Ms. Lang, as you well know, this isn't all on the shoulders of the FAA, while you do play a role.

And one thing I want to make mention of, and I know the chairman shares the concern and the priority, is updating the curriculum. The current curriculum was written before I was born. I don't know, maybe that is not that old, but I think it is.

We need to make sure that each entity is focused on their respective role. I know that Republic Airlines has recently invested in a training academy. Again, I know, Ms. Lang, that you are working on updating the curriculum, which is something that is very important.

We need to make sure that we are working with our aviation schools, including in the State that I represent—Louisiana Tech

University has an aviation program—to ensure that we are attracting the appropriate students into the right curriculums. And the chairman noted the huge opportunities we have in terms of diversity with African Americans, with women, Hispanics, and other populations that are clearly under-represented in the repair fields, as well as in the mechanic fields.

So I look forward to working with all of you, looking forward to the FAA and GAO testimony in terms of your suggestions and recommendations. And, in particular, we are looking forward to hearing your thoughts on how the FAA reauthorization bill we did in 2018, which had a workforce title, will help to address some of the challenges we have before us.

[Mr. Graves of Louisiana's prepared statement follows:]

Prepared Statement of Hon. Garret Graves, a Representative in Congress from the State of Louisiana, and Ranking Member, Subcommittee on Aviation

Earlier this Congress, we held a hearing to look at the future of aviation and talk about issues such as the possibility of supersonic travel, the role of drones in delivering packages or people to their destinations, urban air mobility, and commercial space travel. It's an extraordinary future to think about.

The aviation industry today is the largest sector in terms of our net trade benefits—we export more aviation related materials and technologies than any other sector. It's such a critical component of our economy. According to the FAA, aviation constitutes $1.6 trillion in annual economic activity and supports millions of jobs.

However, we're facing projected needs of 754,000 aviation maintenance technician jobs and 790,000 pilots over the next 20 years. These figures don't even take into consideration the kinds of innovation I noted.

On one hand, we have a promising future in the economically vital sector of aviation, but on the other hand, a large segment of that workforce is nearing retirement age. So it's imperative that we work collectively to ensure we're ready for our future's promise.

This issue is not all on the shoulders of the FAA, but the FAA does have influence over the workforce pipelines. For example, the curriculum used to certify aircraft mechanics set by the FAA dates to the 1960s. That's absolutely a barrier to entry, and I'm glad that the FAA is working to bring it into the 21st century.

But everyone in this industry needs to focus on their respective role in growing the workforce. For example, we'll hear today from the LIFT Academy—a pilot and mechanic training academy that Republic Airlines has invested in. We'll also hear from Gulfstream and Delta Air Lines about their training programs.

In addition, we need to ensure we're working with our aviation schools; Louisiana Tech, in my home state, has an aviation program. And Vaughn College and Aviation High School are here to testify today as well.

All of our efforts together must focus on attracting capable people into these careers, including recognizing our incredible opportunity to attract a much more diverse workforce. Just 2 percent of aircraft mechanics and 4 percent of airline transport pilots are women. Only 3 percent of commercial pilots are African American and 7 percent are Hispanic or Latino.

In 2018, the Committee passed the bipartisan FAA Reauthorization Act, which included the most comprehensive aerospace workforce title ever signed into law. I look forward to hearing from the FAA on their progress in implementing the title, and who those provisions can help us address workforce issues.

Mr. GRAVES OF LOUISIANA. With that, Mr. Chairman, I yield back.

Mr. LARSEN. Thank you, Representative Graves. I now turn to the ranking member of the full committee, Representative Graves of Missouri.

Mr. GRAVES OF MISSOURI. Thank you, Mr. Chairman. I appreciate it. This hearing is very important, and I appreciate you doing this.

The pipeline of people seeking careers in aerospace has been running low for years. We know that. And the projected growth in commercial aviation makes an already serious situation even more critical. Aerospace careers including piloting, maintenance, manufacturing, and engineering, they offer pathways to well-paying careers that are in demand. These are the kinds of jobs that you can raise a family on, while also having the flexibility to find work in just about any part of the country.

And despite these benefits, and despite the demand, companies across the aerospace industry, they do face challenges recruiting and retaining well-qualified professionals. At the same time the industry is contending with forecasted growth, it also faces an impending baby boomer retirement wave, workers moving to other industries, and high barriers to those who might want to pursue an aviation career.

Congress recognized the impending workforce crisis, and responded by including an entire aviation workforce title—as was pointed out by Ranking Member Graves—in the 2018 FAA reauthorization bill, including my bill to invest $5 million in aviation technician workforce training. Much of the work that was directed by that law is underway, and I look forward to hearing from the FAA and the GAO about those efforts.

Additionally, there have been several bills introduced this Congress to address aerospace workforce shortages and entry barriers, and I wholeheartedly support the efforts to deal with the barriers to entry and ensure a steady, more reliable pipeline of well-qualified and diverse aerospace professionals. I look forward to working in a bipartisan way to address the workforce shortages.

But I do believe that we have to be very thoughtful in addressing the workforce needs. The FAA should not be replacing the role that the industry and the other Government agencies must play in these efforts. And I know several on the panel and throughout the industry have programs in place to help attract new workers, and I look forward to hearing more about how the FAA can complement those efforts. So, as we continue the conversation and consider legislation to address aerospace workforce issues, we must be mindful not to pull the FAA in too many directions.

As I said in the beginning, this hearing is very important. It is important, not just for the future success of the U.S. aerospace industry, but to the hard-working men and women who make up the aerospace workforce.

[Mr. Graves of Missouri's prepared statement follows:]

Prepared Statement of Hon. Sam Graves, a Representative in Congress from the State of Missouri, and Ranking Member, Committee on Transportation and Infrastructure

Today's hearing is very important. The pipeline of people seeking careers in aerospace has been running low for years, and predicted growth in commercial aviation makes an already serious situation even more critical.

Aerospace careers, including piloting, maintenance, manufacturing, and engineering, offer pathways to stable, well-paying careers that are in demand. These are the

kinds of jobs that you can raise a family on while also having the flexibility to find work in many different places across the country.

Despite these benefits and despite the demand, companies across the aerospace industry face challenges recruiting and retaining well-qualified professionals. At the same time the industry is contending with forecasted growth, it also faces an impending "baby boomer" retirement wave, workers moving to other industries, and high barriers to entry for those who might want to pursue an aerospace career.

Congress recognized the impending workforce crisis and responded by including an entire Aviation Workforce title in the FAA Reauthorization Act of 2018, including my bill to invest $5 million in aviation technician workforce training. Much of the work directed by that law is underway, and I look forward to hearing from the FAA and GAO on those efforts.

Additionally, there have been several bills introduced this Congress to address aerospace workforce shortages and entry barriers. I wholeheartedly support efforts to deal with barriers to entry and ensure a steady, more reliable pipeline of well-qualified and diverse aerospace professionals.

I look forward to working in a bipartisan way to address workforce shortages. But I believe we must be very thoughtful in addressing workforce needs. The FAA should not be replacing the role that industry or other government agencies must play in these efforts.

I know several on the panel and throughout the industry have programs in place to help attract new workers and I look forward to hearing more about how the FAA can complement those efforts.

So, as we continue the conversation and consider legislation to address aerospace workforce issues, we must be mindful not to pull the FAA in too many directions.

As I said in the beginning, this hearing is important. It is important not just to the future success of the U.S. aerospace industry, but to the hardworking men and women who make up our aerospace workforce.

Mr. GRAVES OF MISSOURI. And with that, I look forward to hearing from our witnesses, and I thank everyone for being here, and I would yield back the balance.

Mr. LARSEN. Thank you, Representative Graves, Ranking Member. I want to now welcome the witnesses on the panel.

Ms. Kate Lang is a Senior Advisor for Aviation Workforce Outreach at the Federal Aviation Administration, and Ms. Heather Krause is the Director of Physical Infrastructure at the Government Accountability Office, or GAO. Thanks for being here today. We are looking forward to your testimony.

Without objection, our witnesses' full statements will be included in the record.

Since it has been included in the record, the subcommittee requests you limit your oral testimony to 5 minutes each.

All right, with that I recognize Ms. Lang for 5 minutes.

TESTIMONY OF CATHERINE LANG, SENIOR ADVISOR FOR AVIATION WORKFORCE OUTREACH, FEDERAL AVIATION ADMINISTRATION; AND HEATHER KRAUSE, DIRECTOR, PHYSICAL INFRASTRUCTURE, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Ms. LANG. Thank you. Good morning, Chairmen DeFazio and Larsen, and Ranking Members Graves and Graves, and members of the subcommittee. My name is Catherine Lang, or Kate, as everyone calls me, and I am pleased to be here today to provide you with an update on the FAA's workforce priorities.

The FAA's primary mission, as the safety oversight organization, is to ensure the overall safety of the national aviation system. Success in completing our mission continually depends on our ability to recruit a new generation of dynamic and highly skilled workers, not just at the FAA, but throughout the aerospace industry. Tech-

nological advances have helped us to minimize risk, but ultimately people, not technology, will help us to the next level of safety and organizational and operational excellence.

An increasing share of today's technical workforce is moving toward retirement, and the pipeline of aviation professionals that support the industry has shown signs of slowing. For this reason we are examining the trends, and working with our industry partners to identify and ensure that we have an adequate workforce. In collaboration with industry, academia, and other Government agencies, we will work to remove unnecessary barriers to entering the aviation workforce, to enhance educational pathways, and to build a pipeline of qualified aviation professionals.

This is the main reason I took the role of the Senior Advisor to the FAA Administrator on Aviation Workforce Outreach, having just finished a 6-year assignment in Brussels as the FAA's Regional Director for Europe, Africa, and the Middle East. In my new role I will serve as the FAA's focal point for engaging with all of our stakeholders in the aviation community, collectively, to recruit and develop the next generation of aerospace professionals.

I have also been asked to chair the Aviation Workforce Steering Committee that the FAA established last year. The goal of the committee is to assess the current aviation workforce challenges from the perspective of pipelines, pathways, and partnerships, and to identify concrete actions we can take to address those challenges. We will have a special focus on diversifying the workforce by attracting women, minorities, and persons with disabilities.

Another role of the steering committee is to help provide leadership guidance and oversight to the FAA Science, Technology, Engineering, Math, Aviation and Space Education program, better known as AVSED. Originally established in 1961, the AVSED program gives young people a glimpse of the wide range of exciting career opportunities available in aerospace. We support initiatives like Aviation Career Education, or ACE camps, Girls in Aviation Days, and many, many other events with elementary, middle, high school, and colleges across the country.

The success of AVSED relies heavily on FAA volunteer outreach representatives who engage directly with local communities. We more than doubled the number of our outreach representatives from 2018 to 2019, and this year we have already reached our goal of signing up more than 1,100 FAA volunteers.

We also launched an Adopt a School pilot program in Texas and Maryland, where outreach representatives will connect with students to generate excitement in aviation. Youth participation in national, regional, and local AVSED events is rising rapidly. Last year we reached nearly 60,000 students, more than double the previous year.

In the FAA 2018 reauthorization, Congress recognized the importance of these collaborative efforts to recruit, train, and retain aviation talent. You enacted numerous workforce-related provisions, all of which we are working to implement. Your priorities are the starting point for our work within the FAA.

An example is the establishment of a new Aviation Workforce Development Program for education and recruitment of pilots and aviation maintenance technicians. Industry has expressed its con-

cerns about having an adequate supply of pilots and technicians to meet the growing global demand for pilots and technicians. Forecasts show that we will need about 200,000 pilots and about 200,000 technicians over the next 20 years in North America alone. As directed by Congress, the FAA is finalizing the program, and intends to issue a call for proposals later this year.

We are also taking steps to implement the unmanned aircraft systems workforce provisions in the 2018 bill, including a specific focus on community college training programs. UAS are a great entry point into aviation. The advancement and proliferation in UAS applications are creating new opportunities for the next generation.

Also, as directed in reauthorization last year, we began the process of launching two advisory groups, one to encourage women and girls to join the aviation workforce, and the other to encourage high school students to pursue aviation careers. We are currently reviewing applications, and plan to announce membership for both of these groups later this spring.

As I stated earlier, we recognize the importance that workforce development has on the overall safety of the National Airspace System, and we are committed to collaborating with industry, academia, and other Government agencies to develop solutions to the workforce needs of today and for those of the future.

We are grateful for the support of this committee that you have provided in all areas related to workforce. Thank you.

[Ms. Lang's prepared statement follows:]

Prepared Statement of Catherine Lang, Senior Advisor for Aviation Workforce Outreach, Federal Aviation Administration

Chairman Larsen, Ranking Member Graves, Members of the Subcommittee:

Thank you for the opportunity to appear before you today to discuss the Federal Aviation Administration's (FAA) ongoing work to develop the future aviation workforce. As this is my first time appearing before this Committee in quite some time, let me introduce myself.

My name is Catherine (Kate) Lang, and I am the new Senior Advisor to the FAA Administrator on Aviation Workforce Outreach. As you know, one of the key issues the FAA is facing is ensuring that we have a dynamic and skilled aviation workforce that meets our needs today and in the future. To that end, one of Administrator Dickson's first personnel actions was to create this position to serve as the FAA focal point for engaging with industry, the academic community, and other government agencies to foster the workforce that both industry and the FAA need to meet the challenges ahead. Internally, I will focus on ensuring a coordinated, agency-wide approach as offices advance workforce development programs to address aviation workforce challenges.

Previously, I served as the FAA's Regional Director for Europe, Africa, and the Middle East in Brussels from 2013 to 2019. I have also served in a number of senior roles at FAA Headquarters. Before arriving at the FAA in 1992, I worked as the Assistant Commissioner of the Chicago Department of Aviation. I look forward to working with the Committee to address the important issue of workforce development.

As the Committee knows, this is a transformational time for aviation with emerging technologies and capabilities that are changing the industry at an unprecedented rate. New entrants into the National Airspace System (NAS), such as unmanned aircraft systems (UAS) and commercial space transportation, continue to amaze us with new innovations. Advances in aviation and aerospace are benefiting our economy, transforming the way we travel, helping the environment, and saving lives. Meanwhile, in the manned aviation space, the International Air Transport Association reports that the aviation industry is experiencing strong growth, with the number of air passengers expected to nearly double globally to 7.8 billion annually

by 2036. Industry forecasts show that we will need over 212,000 new civilian pilots and 193,000 new maintenance technicians over the next 20 years in North America alone.[1] In addition, with the field changing so rapidly, there likely will be future aviation careers that we cannot even contemplate today. For example, a commercial drone operator was not even a job category or career path just a few short years ago. Since August 2016, the FAA has issued more than 150,000 Remote Pilot Certificates to fly a drone for commercial or recreational use.

As the nation's aviation safety regulator, the FAA's primary focus is always on safety. While we have made significant strides in commercial aviation safety, our efforts to improve will never stop. Though technological advancements have helped us to minimize risks, ultimately, it is people who will take us to the next level of safety and operational excellence. An increasing share of the industry's technical workforce is moving toward retirement, and the pipeline of aviation professionals that support the industry has shown signs of slowing. For this reason, we are examining these trends and working with our industry partners to identify and take steps to avoid it.

The FAA has prioritized efforts to ensure a skilled and robust aviation workforce, but this cannot be done by the FAA alone. The U.S. aviation system is the safest, most dynamic, and innovative in the world, largely due to the collaborative approach to safety championed by the FAA, and shared by our partners in industry, academia, and government. The FAA needs the knowledge and expertise of stakeholders from the entire aviation community to identify potential barriers to entry into the aviation workforce, and more importantly, to develop coordinated efforts to address the issue. In the FAA Reauthorization Act of 2018 (2018 Act), Congress recognized the importance of these collaborative efforts by enacting numerous workforce-related provisions, which we are working to implement.

The FAA is committed to partnering with industry, the academic community, and government agencies to remove unnecessary barriers for entry to the aviation workforce, enhance education pathways, and build the pipeline of qualified aviation professionals. In 2019, the FAA established an Aviation Workforce Steering Committee within the agency's leadership. The goal of the steering committee is to assess the current aviation workforce challenges from the perspective of pipelines, pathways, and partnerships, and to identify concrete actions that can have an impact on the aviation workforce challenges. In my new role at the FAA, I will chair the steering committee going forward. The steering committee will explore options and establish FAA goals to address workforce issues, with a particular focus on cross-agency collaboration. This holistic approach will help the FAA better coordinate workforce efforts across the agency, and provide a more consistent and comprehensive workforce strategy. While the most immediate workforce challenge is the shortage of qualified pilots and industry maintenance technicians, the committee will consider all aviation professions, with a special focus on diversifying the workforce by attracting women, minorities, and persons with disabilities. This will help ensure the FAA and industry can recruit from a broader and more inclusive talent pool in the future.

PARTNERING WITH INDUSTRY

Last fall, the FAA issued notices to solicit nominations for two advisory groups—one to encourage women and girls to join the aviation workforce, and the other to encourage high school students to pursue aviation careers. Directed by the 2018 Act, these advisory groups will recommend strategies and plans to facilitate and encourage women and high school students to pursue aviation careers, including manufacturing, engineering, and maintenance fields, and identify and develop career pathways including apprenticeships and workforce development programs. Tasks include identifying industry trends that encourage or discourage women and youth to pursue participation in the sector, as well as identifying potential sources of government and private sector funding, including grants and scholarships, that support women and youth pursuing aviation careers. We are currently reviewing applications, and plan to announce membership for both groups this spring. These tasks are in direct alignment with the Federal Strategy for Science, Technology, Engineering, and Math (STEM) Education, released by the White House in December 2018. In order to meet STEM workforce needs, this plan identifies increasing diversity, equity and inclusion as a top priority. Additionally, strategic partnerships provide an opportunity to bridge gaps between the aviation industry and educational institutions through the fostering of STEM ecosystems and providing work-based learning opportunities to further share aviation careers with students.

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[1] Boeing 2019 Pilot & Technician Outlook Report, July 2019. Available at https://www.boeing.com/commercial/market/pilot-technician-outlook/

In September 2018, Secretary Chao, Air Force Secretary Wilson, and the FAA held an aviation workforce summit entitled, "Aviation Workforce Symposium: Ensuring America's Pilot and Mechanic Supply." The event brought together nearly 300 stakeholders from government, industry, and academia and initiated a dialogue about the workforce pipelines, pathways, and partnerships that will be needed to attract more young people to the aviation industry, improve the quality and efficiency of training, and build better partnerships to support our next generation of pilots and aviation technicians. The summit underscored the complex, multi-faceted challenges that we face to ensure that talent is available to fill a growing need for skilled aviation professionals. Maintaining the highest levels of safety while adapting to technological advancements will be a key part of our success. The rapid rate of change is something that will require the focus and attention of the FAA, and all aviation stakeholders.

PARTNERING WITH THE ACADEMIC COMMUNITY

The FAA supports multiple initiatives that help educators build competencies and technical knowledge to propel interest in the aviation workforce. Many of these efforts focus on underrepresented populations to encourage minorities, women, and people with disabilities to pursue careers in aviation and increase their representation in the industry. For example, the Aviation Workforce Steering Committee that I previously mentioned provides leadership, guidance, and oversight to the FAA STEM Aviation and Space Education (AVSED) Program and its partners. Originally established in 1961, the AVSED program provides sponsorship and support for programs that develop skills for a future workforce. These efforts include the Aviation Career Education (ACE) Academies, Girls in Aviation Day, and other events with elementary, middle, high schools, and colleges designed to expose students to a wide range of aviation career exploration experiences.

AVSED also works with the FAA Centers of Excellence, which are established through cooperative agreements with select universities, and their members and affiliates, who conduct focused research and development and related activities. Additionally, AVSED partners with the National Coalition of Certification Centers, a network of education providers and corporations that supports and advances technology skills in the aviation industry, among others, and promotes aviation-maintenance technical degrees and careers. Further, AVSED maintains national partnerships with various groups with shared interest in growing the manned and unmanned aviation workforce, including the Organization of Black Aerospace Professionals, Women in Aviation International, Youth Aviation Adventure, Association for Unmanned Vehicle Systems International, Aircraft Owners and Pilots Association, and the Experimental Aircraft Association.

Success of the AVSED program relies heavily upon FAA Outreach Representatives who engage directly with local communities. These representatives are dedicated FAA employees who volunteer their time to help educate and inspire today's youth by working with communities to foster interest in aviation and aerospace. Expanding its efforts, the FAA has increased the number of its Outreach Representatives from 375 in FY2018 to 778 in FY2019, with a goal of over 1,100 in FY2020. This year, under the AVSED umbrella, we launched an "Adopt-a-School" pilot program initiative in Dallas, Texas and Washington, D.C., where Outreach Representatives will connect with students to generate excitement in aviation. The FAA aims to increase the number of outreach events by 100 percent from FY2019. Youth participation in national, regional, and local STEM AVSED events reached approximately 59,000 youth in FY2019, as compared to 24,000 youth in FY2018.

Last September, the FAA hosted the second annual Office of Aviation Safety (AVS) STEM Career Symposium, where nearly 150 potential aviation engineers, doctors, pilots and air traffic controllers converged on FAA Headquarters. Students from area middle and high schools heard from FAA executives, aviation enthusiast groups, industry leaders, and academic teams, and enjoyed demonstrations, presentations, and exhibits on aviation careers, skills, and the FAA's oversight of the NAS.

Specifically for new entrants, as directed by the 2018 Act, the FAA is taking steps to implement the UAS workforce provisions to establish a UAS collegiate training initiative, and to designate consortia of 2-year colleges to train students for UAS careers in industry and government. Additionally, last November, the FAA launched the first-ever National Drone Safety Awareness Week with a day devoted to STEM and education activities. There were 22 STEM events in 20 different states reported to the FAA that day alone, with a total of 594 events in FY2019. These targeted efforts will help ensure that we are addressing the workforce needs of the current system, as well as needs that will emerge with the advent of new technologies.

PARTNERING WITH OTHER GOVERNMENT AGENCIES

The FAA and the U.S. Air Force announced a partnership last spring to explore options and establish agency goals to address aviation workforce issues. This effort aims to ensure the continued and long-range health and safety of the aviation industry and to inspire a passion for aviation in the next generation.

Finally, the FY2020 Further Consolidated Appropriations Act provided $5 million for a new Veterans' Pilot Training Grants Program and $10 million for the Aviation Workforce Development Program for the education and recruitment of pilots and aviation maintenance technicians. The FAA has begun taking steps to implement the Aviation Workforce Development Program, which was authorized by the 2018 Act. We recently published a Federal Register notice to initiate information collections under the Paperwork Reduction Act process. Once this process is complete, the FAA will issue a call for proposals later this year.

FAA WORKFORCE CONSIDERATIONS

The FAA's first and most important responsibility is to maintain the safety of the NAS. This means that our efforts are focused in part on ensuring that our own workforce is up to the challenge of setting and enforcing the standards for the broader aviation workforce. As directed by the 2018 Act, the FAA recently reviewed and revised our safety workforce training strategy to align with an effective risk-based approach to safety oversight. This effort will help to foster an inspector and engineer FAA workforce that has the skills and training necessary to provide effective safety oversight.

Additionally, the FAA is working to improve the regulatory framework for the aviation maintenance technical workforce. Specifically, the FAA is conducting a rulemaking to modernize the regulations governing the curriculum and operations of FAA-certificated Aviation Maintenance Technician Schools. The FAA objective in this effort is to move toward a performance-based standard that will usher in the next generation of aviation maintenance professionals, while still maintaining our high safety bar. The FAA is currently reviewing public comments on the pending rulemaking. Along those same lines, the FAA has been developing the Airman Certification Standards for mechanics by integrating aeronautical knowledge and risk management with specific skill tasks. The Airman Certification Standards provide a single-source set of standards for both the knowledge exam and the practical test. Once in effect, these standards will enable the FAA, in collaboration with the aviation training community, to quickly, efficiently, and systematically amend certification testing requirements to address safety concerns as they arise.

Similarly, the FAA is in the process of modernizing and standardizing oversight of our pilot, mechanic, and medical examiners. This will help ease administrative burdens, and ultimately, minimize barriers for aspiring pilots and mechanics to enter the workforce.

CONCLUSION

We recognize the importance that workforce development has for the overall safety of the NAS. To that end, we are committed to partnering with industry, the academic community, and government agencies to remove unnecessary barriers for entry into aviation careers, as well as to enhance education pathways and build the pipeline of qualified aviation professionals. We are grateful for the support of the Committee in highlighting these workforce issues and the need for collaborative solutions from all stakeholders.

This concludes my statement and I will be happy to answer your questions.

Mr. LARSEN. Thank you.

And I now recognize Ms. Krause for 5 minutes.

Ms. KRAUSE. Chairman Larsen, Ranking Members Graves and Graves, and members of the subcommittee, thank you for the opportunity to discuss our work on the aviation maintenance workforce.

Each year hundreds of millions of passengers rely on airlines to get them safely to their destination, rendering public confidence and safety critical to the aviation industry. A sufficient supply of aviation maintenance workers is necessary for ensuring a safe and robust aviation system. Federal and aviation industry stakeholders

have expressed concern over the capacity of this workforce to meet projected needs due to retirements, attrition, and the growing demand for air travel.

In addition to these concerns, rapidly changing technology has implications for the training of this workforce.

My statement today will focus on, one, what Federal data reveal about the aviation maintenance workforce; two, how Federal agencies and other key stakeholders provide support in developing this workforce; and, three, FAA's progress in updating the curriculum and testing standards for mechanics.

First, Federal data reveal some information on the characteristics of this workforce. They show that there are roughly 330,000 FAA-certificated aviation maintenance technicians as of December 2018. Over half of them are between the ages of 50 and 70, and 3 percent are women. In terms of the pipeline, FAA certificated roughly 8,600 aviation maintenance technicians on average each year from 2014 through 2018. And the most common pathway to becoming certificated is attending aviation maintenance technician, or AMT, school.

Federal data on demand project an annual average of roughly 12,000 job openings, a growth of 3 percent annually, for both FAA-certificated and noncertificated workers in the U.S. from 2018 to 2028. However, there are some limitations to what the Federal data can tell us about this workforce.

For example, the number of individuals that are certificated likely overestimates the number of them working in the aviation industry, since the data do not identify how many are retired, deceased, or working in other industries.

Also, there are no comprehensive data on the number of noncertificated aviation maintenance workers.

Employers we interviewed expressed differing perspectives on the potential growth and the demand for aviation maintenance workers. Some, including small and medium-sized employers, said that they have experienced difficulty finding enough workers to meet their needs. However, others, including large employers such as major commercial carriers, said they have experienced less difficulty, but acknowledged the competitive market for aviation maintenance workers.

To develop this workforce, various Federal agencies, educational institutions, and businesses have programs that support individuals pursuing aviation maintenance careers. For example, DoD has a program to help servicemembers translate their military experience, such as aircraft maintenance, into civilian occupations. The Department of Labor has a program that awarded almost $3.8 million in grants and contracts from 2014 through 2018 to promote apprenticeships for aviation maintenance workers.

States, employers, and schools are also partnering on various efforts. For example, one repair station we interviewed started a program to recruit students out of high school.

FAA has also taken some steps to engage and coordinate with these and other groups on aviation workforce development initiatives. Our report that issued last week identified opportunities for FAA to further enhance its workforce development efforts. In particular, we recommended that FAA leverage existing data and co-

ordinate with other Federal agencies to advance its goal of promoting a robust, qualified, and diverse aviation maintenance workforce.

Finally, ensuring that aviation maintenance, training, and skill requirements are current is important because of ongoing and rapid changes in aviation technology. However, aviation stakeholders we interviewed said that the current AMT curriculum requirements, which are decades old and established in regulation, do not emphasize commonly used, modern aircraft technologies such as avionics and composite materials.

FAA has also acknowledged that these requirements and testing standards are outdated, and are working to revise them. We have been reporting on some of these issues since the early 2000s, and believe it is important for them to be addressed.

In closing, both the Federal Government and aviation industry benefit from having a professional, trained, and qualified workforce. Addressing aviation workforce needs is a shared responsibility among the different aviation stakeholders. It is important for Federal agencies to coordinate efforts to effectively support this workforce and ensure a safe and robust aviation system.

This concludes my statement. I look forward to answering your questions.

[Ms. Krause's prepared statement follows:]

Prepared Statement of Heather Krause, Director, Physical Infrastructure, U.S. Government Accountability Office

Chairman Larsen, Ranking Member Graves, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on the aviation maintenance workforce. The FAA Reauthorization Act of 2018 included a provision for us to examine different aspects of this workforce, including how government, industry, and educational institutions coordinate to support workforce growth.[1] Each year, hundreds of millions of passengers rely on airlines to get them safely to their destination, rendering public confidence in safety critical to the aviation industry.

The Federal Aviation Administration (FAA) requires that only mechanics who are "certificated" by the FAA approve aircraft for return to service. A sufficient supply of qualified aviation maintenance workers, including FAA certificated mechanics and repairmen, is necessary for repairing aircraft and maintaining a safe and robust aviation system.[2] Changes in aviation industry technology are ongoing and are expected to continue at a rapid pace, which has implications for the training of these workers. In addition, FAA and the aviation industry anticipate that the demand for air travel will grow in coming years. Federal and aviation industry stakeholders have expressed concern over the capacity of the aviation maintenance workforce to meet projected needs due to retirements, attrition, fleet growth, and the growing demand for air travel. Yet federal data limitations make it difficult to determine certain employment characteristics for this workforce and the curriculum requirements for the aviation maintenance technician (AMT) schools that train certificated mechanics are decades old.

My testimony today is based on our report that issued last week, *Aviation Maintenance: Additional Coordination and Data Could Advance FAA Efforts to Promote a Robust, Diverse Workforce*.[3] Accordingly, this testimony addresses (1) what federal data reveal about the characteristics of the aviation maintenance workforce, (2) how selected federal agencies and other key stakeholders provide support and coordinate to develop the skills of this workforce, and (3) FAA's progress in updating the cur-

[1] Pub. L. No. 115–254, § 624, 132 Stat. 3186, 3405.

[2] The requirements for becoming a certificated mechanic are prescribed in 14 C.F.R. part 65, subpart D, §§ 65.71–65.95, and for a certificated repairman in 14 C.F.R. part 65, subpart E, §§ 65.101–65.107. We use the term "repairmen" to include both men and women.

[3] GAO, *Aviation Maintenance: Additional Coordination and Data Could Advance FAA Efforts to Promote a Robust, Diverse Workforce*, GAO–20–206 (Washington, D.C.: Feb. 6, 2020).

riculum and testing standards for mechanics. We also issued a report in 2014 that covered similar topics.[4] In addition, we have ongoing work on the aviation and aerospace workforce of the future, which focuses on airline pilots, aerospace engineers, and aircraft mechanics and includes information on worker supply and demand and the potential effects of emerging technology on these professions.[5]

To develop the findings and recommendation for our recently issued report, we analyzed relevant FAA and Bureau of Labor Statistics (BLS) data; interviewed agency officials from FAA and the Departments of Labor (DOL), Education (Education), Defense (DOD), and Veterans Affairs (VA) as well as key stakeholders including employers, AMT schools, and industry associations; and reviewed relevant federal laws, regulations, and FAA documents, such as FAA's 2019–2022 strategic plan. Additional information on our scope and methodology is available in our report. Our work was performed in accordance with generally accepted government auditing standards.

BACKGROUND

Aviation Maintenance Workforce

Different aviation industry employers have distinct workforce needs and may require workers with specific skillsets depending on the type of work performed. The workforce includes FAA-certificated mechanics and repairmen, as well as non-certificated workers.

- *FAA-certificated mechanics* inspect, service, and repair aircraft bodies (airframe) and engines (powerplant), and only they can approve an aircraft for return to service. It can take between 1 and 3 years to obtain the required education or training to become certificated.
- *FAA-certificated repairmen* service aircraft components and must be recommended for certification by their employer to perform specific tasks such as welding or painting. It can take more than a year to obtain the required experience or training to become certificated. A repairman certificate is only valid at the employer for which it was issued.[6]
- *Non-certificated aviation maintenance* workers include individuals who are supervised by certificated mechanics or repairmen in performing repair work.

FEDERAL DATA REVEAL SOME DEMOGRAPHIC AND EMPLOYMENT INFORMATION ON CERTIFICATED MECHANICS AND REPAIRMEN

Existing federal data shed light on key workforce characteristics such as the number of FAA-certificated mechanics and repairmen, their age, sex, and education. Specifically:

- As of December 2018, about 295,000 individuals held a mechanic certificate and about 35,000 held a repairmen certificate.[7]
- The median age of FAA-certificated mechanics and repairmen was 54 years old, according to our analysis of FAA data.[8]
- Three percent of all aviation maintenance certificate holders were women as of December 2018.
- Attending AMT school was the most common pathway certificated individuals used to qualify for the FAA tests to become mechanics.[9]

Existing federal data also provide some information on employment characteristics such as the supply of certificated workers. Specifically, FAA certificated about 8,600 mechanics and repairmen on average each year for 2014 through 2018 (see fig. 1). BLS data project an annual average of 11,800 job openings in the United States from 2018–2028 for aircraft mechanics and service technicians due to growth

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[4] GAO, *Aviation Workforce: Current and Future Availability of Aviation Engineering and Maintenance Professionals*, GAO–14–237 (Washington, D.C.: Feb. 28, 2014).

[5] The FAA Reauthorization Act of 2018 included another provision for us that relates to this workforce that will result in a separate, forthcoming report. Work in this area is ongoing. Pub. L. No. 115–254, § 622, 132 Stat. 3186, 3404.

[6] 14 C.F.R. § 65.103(a). Certificated repairmen must meet FAA practical experience or formal training requirements. 14 C.F.R. § 65.101(a)(5).

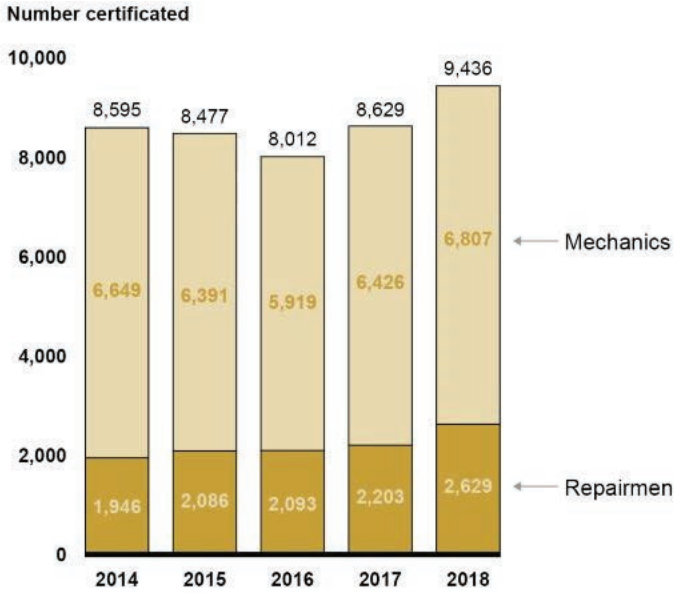
[7] We limited the scope of our analysis to those individuals less than 90 years old who were issued a plastic certificate by FAA, which is required for certificated workers to exercise their privileges after March 31, 2013. See 14 C.F.R. §§ 63.15(d) and 65.15(d). FAA began issuing plastic certificates in July 2003.

[8] BLS reported the median age of the overall workforce in 2018 was 42 years old.

[9] Of the 25,543 mechanics FAA certificated from 2015 through 2018, 62 percent completed AMT school; 28 percent qualified based on civilian practical work experience; and 10 percent qualified based on military training and experience. FAA officials told us they began collecting data on the military pathway in 2015 at the request of DOD.

and replacement, which include job openings for certificated and non-certificated workers.

Figure 1: Number of Mechanics and Repairmen Newly Certificated by the Federal Aviation Administration (FAA) Each Year, 2014–2018



Source: GAO analysis of FAA data. GAO–20–421T

There are, however, certain limitations to existing federal data. For example, neither FAA nor BLS collects data on the race or ethnicity of certificated individuals.[10] In addition, FAA officials said the number of certificated individuals likely overestimates the number of them working in the aviation industry. It is unknown how many of the approximately 330,000 certificate holders are retired, deceased, or working in other industries.[11] Furthermore, BLS data indicate 136,900 individuals were employed in the aircraft mechanics and service technicians occupation in 2018, but it is not clear how many of those jobs were filled by FAA-certificated workers.[12]

There are also limitations to determining employment characteristics such as pay for certificated workers, specifically. BLS publishes some data on pay for aircraft mechanics and service technicians, such as average hourly and annual wages. However, the occupational classification system BLS and other federal statistical agencies use for aircraft mechanics and service technicians does not distinguish between FAA-certificated and non-certificated workers, making it difficult to determine employment characteristics such as pay for certificated workers, specifically.[13] This is in part because workers are classified by the work they perform and not necessarily by certification or education, according to occupational classification system principles. BLS officials said they collected wage and employment data for certificated workers separate from non-certificated workers in employer surveys conducted be-

[10] BLS publishes employment data by race and ethnicity for the aircraft mechanics and service technicians occupation, which includes both certificated and non-certificated aviation maintenance workers.

[11] The database that stores certificate holder information maintains records on individuals unless FAA is informed of their death.

[12] See https://www.bls.gov/emp/tables/occupational-projections-and-characteristics.htm (accessed December 13, 2019).

[13] Certain industry groups petitioned the Standard Occupational Classification Policy Committee (SOCPC) to change the SOC framework as part of the 2018 update to differentiate between certificated and non-certificated workers. The SOCPC did not recommend any changes to the classification of aircraft mechanics and service technicians or avionics technicians. In its response to comments, the SOCPC stated that workers are classified based on work performed, and that it must be able to collect and report data for a detailed occupation for it to be included.

tween 2000 and 2012, but stopped collecting these data in part because employers inconsistently reported them.[14]

Employers we interviewed, including air carriers and repair stations, had differing perspectives on potential growth in demand for aviation maintenance workers; some said they were experiencing difficulty finding enough workers to meet their needs, while others said they were not experiencing difficulty. Employers we interviewed for our 2014 report also expressed varying levels of difficulty filling vacancies and recruiting individuals for certain aviation professions, including aviation maintenance workers. Small and medium-sized employers in particular cited some challenges to hiring due to the wage they offered.[15] Some stakeholders we interviewed for our recent report voiced concerns about the potential for a labor shortage. In addition to these views, two of the three selected labor market indicators (unemployment rate and wage earnings) we reviewed from 2013 through 2018 were consistent with difficulties in hiring aircraft mechanics and service technicians, while the other indicator (employment) was not.[16]

GOVERNMENT AND INDUSTRY PROGRAMS SUPPORT THE WORKFORCE, BUT FAA LACKS INFORMATION THAT COULD ADVANCE ITS WORKFORCE DEVELOPMENT EFFORTS

Several federal agencies such as DOD, DOL, VA, Education, and the Department of Transportation administer grants or programs that support individuals pursuing aviation maintenance careers or facilitate coordination among different stakeholders to support them. For example:

- *DOD's Military Services' Credentialing Opportunities On-Line (COOL) program*. This program provides funding for service members to obtain professional credentials related to their military training and helps them translate their military experience into civilian occupations.
- *DOL's Registered Apprenticeship Program*. DOL awards grants to support Registered Apprenticeship Programs—employer-driven training opportunities that combine on-the-job learning with related classroom instruction. The program facilitates coordination among different stakeholders such as industry, states, and educational institutions to support apprenticeships and employment opportunities.

In addition, FAA established an Aviation Workforce Steering Committee in February 2019, in part to coordinate efforts across FAA to address various workforce related provisions included in the FAA Reauthorization Act of 2018.[17] Additional examples of federal grants or programs that support this workforce can be found in our report. The report also includes examples of states, industry employers, and AMT schools coordinating or partnering to support the workforce including developing career grants and military pathway programs.

Despite some of FAA's recent efforts in support of this workforce, we found that FAA does not routinely analyze, collect, or coordinate with other stakeholders on certain data related to workforce development.

FAA's strategic plan includes an objective on promoting the development of a robust aviation workforce, and its Aviation Workforce Steering Committee charter emphasizes providing diverse populations, including youth, women, and minorities, with clear pathways into aviation careers to expand the talent pool from which both government and industry may recruit.[18] However, neither the strategic plan nor the steering committee charter provides specific information on how FAA plans to select and measure any efforts it undertakes related to these objectives. Without routinely analyzing its own data or leveraging others' data, FAA may not have certain information it needs to track or ensure progress toward its workforce development goals.

We identified several areas in which improved data analysis, collection, or coordination could assist FAA in measuring progress and understanding how to target its resources in support of its workforce related objectives. For example, FAA could use the demographic or pathway data it already collects to identify patterns or relationships (such as the trend in female certificate holders by pathway), which could be useful information as FAA aims to increase opportunities for women to pursue aviation maintenance careers. FAA could also use existing AMT school data (such as en-

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[14] See *An Examination of the Employment and Wages of FAA-certified and FAA-noncertified Aircraft Mechanics and Service Technicians, 2001*. This study found that FAA-certified aircraft mechanics and service technicians earned more than noncertified workers, and that about 80 percent of aircraft mechanics and service technicians employed by private industry were FAA-certified.

[15] GAO–14–237.

[16] For more information, see GAO–20–206.

[17] Pub. L. No. 115–254, 132 Stat. 3186.

[18] FAA Strategic Plan, FY 2019–2022.

rollment or mechanic test pass-rate data) to analyze nationwide trends or aggregate information across AMT schools to better understand the AMT school pathway as a whole.

In our 2020 report that issued last week, we recommended that the Aviation Workforce Steering Committee, as part of its ongoing efforts, take steps to use existing FAA data and coordinate with other federal agencies to identify and gather the information it needs to measure progress and target resources toward its goal of promoting a robust, qualified, and diverse aviation maintenance workforce. FAA agreed with our recommendation.

REVISIONS TO FAA'S DECADES-OLD MECHANIC CURRICULUM REQUIREMENTS AND ITS MECHANIC TESTING STANDARDS ARE ONGOING

Even as FAA's strategic plan states the agency's focus on promoting the development of a skilled aviation maintenance workforce to integrate new technologies, the agency has acknowledged that the current curriculum requirements for AMT schools and mechanic testing standards are outdated.[19] FAA officials, employers, and AMT School officials we interviewed said the current curriculum requirements do not emphasize commonly used modern aircraft technologies, such as avionics and composite materials. Over the years, FAA has attempted several times to revise curriculum requirements for AMT schools through the rulemaking process, and efforts to revise these requirements are ongoing through this process. FAA is also currently updating the testing standards for mechanics.

FAA officials have noted several challenges to updating the curriculum requirements including competing demands at the department level and the extent of comments FAA has received from stakeholders in response to proposed changes. In October 2015, FAA published a notice of proposed rulemaking (NPRM) with the stated goal of updating the existing AMT school curriculum.[20] FAA issued a supplemental NPRM in April 2019 that expanded the scope of the NPRM it issued in October 2015.[21] Comments on the supplemental NPRM were due in June 2019. As of October 2019, FAA officials said they were in the process of reviewing the comments. FAA officials told us that a final rule will be published some time toward the end of 2020.

In a separate effort outside of the rulemaking process, FAA is currently updating the testing standards for mechanics.[22] FAA has acknowledged that current mechanic testing standards are also outdated.[23] As a result, aviation stakeholders have stated the mechanic tests include outdated or irrelevant questions. For example, the practical test may include projects on wood airframes and fabric coverings, which are not common to modern commercial aircraft.

An FAA official noted that any delay in finalizing the rule would likely result in a corresponding delay to finalizing the testing standards. Delaying the release of the updated mechanic testing standards could result in the prolonged use of outdated or irrelevant questions on the mechanic tests. FAA officials said that once finalized and implemented, the updated curriculum requirements for AMT schools and the mechanic testing standards for individuals should be mostly aligned.[24]

Chairman Larsen, Ranking Member Graves, and members of the Subcommittee, this completes my prepared remarks. I look forward to answering any questions you may have.

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[19] While FAA officials said there is no certification renewal requirement for mechanics, several of the employers we interviewed said they provide training to their employees. In addition, certificate holders with inspection authority are subject to certain renewal requirements. 14 C.F.R. §§ 65.91–65.95. Furthermore, FAA officials said AMT schools may include curriculum beyond that which is required.

[20] 80 Fed. Reg. 59,674, 59,675 (Oct. 2, 2015).

[21] Aviation Maintenance Technician Schools, 84 Fed. Reg. 15,533 (April 16, 2019).

[22] Testing standards are not in regulation and therefore changes to them do not need to go through the rulemaking process. FAA's ongoing effort to update the mechanic testing standards began in 2015 and is part of a broader effort to update the testing standards for different types of FAA certifications. FAA has already updated the testing standards for several FAA certifications.

[23] The Practical Test Standards (PTS) are the current testing standards for mechanics and include information that may help individuals prepare for the practical and oral tests. There are three tests—written, oral, and practical. Currently, there are no published knowledge test standards. FAA is switching from the PTS to the Airman Certification Standards.

[24] FAA officials stated the anticipated effective date of the updated curriculum requirements for AMT schools would be anywhere from 1 to 3 years after the publication of the final rule.

Mr. LARSEN. Thank you. Thank you both for an enlightening testimony and helpful testimony to get us started on questions.

So we will move on now to Member questions. Each Member will be recognized for 5 minutes, and I will start by recognizing myself.

First for Ms. Krause, your testimony mentions that the FAA does not routinely analyze, collect, or coordinate with other stakeholders on certain data related to workforce development. But it sounds like you recommended that it do that. Can you elaborate on the potential impacts of the gap, of this gap on workforce development efforts?

Ms. KRAUSE. Yes. I mean, I think what we found is that there are various data sources out there that give you insight into different components of the workforce. So, for example, with a—the sort of—the data on FAA workforce that is certificated, you can get a sense of sort of some demographic data. I mean, FAA also has data related to repair stations and the number of certificated and noncertificated workforce.

But I think, as they are kind of pursuing these new efforts to really look at all these available sources that both they have and other sources have, and sort of identifying where are the gaps in terms of what might be able to address some of the issues with the workforce, whether it is bringing in more diverse populations or building other pathways, we think that there are ways that you could really leverage different data sources, both within and outside Government.

Mr. LARSEN. OK. Ms. Lang, presumably the workforce development efforts are nested in other agencies, Department of Labor, and then at the State level. In Washington State it would be the Employment Security Department and a variety of other agencies. So it sounds like there is a lot of—we have a lot of examples of a lot of people trying to do a lot of things.

Can you address how you kind of—how FAA might approach trying to get a common effort established for workforce development in this particular area?

Ms. LANG. Thank you. I mean, it is really evident. I have spent much of the last few weeks reading a lot of the literature, and I think there is a profound desire to better understand the nature of the problem we are wrestling with, because we need to know how serious of a gap we may have, or what are the best solutions to tailor to meeting the workforce requirements.

So absolutely, I think the FAA—one of the major things the steering committee is going to do is to create a group that works intergovernmentally with other sister agencies.

Clearly, the Departments of Labor and Education have very important roles, especially in the areas of data collection. But I really appreciate the point that you have made that we have also got to work with State agencies that also—closer to the issues—have data we have to do. So I think you are going to be seeing more from us. And I will take your point that we really need to make sure we loop in our State partners, as well.

Mr. LARSEN. Thanks. Just a followup on another point in the GAO's report—and this is for Ms. Lang. It has to do with the maintenance curriculum standards. I think we have established they are at least as old as Garret Graves, if not older.

But as of October 2019, the agency officials said they are in the process of reviewing stakeholder comments. When do you anticipate a final rule on this issue being released, on the standards for maintenance curriculum?

Ms. LANG. The FAA's stated goal is to get it done before the end of the year. And I am certainly—again, this is an area where there is unanimity of view that we have got to get this over the finish line. And that is the message I am definitely going to be chatting with Administrator Dickson about, that we really have to put agency priority in getting this done.

Mr. LARSEN. I think you will hear that from other Members, as well, how important this is.

Ms. Lang, how, specifically, are you going to begin to address the barriers faced by women, people of color, and other historically under-represented groups in providing pathways into aviation and aerospace?

Ms. LANG. You know, this is really going to have to be a multi-tiered effort. I mean, Congress has clearly given us some direction to work and convene an aviation task force to really look at this question, and we are well on our way to getting that started. I think there is a lot of ideas out there.

The FAA also has great partnership with our employees' associations. And we are working right now—we are trying to catalog with my colleagues in civil rights and human resources all the efforts the FAA has to make sure that we are on a path to promote those programs, but, more importantly, that we begin to see some results in outcome as a result of those efforts.

But I—you know, frankly, this is something we all own in the industry. And as we really expand the outreach we are doing with our industry partners in academia, this has got to be front and center. We have got areas of chronic under-representation that simply have to be addressed.

Mr. LARSEN. Ms. Krause——

Ms. LANG. Particularly in the maintenance area.

Mr. LARSEN. Yes.

Ms. Krause, I have a very short time. On that last question, does GAO have any specific recommendations?

Ms. KRAUSE. I mean, I think we have just done work and maybe would offer that stakeholders have also emphasized the importance of increasing diversity, and are looking at different pathways. So I think folks are interested in trying to address these issues, as well.

Mr. LARSEN. Thanks. With that I will now turn to recognize Ranking Member Graves from Louisiana for 5 minutes.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman. Ms. Lang, as you know, the FAA recently had their statutory authority to actually promote the aviation industry removed in statute. With the huge influence that the FAA has over the pipeline of the workforce, how do you balance that role of safety regulator, yet, to some degree, advocate of industry and of those occupations?

Could you talk about that a little bit? Does that question make sense?

Ms. LANG. You know, it really makes a lot of sense. This is something I know the FAA has wrestled with since the ValuJet acci-

dent. And I think we really do understand that we have a responsibility to always preserve, without question, the efficacy of our oversight capabilities, and the ability for the public to have confidence that we are always, first and foremost, putting safety forward.

But that said, there are clearly things we and only we can do, as a regulator, that get out of the way of things that are injuring the ability for the workforce or the pipeline to be developed. I think all of the interest in getting part 147 finished is a great example that we need to stay current and modernize our regulations to keep pace with the changing demands and the new information and sciences that are available to us.

So I think we have got to make sure we are doing everything to transparently balance both our role as a regulator, and our role to make sure that we are part of the facilitation, and not part of the problem in advancing workforce issues.

Mr. GRAVES OF LOUISIANA. Thank you. Ms. Krause, analysis by the GAO found that there were hiring difficulties, workforce difficulties in aviation and aerospace. Could you—and I know you have extensive testimony that was submitted, but could you talk a little bit about sort of the cause and what you found there, and how we may be able to help address some of those?

And I want to reemphasize what I said in my opening statement. I think we need to be very careful about stepping on one another's turf or territory. I think there is a role for Government, and I think there is a role for industry. There is a role for our colleges and universities.

Ms. KRAUSE. Yes, I think you are absolutely right. There are a number of programs, both at industry and Government levels and educational institutions, that are going on.

I think it is really trying to make sure that the efforts that are being carried out, including the ones in the FAA bill, are really effectively targeting, and not overlapping other programs, and sort of targeting areas that there is sort of real need. So I think it is really kind of focusing on making sure the programs are sort of all moving in the right direction, and sort of filling in various gaps that might exist.

Mr. GRAVES OF LOUISIANA. Thank you. Ms. Lang, what work is the FAA doing, or are you doing anything to help to identify and sort of inventory some of the barriers to workforce development, or just helping to sort of improve that pipeline of the aviation workforce by helping to, you know, sort of recalibrate the barriers to entry that are under the FAA's jurisdiction?

Are you working to do that now? And what can we expect, in terms of a path forward?

And then, look, we all understand that many of those are for safety. For example, I don't think anybody here would suggest that we don't need to have proper training or experience before we put people working on planes or, of course, in the cockpit.

Ms. LANG. You know, again, I am struck by the fact that, over the last few weeks, as I have come into this position and read the literature, there is a very long list and a lot of opinions about where the barriers are, and the things we need to do to deal with pipeline and pathway opportunities and issues.

I think the FAA is, right now, committed to looking at all of those. We will be implementing the areas where Congress has explicitly asked us to do some work, both with women in the industry, with students. There are, clearly, a very long list of barriers we are going to have to deal with, from education to the time it takes to be able to get into, in some career paths, frontline positions. We are going to have to look at all of those.

Again, some of those we are going to be looking at internally at the FAA, within our own workforce. We do have to look at what we can do with sister Federal agencies like Labor, Education, Veterans Affairs to improve the availability of loan programs, subsidies, incentives. There are a lot of ideas out there that—we need to sit down and champion some of these within the Federal Government.

And again, there are those things that we do that are part of the barriers that we have to take stock of and own.

But again, I think you have stated it very well. This is something everybody in this community owns. I mean, we have got to get out there. The FAA will be doing outreach. We want to hear first person. I am really looking forward to the next panel. We need to hear the voices of the people on the frontline about the things we collectively need to do, and what industry is doing to help promote a strong and robust workforce of the future.

Mr. GRAVES OF LOUISIANA. Thank you. Mr. Chairman, you noted this, but I just think it is noteworthy, you have 2 percent of aircraft mechanics and 4 percent of pilots are women, 3 percent of commercial pilots are African-American, and only 7 percent of commercial pilots are Hispanic, or Latino. So, certainly, I think we have some opportunity in those communities. I yield back.

Mr. LARSEN. Thank you, Ranking Member Graves. I now turn to Representative Lipinski of Illinois for 5 minutes.

Mr. LIPINSKI. Thank you, Mr. Chairman, for holding this important hearing on aviation workforce. Certainly something you hear about all the time is the growing need in this area.

I am fortunate enough to have Lewis University located in my district in Romeoville, and their aviation and transportation department does tremendous work training students in aviation career fields, including aviation maintenance. Lewis University is a critical piece in training the next generation of aviation workers.

In fact, I was out there a couple of weeks ago for an event to welcome a retired American Airlines McDonnell Douglas MD–80. This aircraft is going to be able to provide students at Lewis University with more opportunities to earn FAA certificates to become a mechanic. So it is great to see that opportunity. As a former engineer, I appreciate how important it is to have the opportunities for the hands-on experience. Lewis University graduates will now be able to enter the aviation workforce with the best possible training and experience.

So I want to ask Ms. Lang, how is the FAA partnering with schools like Lewis to encourage students to pursue careers in aviation, especially aviation maintenance and manufacturing?

Ms. LANG. Thank you. You know, I began my aviation career in Chicago, and I am very, very aware of the deep aviation roots in Illinois. I think Lewis, like any number of the academic institu-

tions, first of all, ought to take advantage of some of the programs that are now in the reauthorization bill related to workforce development. But I can assure you we are very much interested in working with academia to also hear from academia what they need from us.

One of the things we are doing at the FAA—when I joined the agency, we had a very robust STEM AVSED program in the field. And we are literally in the process of rebuilding that. And I think you can expect that our regional administrators and their outreach representatives are going to be going out to all of our aviation institutions and community colleges to see what we can do in partnership to advance them.

So if you have particular ideas, please let us know. But they should absolutely be in touch with FAA as we double up our efforts in this area.

Mr. LIPINSKI. Thank you. And I wanted to follow up on that with an issue that Ranking Member Sam Graves had raised in his opening statement, the 2018 FAA reauthorization bill. I partnered with Ranking Member Graves on section 625 for the establishment of two new programs for workforce development, one for pilots and the other for maintenance technicians.

The recent appropriations bill saw $5 million for each of these two programs. What is the FAA doing right now to get these two grant programs up and running? I think it is very important that we move quickly on this. So Ms. Lang?

Ms. LANG. Well, I am really happy to report that the FAA is moving out quickly on these. It is a brandnew program, both of these programs, and they come with them the requirements of a lot of prerequisites you have to do, like the Paperwork Reduction Act. Those processes were started last November, and are underway, and we hope to get wrapped up in the next 2 to 3 months.

We also received the necessary appropriations, as you pointed out, in the fiscal year 2020 bill in December. So those are underway.

While we are finishing the processes one has to go through to stand up a program, though, our teams are right now working on the initial eligibility and application requirements. The program is drawing a lot of attention, we understand, from the legislation. There is a desire that we should consult with interested parties, and we will be doing that. And we hope to be getting that criteria and those details out later this year on both programs.

Mr. LIPINSKI. Do you have a sense—are you going to have the—will the grant money be given out in this fiscal year?

Ms. LANG. I can say categorically it will be started in this fiscal year. Part of it is going to be a function of how quickly we can get through the prerequisite programs. But we understand the sense of urgency that Congress has, and we are keeping a very close track of making sure we are hitting the milestones as quickly as we can. And I will be a dog with a bone any place where it is getting stuck.

Mr. LIPINSKI. I appreciate that, and I will continue to follow up, and I would appreciate you keeping in touch with me in my office on the movement on that. So thank you. I yield back.

Mr. LARSEN. Thank you. I now turn to Representative Fitzpatrick of Pennsylvania for 5 minutes.

Mr. FITZPATRICK. Thank you, Mr. Chairman. Thank you to both of you for being here today.

First, Ms. Krause, regarding—well, aside from the aviation maintenance workforce, what does GAO know about the status of the pilot supply issue?

Ms. KRAUSE. Yes, we had looked at the pilot supply issue back in 2018, and did a labor market analysis where we found those indicators were all consistent with a shortage in—when it comes to pilots. We think also, as part of that work, we did find some positive signs, as well, in terms of enrollment being up at some of the—at the schools, and wages increasing, and sort of response.

But nonetheless, there are still challenges in meeting the demand of the pilot supply. And so that we have found to be different factors, like the cost of education and sort of retaining flight instructors.

We have some work that is ongoing that will further update that, and kind of be able to speak and provide more insight into that issue.

Mr. FITZPATRICK. Regarding the costs of degrees, what can you tell us about how much of a barrier that is for entry? And if so, what are the policy recommendations that you expect the study to recommend?

Ms. KRAUSE. Yes, I think that what we found in that more recent work is that, when students are seeing a clear career path to a position, that that makes the cost a little more, I don't know, palatable, like they sort of see where their education is going to take them.

So I feel like that is something that has been positive, in terms of getting enrollment up of, like, a senior career path, going forward.

Mr. FITZPATRICK. Thank you, Ms. Krause.

Ms. Lang, how is the FAA and DOT working together to help veterans with aviation experience transition into the civilian workforce?

Ms. LANG. You know, we actually have a number of initiatives in this area. I will say that the Department actually set up a program called Forces to Flyers, and that program is being conducted by DOT at the Volpe Center. We are quite anxious to see how that program—it is a research program. We are anxious to see the report that comes out of that this summer.

The appropriations bill likewise had a provision for the FAA to implement with respect to veterans and facilitating veterans, being able to get into flight instructions and schools. We will be working that, as well.

But I would also note, when we had a symposium a year ago—or I guess it was in the fall of 2018—we partnered with the Air Force in that program, and we have subsequently now done a memorandum of understanding with the Air Force to see what we can do, working with them, to both learn from their experiences of streamlining, getting pilots trained, and into the workforce, but also what we need to do, working jointly, to make the transition

from military service to civilian service faster and more readily available.

We are also working with the Department of Defense and Teamsters on a new program to improve or streamline, where we can, the certification mechanics coming out of the military into the civilian workforce.

So that is just the initial set of initiatives. I think you are probably going to see more. If you have any ideas, we certainly would welcome those.

Mr. FITZPATRICK. And as far—Ms. Lang, as far as new entrants, unmanned aircraft, commercial space transportation, do you see that as attracting new people, young people, into the industry?

Ms. LANG. Well, the numbers don't lie. I mean, the number of registrations we have related to drones and pilot licensing and training and all of that, there is definitely—it is one of the areas of the buzz in the industry.

And again, this is where we agree with Congress in setting up a program in the reauthorization to work with community colleges to see what we can do to develop curriculums and application processes for CTIs, or Collegiate Training Initiative programs related to drone activities.

So, again, it is a burgeoning area, and we are quite anxious to get—there is a lot of things that are making people very excited about it. We are trying to piggyback on that excitement to get people interested in aviation. Drones are a great way in.

Mr. FITZPATRICK. Great. Thank you, Ms. Lang.

I yield back, Mr. Chairman.

Mr. LARSEN. Thank you. I now recognize Representative Stanton of Arizona for 5 minutes.

Mr. STANTON. Thank you very much, Mr. Chairman. Thank you for organizing this very important hearing.

Section 625 of the 2018 FAA reauthorization directed the FAA to establish new grant programs to support maintenance technician recruitment and training and pilot education. Those programs were authorized at $5 million annually, and they do have broad bipartisan and industry support, and they were fully funded as part of the fiscal 2020 appropriations process.

Congressman Lipinski asked a question about that, so I won't reiterate the question, but only make the point that time is of the essence. We have already lost 1 year on the 5-year authorization time period, and the agency should stand up a program as quickly as possible to ensure that the money gets out of the door in time for the 2021 academic year, so that the money we have appropriated can be put to work as quickly as possible.

I know you are working on that, but I want to make sure you hear from myself and, I am sure, other Members of this body. It is really important.

A question for Ms. Lang, although, Ms. Krause, you could answer it if you would like it, as well. The FAA predicts more than 50 percent of the current science and engineering workforce in the industry is expected to hit retirement age with half of the 330,000 FAA-certificated mechanics and repairmen, as of December 2018, between 50 and 70 years old.

The GAO also reported that nearly 70 percent of employers in the aviation industry expressed hiring difficulties, specifically with respect to workers with craft skills such as upholstery and cabinetry, which are typically gained through either technical training or community college programs.

And just more of a general question, in your mind, what created this situation? It is a very difficult situation. We want to do as much as we can to solve it. So what created the situation, and, of all the factors, which do you feel was the largest contributor?

Ms. Lang first, please.

Ms. LANG. You know, I have to tell you, I think the data and the discussion on that is pretty mixed. And I think what is clear, though, and where there is unanimity of view, is that we have got to deal with what the demand is on that in the future, and look for new pathways and strategies to change those numbers and make sure we are on course for doing it.

I don't think it is a single set of solutions on that. I had the opportunity to look at the testimony of the next panel. I think they have a lot of great insight, being on the frontline, to both what has caused some of the problems. And frankly, I am very impressed by some of their ideas on the solutions, which we will take very seriously.

Mr. STANTON. All right, I will look forward to the second panel.

Ms. Krause, have you any thoughts on that issue?

Ms. KRAUSE. No, I just think, when we have looked at sort of the challenges to the supply, there has been a variety of factors that have been raised, things like EMT grads having some highly sought-after skills, so they sometimes end up in different industries.

Also, we have heard about preference for getting a bachelor's degree over a technical degree. So the—and also regional sort of issues in terms of some of the hiring that—challenges that they might face at rural versus urban areas, and things like that.

So—but that said, I think as Kate mentioned, there are a number of efforts underway by industry and others to kind of target and address some of those issues.

Mr. STANTON. OK. I think you are going to see a lot of support from this committee and this body to be supportive of those efforts.

Ms. Krause, in your written testimony you referenced a need for more complete data regarding the supply of and demand for aerospace workers. What do think the FAA and this subcommittee should do to improve the availability of the data?

Ms. KRAUSE. I think the Aviation Workforce Steering Committee that is being stood up provides a real opportunity to kind of look at what data already exists out there, and how it might be leveraged, and how we might make connections between some of that data to better understand where some of the opportunities are to better support this workforce, as well as identify gaps. So I think I would start by kind of assessing what exists.

Mr. STANTON. OK, thank you very much. Those are my questions for today. I yield back.

Mr. LARSEN. Thank you, Mr. Stanton. I now turn to Representative Gallagher of Wisconsin for 5 minutes.

Mr. GALLAGHER. It feels good to be up here, I don't mind saying, as opposed to down there.

Thank you for being here today. We really appreciate it.

This may be also a question for the second panel, and so I hope I get a chance to talk about it, as well. But I have heard from my local airports—I am from northeast Wisconsin—that pay for aircraft mechanics or repair persons can be quite high, but that is not necessarily reflected in job postings, especially in Wisconsin. You know, if the pay potential is indeed considerable, we would expect that demand would be higher.

Maybe to GAO, in your research can you explain the pay potential for mechanics and repair personnel, and how that factors into this discussion?

Ms. KRAUSE. I think, when you look at the aviation maintenance workforce, it is a wide range of skill sets that support that workforce. You have everyone from FAA-certificated mechanics, certificated repairmen, as well as noncertificated workers who are overseen by those certificated workers.

When we have looked at the BLS data, the wages are wide-ranging. They range from about $37,000 to $98,000. So it is a wide range, which would be expected, given the sort of wide variety of skills and experience that that workforce has.

Mr. GALLAGHER. I mean, is the primary variable that explains the range geographic, or——

Ms. KRAUSE. I am not sure that we have looked specifically at that, but I—we could follow up.

Mr. GALLAGHER. That would be great. And what—I mean, how long does it take to get to higher pay grades? I mean, have you done an analysis of just sort of the evolution of careers, whether you are an aircraft mechanic or repair person, and what are the advancement opportunities?

Ms. KRAUSE. Yes. I think, in terms of maybe from the education to the certification aspect, it is usually around 1 to 3 years that it takes to become a certificated mechanic, and then experience after that. I think you have the noncertificated workers that can develop work experience.

And I think on-the-job training is a big aspect of a lot of the maintenance workforce. So I think that there are varying channels that you can take to develop skills.

Mr. GALLAGHER. Great, thank you. And we would love to follow up with GAO on this.

And then, Ms. Lang, I just want to ask—and I apologize if I missed this, I am shuffling between two different hearings, but have you seen any success in terms of programs to transition veterans with aviation experience into the civilian aerospace industry?

What programs are out there that you think are worth doubling down on that have proven success?

Ms. LANG. Well, clearly, there are programs that are getting veterans from the military into the aviation community. And I think a lot of those are pretty well documented in some of the—especially the GI bill, and some of the work right now with industry to recruit pilots.

Pilots from the military are a major source of the pilot community in the industry right now on the commercial side. But as I

mentioned, there are a number of things we are doing. The DOT has a program right now called Forces to Flyers that is working with different flight schools to get veterans that are not pilots into the aviation community as pilots.

We have got the provision in the appropriations bill. Plus, we have got a number of initiatives underway with DoD and the Air Force to remove some of the barriers, streamline certification requirements for DoD mechanics to civilian mechanics. So I—there is actually quite a bit going on.

Mr. GALLAGHER. And then a final question for either or both of you, I mean—and again, apologies if I missed this.

What apprenticeship programs that get into the classroom—you know, K through 12 classroom—have shown success, get kids interested, not only being pilots, but potentially being repairmen, and mechanics, and earning a good living that may not require them to go to a traditional, 4-year college?

Ms. KRAUSE. I just have a couple of anecdotes, and I think they are kind of—the programs are early on, but there are, for example, repair stations that have started partnering with high schools to develop programs. I think you are seeing a lot of different ways that industry is trying to make connections with the educational institutions to sort of build that pipeline.

Ms. LANG. I would only add, because I think we are seeing a real renaissance, certainly at the FAA, and the things we need to do with AVSED and STEM programs. And I think it is a truism to say that the closer we are in the education system to entering the workforce, the more robust the data.

But I think the truism is you got to catch kids early. And if you really think about it, almost anybody in the business will tell you at what age they were inspired and got the bug for aviation. And it is really on all of us to get out there, and making sure we are catching children as young as we can to get inspired and interested, and with tools to enter the workforce.

Mr. GALLAGHER. Well, thank you. My time has expired, but I may never give up my seat on the top row.

[Laughter.]

Mr. LARSEN. Well, our side only controls this side, so you have picked a fight with Garret Graves.

With that I recognize Representative Allred of Texas for 5 minutes.

Mr. ALLRED. Thank you, Mr. Chairman. And thank you to our witnesses for being here.

Ms. Lang, I want to follow up on the question that was just being asked, because I read in your written testimony, and was pleased to learn about the FAA's Adopt a School initiative, which was launched in DC, as well as Dallas, which I represent, at the Solar Prep School for Girls at James B. Bonham. So I wanted to drill down a little bit on that.

Can you elaborate on some of the activities the students will be participating in that program?

And what are your desired outcomes for the Adopt a School initiative?

Ms. LANG. Well, the FAA, like I said, is really convinced that we have got to catch kids early. And this was, actually, an idea that

came out of our senior leadership development program, that we actually foster a pilot program to see what we can do purposely to get out there and reach out to schools. We ended up in Dallas because one of the people in the development program was from Dallas, and was very energetic to get involved in it.

But I think the basic idea—and we have already started that, we are working with four schools in Dallas, and with the teachers to grade an aviation curriculum. And the idea is to use aviation concepts to amplify and apply science and math learning. And so we have started on that. In some cases we will be doing direct in-classroom work. But especially after talking to our colleagues on the next panel, they have really got me thinking about the things we need to do to get hands-on experience, and get that muscle memory built in, and those skills started at a younger age.

And we have got to get people out because, you know, aviation is actually really cool. And getting people out of the classroom and into the hangars, or into the maintenance facilities, or looking at what goes on in the belly of an airport is really going to give people the buzz. And that is where I think we are going to go with these programs.

It is an important pilot. We are already pleased with the initial results. We will be measuring how those kids in Dallas—what they learned before they came in, at midpoint, and afterwards. We are going to take a good look at that. I think we have to figure out some better metrics of whether and what works. And that is what this program is going to do.

But I think we are already excited to see what we might be able to do in the coming year to take it from a pilot to more mainstream within our regional offices.

Mr. ALLRED. Well, thank you. I think that, obviously, aviation is extremely important for the Dallas economy. And I think that it is a great place to have these programs.

I am, of course, interested in increasing the representation of women and minorities in aviation. I know we have had some discussion about that already today, but I wanted to ask specifically about the Adopt a School initiative, and whether or not this would also be part of an effort to increase that representation.

Ms. LANG. You know, absolutely. I think it is a great point. I can't tell you specifically how the selection of these schools was done in this case, but I can assure you a major focus of the steering committee is going to be working on what we are doing nationwide to go into those school districts, where we have had areas where it has been tough to recruit into the community. And that is women, it is minorities, it is people with disabilities.

I hope we will have much more to report to the committee on what we have already been doing, but also some of the things we in industry and academia need to do together. And more importantly, we really need to start showing the dial move on how those numbers are changing.

Mr. ALLRED. Yes. Well, I would encourage you to implement measures to study how that is impacting, and whether or not there is some success there, and to report that back to us, as well. I am very interested in that program, and I think it has great potential, and I want to thank you for doing it in Dallas.

I want to go quickly to the GAO study, though, and the recommendations that were issued there, and just ask you whether or not you plan to implement those recommendations, or what your plan is, in terms of collecting data and improving diversity in the workforce.

[No response.]

Mr. ALLRED. That is to you, Ms. Lang.

Ms. LANG. Well, I—you know, again, I mean, in—I have to say I read both the 2014 GAO report and then the one that was just issued last week, and it was really discouraging to see that the numbers hadn't changed.

And I think someone earlier asked how is that possible. And I think we really have to get in there and really do a forensic on why that is happening, and what we have to do, and come up with better strategies. Because, obviously, what we have done isn't enough.

Mr. ALLRED. There are some recommendations in the study, and have you—do you have any plans on implementing any of those, or are you in the process?

Ms. LANG. Yes, yes, absolutely. I mean, I think we are—the report just came out, and I think the FAA is examining all of those. But I think we are trying everything on at this stage of the game. I haven't ruled any of those out.

Mr. ALLRED. All right. Thank you so much. I yield back.

Mr. LARSEN. Thank you, and I will turn to Representative Balderson of Ohio for 5 minutes.

Mr. BALDERSON. Thank you, Mr. Chairman, and thank you, both of you, for being here today.

And it is encouraging that this committee and the chairman have advocated for workforce provisions. I am excited to learn about Administrator Dickson's actions to foster aviation. A lot of the questions have been asked that I think a lot of us are asking, so I am trying not to duplicate some of the things that you have been asked.

But in written testimony coming from our second panel today that I have gone over, only students 18 years or older can gain access to work-based opportunities in our Nation's airports. Have you looked at expanding this apprenticeship or internship type for high schoolers?

Ms. LANG. I have to tell you, last night when I was reading the testimony and I actually had a chance to talk to the principal a little bit, I was surprised by that. I worked in airport operations a good part of my early career, and I really want to get behind that and see what the issue is there. I don't know what it is, but I have every intention of looking at it.

Mr. BALDERSON. It is good to hear that. And it is not only in aviation, there is some other—for other workforce, also. Do you think this would help?

I mean, I think you answered the question already, but do you think this would help with recruitment to get younger kids engaged in this for firsthand experience?

Ms. LANG. You know, throughout my career, getting kids on the frontline and first person, not just the textbook, really does light up the eyes of kids, and inspires them. And so I think whatever we can do to get kids out into the aviation community, and really

having those opportunities—and there are so many great programs out there that do just that, and have a lot of success stories for them.

So, yes, I think, if there are good ideas out there that we think can help, we should try them on.

Mr. BALDERSON. OK. Thank you, Ms. Lang. Mr. Chairman, I yield back my remaining time.

Mr. LARSEN. Thank you very much. I recognize Representative Lynch of Massachusetts for 5 minutes.

Mr. LYNCH. Thank you, Mr. Chairman and Ranking Member, for holding this hearing.

Ms. Lang, I couldn't agree more with your insight in terms of getting young people involved early in the process. I know from my own experience, I took some welding classes in high school, ended up going to the iron workers apprenticeship school for 3 years. Then I went to work at a shipyard. They had a welding school, as well. I became president of the Iron Workers Union. Of course, then I got my law degree and I became a politician. My wife says it has been one disappointment after another.

[Laughter.]

Mr. LYNCH. But I would say that it has a tremendous influence, getting young people involved early. Part of it is just letting kids know what is out there. And they have an opportunity to become skilled workers. It gives them some direction and some options.

One of the successful programs that they have used in the building trades is the Helmets to Hardhats program. So the building trades unions all across the country, AFL–CIO, worked with the Building Trades Employers Association. And as men and women are transitioning out of the active military duty, they are pulled right into the building trades. So—and we do an assessment. If they are already highly skilled enough, they will just take them in as full journeyman and journeywomen members. And if they are in need of additional training, they will plug them into their apprenticeship programs, sometimes as second-year or third-year apprentices, because they don't need that much training.

But it has been a great program for our diversity goals because, you know, a lot of women and people of color are coming out of the military. We plug them right into our unions, so that has been helpful there.

And there is also the fact that many of our sons and daughters in uniform have deployed multiple times, and there is a stress level there, and a difficulty and awkwardness transitioning back to civilian life. So we find that it has been very helpful that, when they come into our organizations, they are accepted, they are supported, and it is a good—there is a good vibe there. And everybody is so proud of their service, I think they feel very much accepted.

So is there anything like that that the FAA and aviation employees are doing to—and maybe the machinists union? I know they are very active, they have a great program. Are they doing something similar to sort of reach out to our sons and daughters in uniform?

I know there is an effort ongoing when people are reaching that point of transitioning out of the military. You know, they have it on Armed Forces Television when you are over in Afghanistan or

Iraq, you see it all the time. You know, it is constant. But is there any active program going on with the FAA to try to facilitate that?

Ms. LANG. Well, first of all, thanks for the tip on the Helmets to Hardhats. And I think that is definitely something I would like to reach out to our union partners to learn a little bit more about.

I think there are a number of internship programs. I think there is work we are doing with DoD. We have talked about some of that already. I am impressed by—in this industry—I don't want to say it is waking up, but you see a lot of innovation occurring now, because there is an awareness that we actually have to do things that are creating pathways much earlier in people's careers and getting them hooked in.

So I think we are—I am sorry, go ahead.

Mr. LYNCH. No—so, Ms. Krause, how much of this mismatch, or the gap that we are seeing on the aviation mechanics side and technician side, is a result of competition with some of the other disciplines?

Because we have got, you know, kids that have any type of acumen in engineering have so many choices now, right? Computer science, bioscience, chemical engineering, all of that. How much is that—you know, some of these—maybe they are higher paying or more promising disciplines that are pulling people away from the aviation industry.

Ms. KRAUSE. I think it is an issue that is difficult to quantify, but definitely something we have heard from stakeholders as we spoke with them. They have talked about AMT schools, students in those schools having a highly sought-after skill set, and other occupations that do have—you know, can have better wages or better working conditions. So things like amusement parks, NASCAR, industrial heating. So those are other areas that they, you know, might pursue, so that——

Mr. LYNCH. Well, thank you very much.

Mr. Chairman, my time has expired. I yield back.

Mr. LARSEN. Thank you very much. I want to turn now to the gentleman from Minnesota, Representative Stauber, for 5 minutes.

Mr. STAUBER. Thank you, Mr. Chair. I appreciate it, and I appreciate both your testimonies here today.

Ms. Lang, in 2016 a report done by Boeing showed more than 40 percent of the current pilots flying for major airlines will meet retirement age by 2026. Can you please discuss what the FAA is doing to address this projected pilot shortage?

Ms. LANG. Well, first of all, we are very aware that industry has a great deal of concerns about the pilot pipeline. And clearly, on the one hand, it is good news, because we have robust forecasts for growth in aviation, both in terms of traffic levels and in the fleet. But we are also aware that we have got to get our arms around what are potential impediments. We have got to get people attracted to aviation.

But I think my colleague from GAO put it well. In light of the costs associated with entry, especially on the pilot side, the more we have programs that give them confidence that they are going to get a rate of return on that investment, probably the better we are going to do.

And a good portion of the work that our steering committee is going to do is, first of all, look at what we can do with other sister Government agencies to create better access and affordability on education, making this career path more affordable, and the access to loans and so forth is something very important we have to do. We have to look at what we can do on the regulatory end.

But most importantly, I think we have got to collectively come together as an industry to look at what we all have to do in our respective roles to really feed that pipeline and get people interested in it, and take the long view. I mean, I think we have to start not just at the workforce we need today, but also the workforce we need 10 years from now and 20 years from now. What is our level of investment in making sure we are priming that pump?

Mr. STAUBER. A couple of followups. The current age for commercial pilots for retirement is 65. And that was changed in 2009 from 60 years old. Is raising the mandatory retirement age, which hasn't been raised in 11 years, part of the discussion at the FAA?

Ms. LANG. Well, I will tell you truthfully that is a bit out of my swim lane, but that is—because I have never minded my swim lanes too well.

I would offer this. You know, on the one hand, there are an awful lot of ideas about the things we can do as a regulator that could do things to get up to date on the capabilities of modern science, medical information, technology, all of which will safely allow us to think in different ways than we have in the past.

I have not had a conversation at FAA with anybody on it. I am aware that different parts of the world have raised the age limit to 67. I think those are worth looking at and examining, both the safety case, the medical case they made in doing that. I am old enough to have been around when the debate began on moving from age 60. It took a lot of rigor and it took a lot to build public confidence that we can do that safely. And I think that is one of the things that will at least be on the list of things to examine and explore: What are some of the practices in other parts of the world?

Mr. STAUBER. Thank you. Just a comment. You had talked a couple of minutes ago about the importance of ensuring that the aviation is front and center. What are you doing for the high schools and even in the colleges to promote—and working with other governmental agencies to promote aviation, and to promote the industry in general?

We see the high schools bring the building and construction trades in, for example. What is aviation doing, and what do you see—the push for the industry to move forward?

Ms. LANG. You know, again, I think there is an awful lot we need to do.

On the one hand, I will be perfectly honest, as I mentioned before, much earlier in my career, FAA had a very robust program in the field on STEM and AVSED, where we were working with all ages, and I mean from kindergarten all the way to postgraduate work. We have some activities we are doing, we have kept doing, but we really are in the process of rebuilding that program up. I don't know how it began to atrophy in certain parts of the agency, but, frankly, we do have to build it up again.

I also think that we really need to listen with, you know, the long ear to our aviation academic counterparts on what it is they need us to be doing to improve their ability to get more people into the pipeline.

Mr. STAUBER. I thank you very much, and my time has expired. Back to you, Mr. Chair.

Mr. LARSEN. Yes, thank you very much. I now recognize Representative García of Illinois for 5 minutes.

Mr. GARCÍA. Thank you, Mr. Chairman. Thank you both for being here this morning, our two panelists. I would like to begin with Ms. Lang.

Last year Congressman Hank Johnson and I made an effort to increase funding in the FAA's Minority Serving Institutions intern program. And although minorities make up 40 percent of the U.S. population, 75 percent of aerospace engineers are white. I, of course, hail from a predominantly Latino district. According to the Equal Employment Opportunity Commission, only 7.8 percent of the FAA's workforce is Latino, though we make up about 16.8 percent of the total workforce. These disparities are exactly the issues programs like the Minority Serving Institutions intern program at the FAA seek to resolve, as you know.

Can you share with me what strategies the FAA currently employs to diversify its workforce?

And do you think that these initiatives are adequate?

And finally, should the FAA do further to ensure its workforce is reflective of the broader U.S. population?

Ms. LANG. You know, clearly we need to do more, because the numbers don't lie. And so I do think we are going to have to work on whether examining the programs we do have—and we do have some, we do have programs with our employee associations, we have programs with minority-serving institutions, where we have internships. I think last year we did about 150, and we worked in close partnership with Hispanic and Black universities on those programs. But the numbers aren't changing as rapidly as they ought to.

Yesterday I had the opportunity to chair my first steering committee meeting, and I think we collectively agreed we are going to have to do a more focused effort, both within the FAA and with industry, in improving these numbers. And outreach——

Mr. GARCÍA. Any sense what that could be? Any sense what that could be, measures to improve outcomes?

Ms. LANG. Well, I think, fundamentally, the measure is increasing the employment numbers. And I think we have to absolutely understand where are the barriers in recruiting and getting people interested in going into the aviation careers. I am very interested in hearing the next panel. We have got institutions that are based and working very closely in minority neighborhoods and recruiting. I think we have to learn from these programs and adopt the best practices that are out there. But we definitely can do more.

I think our own outreach efforts have to do more in these communities.

Mr. GARCÍA. OK, thank you.

Ms. Krause, in 2015 the FAA issued a proposed rule to modernize the aviation maintenance technician educational curriculum.

I understand that there have been growing concerns about the aging curriculum, which is exacerbating a skills gap in the workforce, coupled with a retiring workforce. This is cause for concern.

Would you agree that a modernization of AMT curricula is overdue?

Ms. KRAUSE. Yes, we would absolutely agree that this is an issue that needs to be addressed. When we have talked to stakeholders about sort of the implications of the outdated curriculum, some of the factors they cite are really kind of having to focus on both new and old technologies. Companies talk about having to provide gap training in terms of filling in some of those skill sets. So we do think this is an important area to address.

Mr. GARCÍA. And would you also agree that, while—modernization of the AMT curriculum and maintaining minimum safety standards must remain a top priority?

Ms. KRAUSE. Given the mission of FAA, yes, safety is very important.

Mr. GARCÍA. So what steps is the industry or the FAA taking to advance its 2015 rulemaking or other initiatives to address the aging curriculum for AMT certification? For either one of you.

Ms. LANG. Well, I can say that we definitely have got to get this thing done, and there is unanimity of view that it is late and overdue.

The FAA did a rulemaking that we began, I believe, in 2015. The ideas came in, there were new ideas we had, and complicated, that put us back into doing a supplemental rulemaking last year. Our goal is to get that out. And we understand the interest of this community and this committee that that get done quickly.

Mr. GARCÍA. Thank you.

Thank you, Mr. Chair. I yield back.

Mr. LARSEN. Thank you, and I recognize Representative Woodall from Georgia for 5 minutes.

Mr. WOODALL. Thank you, Mr. Chairman. Thank you all both for being here.

I was interested in the GAO report—not the one that you wrote, Ms. Krause, but the one that was written in 2003 that said the very same thing that the one you wrote said.

And so my question is for you, Ms. Lang. A lot of excitement about your arrival in this spot at this time. I look forward to having the conversation with the next panel, but I am wondering if FAA does have a continuing and growing role in aviation maintenance certification, or if that role needs to turn and begin to decline.

We have got Delta folks coming up next. They have been innovating a lot over the last 60 years. Gulfstream folks coming up next, they have been innovating a lot over the last 60 years. We can't get new regs out for our maintenance technicians in the last 60 years. That doesn't tell me that you need to hurry up and get these things out so we can have them in place for the next 60 years. It tells me maybe that Gulfstream has a better shot at identifying the right skill sets for its mechanics than you do, as talented as you are.

As you look forward—since you don't mind getting out of your swim lane—do you see a continuing and growing role of FAA cer-

tification, or do you see a possibility that maybe you are working more on hooking up with high schools, and developing minority interest, and working on STEM programs in colleges, but that Gulfstream can determine for Gulfstream what it needs, and Delta can make sure it is partnering with good partners to get Delta what it needs?

Ms. LANG. Well, I think the first answer is we have got to do our job.

I mean, look, the FAA puts high priority in the rulemaking process on safety-critical rulemakings and procedures. And——

Mr. WOODALL. If I could just interrupt you for a second, that just can't possibly be true, right? Sixty years of delay can't be high priority. GAO recommending the changes happen in 2003 can't be high priority. It is not your fault, right? It is different administrations, it is different parties, but it is not high priority. It may well be the lowest priority.

The minority retention programs, we have set those up. The STEM development programs, we have set those up. The changing safety training, maintenance requirements, we are not doing anything at all.

Ms. LANG. What can I say, but point taken? I think the FAA needs to get the lead out and get this rule done. I mean, it is a rule everyone agrees is out of date. So first and foremost, we have got to do our part in getting that rule out. And we are committed to getting that done.

I think you raise an interesting question—again, on this swim lane issue—as to, ultimately, what is the regulatory role for the FAA going forward in curriculum development, if we can't find a way to do it with agility and real-time adaptability, and that is what I am hearing.

You know, it raises a lot of questions I think we need to have followup conversations with this committee on, because these are really important safety questions. There are a lot of industries that not only do the certification—by that I mean the testing and practical exams—but they also establish the curriculum as a precondition to doing that. Now, you see that on the finance sector, and I think we all would have to answer the mail on why we would have a lesser standard and get out of the curriculum business on the safety side. But that said, we have to do it in a way that remains current, or it is not useful.

So first order of business is getting out the rulemaking we have in hand, and we are committed to doing that. But I think there is a longer conversation to have about what we need in order to stay agile and adaptable to a very fast-changing pace in technology.

Mr. WOODALL. Ms. Krause, as I mentioned, folks are excited about Ms. Lang being in this job. And if anybody can get it done, she can. I will ask the other stakeholders when they come in panel 2. But the stakeholders you talk to, is it obvious to everyone that the FAA has a continued role in curriculum training standards? And I don't mean a role in guidance and making recommendations. I mean a role that says do it this way, or your folks can't graduate, so keep building those paper airplanes so that your kids can be trained for the 21st century?

Ms. KRAUSE. I think there are different approaches to take to addressing curriculum. I think the thing we would emphasize is the need to involve FAA to partner with industry and the Congress on how best to proceed.

I mean, we didn't talk with stakeholders on getting perspectives on that specific issue, but that should certainly be part of these conversations on how best to move forward.

Mr. WOODALL. The FAA has got a lot on its plate, and a lot of constructive criticism comes from every direction. I just—as much as you care, you can't possibly care more about Gulfstream safety than Gulfstream does. And so I am just looking for those ways that we can alleviate some of your burden, while continuing to maintain that safety for the flying public.

Thank you for your indulgence, Mr. Chairman. I yield back.

Mr. LARSEN. Absolutely. I recognize Representative Perry of Pennsylvania for 5 minutes.

Mr. PERRY. I thank the witnesses. I thank the chairman for the time. I am late to the conversation, I do apologize—multiple hearings at the same time. And if the question has already been asked, I apologize for that, as well.

What is the projected release date, if you have one, of the final rule?

And again, I apologize. I suspect—I hope it has been asked, but if you can characterize that at all. And I probably don't have to go into different machinations about how we got to where we are, and being late, and so on and so forth. But what do you see?

Ms. LANG. Well, I know, by the FAA's internal standards we hold ourselves to, we try to get—if we have done a supplemental—and we did that in June of last year—the goal is to get the final rule out within 16 months, which would be this fall.

Mr. PERRY. This fall?

Ms. LANG. Yes.

Mr. PERRY. And just—I hate to do this, but can you characterize—there are a lot of folks that are waiting, right? There are a lot of folks that are waiting, and they are trying to plan. So what—does fall start on August 30th or September 1st, or—when does fall start for the FAA?

Ms. LANG. I think 16 months from June is October, if my math serves me right.

Mr. PERRY. OK, so we are looking for that in October.

Ms. LANG. But listen, we understand there is a lot of interest. And if we can, you know—knock on wood, we will make it. But hopefully we will beat it. And I will take that message home clearly.

Mr. PERRY. So, just out of curiosity, I have been honored to work around a lot of mechanics, AMT folks, in my career. But I have never been one. So you just assume they know what they need to do, and all the ones that I have been around did know what they needed to know, and kept the aircraft safe, and kept us safe.

That having been said, what is the collaboration between the FAA and industry regarding the needs that are commensurate with the industry today? But it also includes the industry of the past, I am sure. I am sure—I am hoping we are not spending a lot of time teaching people how to dope a wing. But at the same time,

those things are still out there, and you have to have some perspective on it.

On the other hand, we are getting into hypersonic flight, unmanned use, and all that kind of thing. So what kind of collaboration does the FAA do with industry and curriculum development?

Ms. LANG. Well, some of it is done formally. I mean, obviously, the part 147 process on the curriculum is a formal process. But it is clear we need to get current in making sure that—because we have got all kinds of new avionics that are out there, new composites—that we have got to get people the curriculum, training people to the things that are out there toward more of a performance base, as opposed to a prescriptive way of doing business, which is what the industry is doing.

I think, first and foremost, we have to look internally at what our role is as a regulator, and the things we are doing that we have to correct. So part 147 is a good example of that. But I suspect there are other things. And we have to look at our regulatory responsibilities on that.

I think a big part of my job in the next few months is really, though, beginning a robust conversation with industry and academia on what it is we collectively need to do to improve that pipeline. And that—I will tell you truthfully I just started this job in January. I have read an awful lot of materials in the last 4 or 5 weeks. But I am really looking forward to beginning the conversation. Today's hearing is a great opportunity on that.

I am very much looking forward to the next panel, but it is one of those things where, the sooner I can get out of Washington and get on the front line, probably the better. Nothing personal on that.

Mr. PERRY. Well, we sure appreciate your involvement and your short tenure so far. We don't mean to be critical to be critical, we hope it is constructive. But there are concerns that are legitimate. And not only the flying public, but the industry demands timeliness and our focus and attention on this issue, as I know you will bring it.

And so please don't take the criticism as solely criticism, but you can see—and you probably already know—that some of these things are warranted because they are concerning—the continual delays vex us and the people that we answer to, our bosses. So we sure appreciate you. Thank you.

Mr. LARSEN. Thank you, Representative Perry. I think that is all the questions that we have for the panel. I want to thank the panel, the first panel, for coming this morning and answering questions. I imagine we will have followup questions on individual issues.

And with that we will let staff reset the table and get the second panel ready to go.

[Pause.]

Mr. LARSEN. Great, well, let's get started with panel 2. I want to welcome our next panel of witnesses.

In order is Mr. Steve Jackson, who would be the principal of Aviation High School, and he is accompanied by Mr. Mario Cotumaccio, assistant principal at Aviation High School. Apparently no one is there providing discipline today.

[Laughter.]

Mr. LARSEN. Ms. Sharon DeVivo, president of Vaughn College.

Mr. Joseph McDermott, managing director of technical operations of Delta Air Lines.

Mr. Jay Neely, vice president of law and public affairs, Gulfstream Aerospace.

And Ms. Dana Donati, the general manager and director of economic programs at LIFT Academy.

Thank you all for being here today. We look forward to your testimony.

And, without objection, our witnesses' full statements will be included in the record.

As with the previous panel, since your witness testimony has been made part of the record, the subcommittee requests you limit oral testimony to 5 minutes.

We will now proceed with witness testimonies. I first recognize Mr. Jackson for 5 minutes.

You are recognized.

TESTIMONY OF STEVEN R. JACKSON, PRINCIPAL, AVIATION HIGH SCHOOL, ACCOMPANIED BY MARIO COTUMACCIO, ASSISTANT PRINCIPAL, AVIATION HIGH SCHOOL; SHARON B. DEVIVO, PRESIDENT, VAUGHN COLLEGE OF AERONAUTICS AND TECHNOLOGY; JOSEPH MCDERMOTT, MANAGING DIRECTOR, TECHNICAL OPERATIONS, DELTA AIR LINES; JOHN J. NEELY III, VICE PRESIDENT, LAW AND PUBLIC AFFAIRS, GULFSTREAM AEROSPACE, A GENERAL DYNAMICS COMPANY; AND DANA DONATI, GENERAL MANAGER AND DIRECTOR OF ACADEMIC PROGRAMS, LIFT ACADEMY

Mr. JACKSON. Chairman Larsen, Ranking Member Graves and Graves, and distinguished members of the subcommittee, thank you for calling this important hearing on the future of our Nation's aviation maintenance and manufacturing workforce. On behalf of the students, staff, and graduates of Aviation High School, I am very honored to testify before this subcommittee.

I am the principal of Aviation High School, a public high school that has been training aviation maintenance technicians since 1936. It is located in Queens, New York, the most diverse county in the Nation. And our school mirrors that diversity. And we have a 21-percent female student body.

We are within reach of JFK International, LaGuardia, and Newark Liberty International Airports, the Northeast aviation sector. The overwhelming majority of technicians at these airports were trained by Aviation High School and our fellow panelist, Vaughn College.

There are approximately 20,000 students currently enrolled in part 147 aviation maintenance technical schools in the United States, and Aviation High School educates 1 out of every 10 of those students. We enroll more students than any other single aviation program. We are part of a larger community, of course, 176 certified schools by the FAA across the United States, and nearly all the other aviation maintenance schools are colleges and technical school, while our graduates are eligible to earn their airframe and powerplant technician licenses at a much younger age.

Our students pull double duty, therefore, to obtain both their high school credentials with academic arts, language, and physical education courses, like any other school. And they also, of course, have the rigorous aviation maintenance training of a part 147 school that is typically, again, taught at the college or post-high school level.

But, as this subcommittee has identified, and we heard from the first panel, we have a problem. As a community, aviation maintenance technical schools have the capacity to enroll 35,000 students, and part 147 schools currently fill just over half of those seats. Our growing industry will need 193,000 new technicians over the next 10 years in North America, alone.

As a high school that receives over 4,000 applications for an incoming class of 500 students, we have a few thoughts on how to address this shortage.

At Aviation High School we see that exposure to the world of aviation at a younger age is key, much younger than where our high school program actually begins. Fewer and fewer students are exposed to mechanical work. They do not work on their bikes or tinker with their cars with their families. Our goods are becoming more digital, and when they break they are more easily replaced than repaired.

The current STEM models in education provide the math and science coursework for elementary and middle school students, but these courses also need to provide students with more hands-on practical jobs so that they can figure out at a younger age whether they would like to learn how systems work together, or how they can be fixed and improved by using their hands.

As a school community we also debate the idea that technicians, who were once known as mechanics, would be better represented and marketed as a career if they were to be known as aircraft engineers. By rebranding aircraft maintenance and repairs an official engineering career path, we believe that many more young people would set their sights on entering the aviation maintenance field as aircraft engineers.

For us, one of the most important aspects—in addition to what I am stating—of our program is the close relationship that we have with commercial airlines that operate in the New York City area. Aviation High School has official partnerships with fellow panelist Delta Air Lines, as well as JetBlue Airways, British Airways, and Panasonic Avionics, which provide many of our students with internship, work-based learning opportunities at their hangars and maintenance facilities.

The Port Authority of New York and New Jersey has provided us with classroom and ramp space at JFK International Airport, where students work in their classroom, participate in internships after class, and that also complete their coursework on a Boeing 727 that FedEx donated to us. Adding more opportunities for our students to participate in such real-world, on-airport experiences at a young age would help to improve their training and entice more young students to enter the career path.

We would also benefit from the introduction of more flexibility and modernization of curriculum, as we heard this morning, for schools to address the FAA part 147 regulations that would help

them align their coursework to the needs of the industry and the geographic location of each school. To that point, we support the Promoting Aviation Regulations for Technical Training (PARTT) 147, the H.R. 5427 bill, the mechanic aircraft certification standards, and the removal of seat time requirements that ATEC has submitted for review to this subcommittee.

Timelines suggest we will not see a modernized rule until at least 2022. Therefore, we ask Congress to support H.R. 5427, which would give schools like ours the flexibility to educate our students and prepare them for today's high-tech jobs in aviation.

As one can imagine, maintaining and operating a part 147 school that works to create a real-world experience for our students as high school students also creates a heavy price tag for our local and educational system to fund. We are very appreciative that Congress has allocated Federal funds to support aviation maintenance schools. It would be extremely helpful if part 147 schools received the additional allocations as soon as possible, so we can continue to improve our students' technical training for the 21st-century workforce.

We appreciate this subcommittee's interest in the future of aviation, and a desire to address the technician shortage. Our belief is that the future is built on programs like Aviation High School and Vaughn College, on quality, well-rounded education that exposes young students to STEM and mechanical training at earlier ages, and practical hands-on partnerships and connections with the FAA and the aviation industry.

Thank you very much for this opportunity to testify today on behalf of Aviation High School, and we look forward to your followup questions to address specific ways that Congress can respond to the aviation maintenance technician shortage.

And we also brought a wing section with flight controls for our question and answers, so you can see some examples of what we are talking about.

[Mr. Jackson's prepared statement follows:]

Prepared Statement of Steven R. Jackson, Principal, Aviation High School

Chairman Larsen, Ranking Member Graves, and distinguished members of the Subcommittee, thank you for calling this important hearing and thank you for the invitation to testify on behalf of Aviation High School. We are very honored to be included with Vaughn College, Delta Air Lines, Gulfstream, and Republic Airways to provide our insights on the future of America's aviation maintenance and manufacturing workforce.

Futures are built and Aviation High School in Queens, New York, is a very special place where this happens. Officially, known as Aviation Career and Technical Education High School, it is a New York City public high school that was founded in 1936 with the mission of training aviation maintenance technicians at the high school level. The school is in close proximity to JFK International, LaGuardia, and Newark Liberty International Airports, the Northeast aviation sector, and the overwhelming majority of the technicians at these airports were trained by Aviation High School or Vaughn College. We are one of the largest Federal Aviation Administration (FAA) certified Part 147 Aviation Maintenance Technician Schools in the nation and one of only a handful of high schools in the nation that provide students with the ability to earn their airframe and powerplant technician licenses—licenses that allow our students to get jobs building and maintaining aircraft for the civil and military aviation industry. Our students can earn one license in four years and their second license in our competitive fifth year program. As a Part 147 school the certification process is extensive; the FAA must approve our curriculum and they

conduct regular oversight of our facilities, processes and procedures to ensure we continue to comply with FAA regulations. Our school is one of 176 FAA-certificated maintenance schools across the United States. While we are part of this larger community, our school is unique in several ways. Nearly all the other maintenance schools are colleges and technical schools, meaning our graduates are eligible to take the FAA mechanic test at a much younger age. And because we are a public high school, the education is free to our students.

Our students learn and work in multi-period aviation maintenance courses from their freshmen year through senior year. Our students also take the traditional academic, arts, language and physical education courses that New York State requires of all students in order to earn a high school diploma. Simply put, Aviation High School students are pulling double duty—they are simultaneously working on their high school graduation credentials while also working on obtaining their airframe and/or powerplant licenses with the hopes of entering the aviation field, attending a variety of college programs or enrolling in the military. Over the course of our 84 years in existence we have trained a great many of the technicians in the industry, with approximately 11 percent of the nation's technicians currently enrolled in our program. Moreover, there are approximately 20,000 students currently enrolled in certificated aviation maintenance programs in the United States. Aviation High School educates one out of every 10 of those students. We enroll more students than any other single aviation program and our alumni span the globe. Last year, 263 students earned their airframe and/or powerplant licenses through our program.

While Aviation High School has a very high rate of success recruiting students into our program, across the nation schools are struggling. As a community, aviation maintenance technician schools have the capacity to enroll 35,000 students, yet Part 147 schools fill just over half of those seats. At the same time, a Boeing forecast projects that our growing industry will need 193,000 new technicians over the next ten years in North America alone. As a high school that receives over 4,000 applications for an incoming class of 500 students one would guess that a large percentage of our recent graduates go into the workforce directly upon graduation, but this is not the case. In this area we find that our experience as a Part 147 aviation maintenance high school provides us with important insight into the various reasons why teenage students and their parents may choose to attend a school such as ours, but possibly not enter the workforce immediately upon graduation. It has been our experience that middle school students and their parents choose our school for a great variety of reasons such as the quality of our aviation maintenance and academic coursework, school safety and environment, potential for learning a highly-skilled trade and the overall high regard that residents of the City of New York have for our school. As a high school we face the challenge of not only providing students with a well-rounded academic and technical program, but we must also teach our students about the aviation industry and the many jobs that are available to aviation maintenance technicians today. Conversely, the challenge is that from the moment of their child's birth parents envision a college and university path for their sons and daughters that will typically prepare them to become a well-paid, highly regarded doctor or lawyer, not necessarily an aircraft technician. It is our belief that this mindset creates barriers for many younger people and their parents to envision their children working in the field of aircraft maintenance.

Though this may be the case we find that we are typically successful in educating our students on the realities of work in the aviation industry through the real-world experiences that our teachers provide to our students. This sharing of real-life experiences provides our students with more opportunities upon graduation than your typical high school. It must be noted that our aviation maintenance staff are largely made up of graduates of our school and use their time with the students to share their industry work experiences and motivate them to enter the aviation industry.

Aviation High School is located in the most diverse county in the nation: Queens, New York. Our student body is made up of high school students ranging from ages 14 to 19 from all five boroughs of New York City. It is a highly sought-after program for students and parents looking for a high school that provides the training and preparation for students to start a lucrative career after high school or to go onto a college or university program. The student body is comprised of 46% Hispanic/Latinx, 37% Asian, 9% White and 4% Black students, 21% of our student body are women, 14% are students with disabilities and 67% of the student body is facing economic hardships in their home life. Additionally, a majority of our students are first generation Americans whose parents have brought them to the United States to gain better educational opportunities and a better quality of life. The diversity, focus and motivation that our students bring to school each day, as well as the dedication and hard work of their teachers, helps create a welcoming and supportive environment for all students as they work through the rigors of a Part 147 program

that is traditionally taught at the college or post-high school level. As a result of the efforts of our students and staff, 96% of our students graduate on time within their cohort and approximately 40% of each graduating class earns their airframe and/or powerplant licenses, and each year we estimate that approximately 10% of our students go into the aviation maintenance workforce not long after graduation, with many also attending college at the same time.

We know this Subcommittee wants to understand how to help our nation fill the many aviation maintenance technician positions that are now available in order to maintain a vibrant aviation industry. At Aviation High School, we see that exposure to the world of aviation at a younger age is key—much younger than even where our high school program begins. Fewer and fewer students are exposed to mechanical work—they do not work on their bikes, or tinker with their cars with their families. Our goods are becoming more digital and when they break, they are more easily replaced than repaired. We believe very strongly that the current STEM models in education overwhelmingly provide the rigorous math and science coursework for our elementary and middle school students, but that these courses also need to provide students with more hands-on practical projects so that they figure out at a younger age that they would like to learn how systems work together or troubleshoot the solutions for fixing and improving the system they are working on. Incorporating more hands-on projects at the middle school level along with the very important marketing and messaging that the industry should incorporate into their advertisements and promotions will help younger generations of students choose the path of working on the various aircraft that are flown throughout the world. As a school community we also debate the idea that technicians, who were once known as mechanics, would be better represented and marketed as a career if they were to be known as aircraft engineers. By rebranding aircraft maintenance and repair as an official engineering career path we believe that many more young people would set their sights on entering the aviation maintenance field, whether they are teenagers or young adults.

Another important aspect of our program that provides many of our students with the exposure to the inner workings of the industry and helps to enhance our students' skillset is the close relationship and partnerships that we have with the commercial airlines that operate in the New York City area. Aviation High School has official partnerships with Delta Air Lines, JetBlue Airways, British Airways, and others, as well as numerous maintenance, repair and overhaul (MRO) companies, such as Panasonic Avionics, which provide many of our students who are working on their second FAA license with internship work-based learning opportunities at their hangars and maintenance facilities. To help with this school-industry partnership we are fortunate enough to have a partnership with the Port Authority of New York and New Jersey who has provided us with classroom and ramp space at JFK International Airport where our students work in their classroom, participate in their internships after class, as well as complete their aviation coursework on a Boeing 727 that FedEx donated to our school. This airport classroom is in addition to the main campus that includes 34 aviation maintenance labs and on-sight hangar that houses our 11-small aircraft.

We are very fortunate that we are here today with two of our partners, Delta Air Lines and Vaughn College. It is important for programs like ours to have clear pathways for our students to learn from technicians in the field on real aircraft, as well as college programs that allow them to use their aviation maintenance training and apply it to the many related career fields that are available to them throughout the industry, such as air traffic control and flight training. These additional pathways help to motivate our students and provide them with that additional inspiration to work towards their various aviation interests. We are very fortunate to work so closely with Delta Air Lines as we gain their feedback on how to improve our students' technical aptitude and with Vaughn College to learn from their experiences at the collegiate level.

These opportunities add to the knowledge base and skills acquisition that our students receive beginning in the ninth grade, and the internships are an important way for our partners to engage with and help train the next aviation maintenance technicians graduating from our school. As one can imagine, maintaining and operating a Part 147 school that works to create real-world experiences for our students also creates a heavy price tag for our local educational system to fund, and we are very appreciative that Congress has allocated federal funds to support aviation maintenance schools and it would be extremely helpful if Part 147 schools received the additional allocations as soon as possible so that we can continue to improve our students' technical training for the 21st century workforce.

We believe that such partnerships and accompanying internships help increase the number and improve the quality of aviation maintenance technicians trained in

the nation. We believe that these experiences need to be expanded and incorporated into schools at an earlier point in our students' educational experience. Currently only students 18 years or older can gain access to work-based opportunities on our nation's airports. To improve such access for high school students, this would require the FAA, industry partners and aviation maintenance technician schools to work more closely together to not only provide more flexibility to allow schools to adapt to the changing aviation technology, but to also create a pathway where more students can earn student apprenticeship type clearance to learn and work alongside certified, experienced aviation maintenance technicians at an earlier age. Ideally it would be wonderful if high school students, such as ours, were provided with on airport, on-the-job experiences with the guidance of the partnering company to help train students for the specific type of job openings available in a school's surrounding area. These earlier connections between school and industry would also create those marketing opportunities for younger students to see the exciting work they could do in a high school that trains aircraft engineers.

This infusion of industry training into aviation maintenance schools at an early point in a child's educational experience, both at the elementary and middle school level, would also benefit from the introduction of more flexibility and modernization of curriculum for schools to address the FAA Part 147 regulations that would help them align their coursework to the needs of the industry in the geographic location of each school, whether that means alignment with general aviation, commercial and cargo, manufacturing or MRO jobs that are available in that area of the country. To that point we support the Promoting Aviation Regulations for Technical Training (PARTT) 147 Act (H.R.5427), the Mechanic Aircraft Certification Standards, and removal of seat time requirements that ATEC has submitted for review to this subcommittee. The Promoting Aviation Regulations for Technical Training (PARTT) 147 Act is a bipartisan and bicameral bill that is awaiting action by this committee. The bill calls for the FAA to revise the current training mandates, something industry has long called for. While the regulation is currently in rulemaking agency, timelines suggest we will not see a modernized rule until at least 2022. Therefore, we ask Congress to support HR 5427, which would give schools like ours the flexibility to better educate our students and prepare them for today's high-tech jobs in aviation.

We appreciate this Subcommittee's interest in the future of aviation and a desire to address the technician shortage. Furthermore, the community deeply appreciates this body's efforts to support aviation technical education by making workforce a central theme in the 2018 FAA reauthorization, providing updated maintenance workforce data, urging Congress to use its oversight authority to ensure FAA initiates funded grant programs, and urging action on proposals like the PARTT 147 Act and the Promoting Service in Transportation Act (H.R. 5118), which would help raise aviation career awareness. Our belief is that the future is built upon programs like Aviation High School, on quality, well-rounded education that exposes young students to STEM and mechanical training at early ages, and the practical, hands-on partnerships and connections with the FAA and the aviation industry.

At Aviation High School we have a great wealth of experience and expertise in navigating the challenges of training young students to become aircraft engineers. Our aviation maintenance staff is made up of two assistant principals, Mr. Mario Cotumaccio and Mr. Giovannie Sosa, and 48 FAA airframe and powerplant certified high school teachers. Members of our aviation maintenance staff helped to develop the ideas and suggestions that are presented in this testimony and Mr. Cotumaccio, an Aviation High School graduate and aviation maintenance technician with over 35 years of experience as a technician, supervisor, teacher, FAA liaison, Designated Mechanic Examiner and administrator, summarized our core suggestions into six main points based on his years of expertise in the field of aviation education for your consideration as described below.

The best solutions to the problems plaguing the airline industry, specifically the shortage of aircraft technicians, involve a multifaceted approach. Our proposed strategy relies heavily on the ability to join all the parties involved in the aviation industry: the party that governs the industry, the FAA, the party that is responsible for educating the industry, training institutions like Aviation High School, and the party that hires them, our beloved partners in the sky. Hopefully as our committee grows, we will be able to include the labor unions in the abovementioned approach, as the labor unions work hand-in glove with industry.

We at Aviation High School, have created a comprehensive strategy to address the shortage of aircraft technicians and have outlined each step into six key parts:

1.) INCREASE OUTREACH TO FOCUS ON EARLY EDUCATION: ELEMENTARY SCHOOL, MIDDLE SCHOOL & HIGH SCHOOL LEVEL

Children today do not grow up hearing their parents' desire for them to become an aircraft technician; they are often encouraged to enter the medical, law or engineering professions. The best opportunity for a child (and their parents) to discover a different career path is through early exposure. The current period of exposure to the aviation industry for future aviators is high school; high school is much too late. It is crucial we develop programs and opportunities that introduce the amazing world of aviation to elementary, middle and high school children.

Elementary

We believe in the STEM model, and we are eager to see elementary schools infuse an aviation-based STEM model that provide students with an opportunity to learn about the aviation industry, hands-on. Engaging elementary students, early on, with Aviation Work-Based Learning Projects, will encourage students to participate in trouble-shooting, problem solving, and improving, actual job issues that arise on aircraft or within the aviation industry. In addition, the introduction of Aviation Work-Based Learning Projects, nourishes the students' fine motor skills; industry educators and leaders are seeing a decline in the ability of our high school students to operate basic tools (screwdrivers, wrenches, etc.), when needed to complete tasks, which is quite often. At a time where our youth are being over-stimulated and distracted by all things "smart", there must be a focus on the importance of utilizing their hands. Furthermore, the introduction of Aviation Work-Based Learning Projects initiatives at the elementary school level, will raise awareness to new opportunities that will supplement their curriculum.

Middle School

Industry partners are asked to invest time and resources to build programs that will sustain schools by creating outreach programs; these outreach programs will enable students to interact with real industry professionals. By exposing our students to a network of industry professionals, these mentors can provide opportunities for on-site job visitations, typically only made available when a student acquires an internship at the high school level. Together with implementing advanced Aviation Work-Based Learning Projects, outreach programs must also start earlier on than high school. There is also a tremendous emphasis on targeting these outreach programs to the communities that are underrepresented in the industry, encouraging diversity within our student population. Lastly, these programs will support and raise awareness of the plentiful and lucrative career opportunities available within the aviation maintenance industry.

High School

As stated above, Aviation High School, has official partnerships with such airlines as: Delta Air Lines, JetBlue Airways, British Airways, and Panasonic Avionics. Our internship programs have earned Aviation High School national recognition and serve as a model to demonstrate how important collaboration is. When school, community, and industry work together, a stronger America is built! We believe that at an earlier point during a students' educational experience, our partnerships and internships need to be expanded and incorporated into schools nationwide. Industry experts have focused on the need to bridge the gap between the present-day CFR Part 147 curriculum and the technologies associated with today's modern-day aircraft. Internship programs help overcome this problem by placing future aviators in advanced modern-day learning environments, along with professional mentors. As a result, interns will become more knowledgeable on the functions of an organization, and they will also gain a more thorough understanding of the skillset needed for this type of career. Furthermore, most airline partners today, will require a minimum of 12 to 24 months of experience before even considering an applicant. Through an internship, a student not only increases their knowledge and experience on modern-day aircraft, but they also increase their communication, organizational and teamwork-building skills that are so critical in today's job market.

2.) IMPROVE THE PERCEPTION & MARKETING

An aviation maintenance mechanic has evolved beyond being branded/categorized as unskilled labor as per the US Department of Labor. Troubleshooting a Boeing 787 requires an individual with advance training, whom has the ability to: analyze symptoms, read and interpret sophisticated wiring diagrams, use complex tooling, and test equipment in order to determine the root of the problem. In addition, the individual must document the maintenance performed, which requires utilizing FAA

approved language. Also, it is important to note, the individual paperwork associated with each repair is scrutinized and regulated by strict FAA protocols, where monetary fines or suspension of certification may be imposed to the individual if not properly performed. Drug testing is also mandatory and felony convictions are disqualifying factors when applying for employment. Lastly, the responsibility of each passenger's life at 35,000 feet above sea level, places an enormous stress on the individual.

In addition to being classified/branded as an unskilled labor, the perception of the aviation mechanic is a hotly discussed item. Within the industry, we often debate the titles of said positions: mechanic vs technician. However, we strongly feel that the mechanic would be better represented and marketed, as a career, if they were to be branded as aircraft engineers. The European equivalent to the FAA is known as EASA and their mechanics are known as engineers. We strongly believe that rebranding aircraft mechanic as an aircraft engineer would attract a younger demographic and garner support of their parents upon entering the aviation maintenance field.

3.) STREAMLINE AND ASSIST WITH THE CERTIFICATION PROCESS AND TESTING CHALLENGES FOR ADULT EDUCATION PROGRAMS

This speaks directly to apprentice students/workers to entice them into the industry. Allow MROs and airlines to take them on as an unlicensed apprentice technicians and conduct their own curriculum/training in-house.

4.) STREAMLINE ENTRY FOR THOSE WITH PRIOR, DIRECTLY-RELATABLE SKILLS—I.E., THE SURPLUS OF MILITARY AIRCRAFT TECHNICIANS

Strip away the extraneous tasks of having a military aircraft technician demonstrate the proper method for preforming a scarf splice repair on an aircraft WOOD structure and permit experienced military technicians to cross directly into the workplace which they have a proven track record and verifiable training to back up their credentials.

5.) STREAMLINE FAA REGULATIONS AS IT PERTAINS TO CFR PART 147 CURRICULUM

Recently, our industry partners (Delta Air Lines, JetBlue Airways and American Airlines) have expressed their concerns towards the rapid changes in technology with respects to students' preparedness. We must remind everyone here today that the airframe and powerplant certificate was designed solely as a "license to learn", and not a license to troubleshoot modern-day aircraft, we, the staff at Aviation High School, wish to alleviate such concerns.

Much emphasis is being placed on the modernization of curriculum. We are in unison that change is necessary and we feel that the major overhaul required to modernize and revamp the curriculum will translate to a higher learning standard; however, the financial resources needed to make these changes would prove to be too costly to each school. Our proposal involves minimizing the financial strain by implementing changes to the curriculum based on geographical needs. For example, the current curriculum proves to be beneficial for students in rural America who need to perform maintenance on crop-duster type aircraft; however, the same curriculum proves to be obsolete for students in metropolitan areas that need to maintain more modern and advanced aircraft. Furthermore, it will assist schools to better align their coursework with the needs of the industry as it pertains to their geographical location, i.e., general aviation, commercial, cargo, manufacturing or MRO jobs, etc.

As the nation's largest CFR Part 147, we are committed to finding a solution. We believe that we can successfully modify the current curriculum, in collaboration with: the local FSDO, industry partners, and aviation maintenance technician schools. This collaboration will provide students with a structured system of work-based learning projects that are designed to address current industry needs.

Lastly, as an example of the type industry-relatable projects students can work on, we have brought an actual student project that speaks directly to the "aviation work-based learning projects" previously mentioned. This project was designed and created in collaboration with our local FSDO, Delta Air Lines and JetBlue Airways. We can make this project available for subcommittee members to review if time permits today.

Thank you very much for this opportunity to testify today on behalf of Aviation High School and we look forward to your questions.

Mr. LARSEN. All right, thank you very much. And I will turn to Dr. Sharon DeVivo, president of Vaughn College.

Ms. DEVIVO. Good morning.

Mr. LARSEN. Five minutes. Good morning.

Ms. DEVIVO. Chairman Larsen, Ranking Member Graves, ladies and gentlemen of the Subcommittee on Aviation, thank you so much for allowing me to speak to this esteemed group, and I am honored to be part of this panel of engaged leaders who are working to provide incredible opportunities to tomorrow's aviation leaders.

Vaughn College is also located in New York City, directly across the street from LaGuardia Airport. Founded in 1932, we offer master's, bachelor's, associate's, and certificate programs in all aspects of aviation, including flight, aviation maintenance, air traffic control, flight dispatch, as well as engineering, airport-airline management, and other technologies. We serve a population of about 1,650 students: 650 of those are in aviation maintenance, 300 in flight and airport-airline management, and about 300 in engineering.

Eighty percent of our students are from a minority background. We really reflect the diversity that is Queens. And most are first-generation Americans and first-generation college students. We are also designated as a Hispanic-serving institution. Twelve percent are women, and we are working to raise our female representation. We also have more than 150 veterans.

As has already been discussed, we face an unprecedented need for pilots and maintenance technicians for the next 20 years, according to the Boeing and Airbus forecasts. Right now the United States will not produce enough qualified talent to meet the demand, which is why we must expand the existing pipeline to include opportunities for underserved populations, especially minorities and women who have not been exposed to these fields.

Prospective students want to know that aviation is a high-tech, in-demand field with well-paying jobs and a solid career outlook. The average family income for a Vaughn student is about $39,000. And within 1 year of graduation, 99 percent of those are employed or continuing their education, 83 percent in their fields. For those graduates who pursue an aviation maintenance degree or certification, those skills are also transferable to a variety of fields, including transportation, public utilities, and manufacturing.

In 2017, a study done by the Equality of Opportunity Project, published in the New York Times, looked at more than 2,100 institutions in the Nation that were the best at moving students from the bottom percentage in income to the top, and Vaughn was number one in the country. That is the evidence of the transformation possible with a Vaughn education. And we don't just change that student's life. We change that whole family's trajectory.

As a result of this overwhelming evidence, we made a strategic decision to offer our full-time bachelor of science and associate in aviation maintenance students the Vaughn guarantee: If they remain enrolled full-time during their studies, meet regularly with our career services office, and are not employed within 1 year, we will pay their Federal loans for 1 year. Our students and families are primarily concerned with affordability and the assurance of a

career path. And this guarantee is a declaration that Vaughan considers this a true partnership for student success.

Queens is incredibly fortunate to have an aviation ecosystem that could act as a model for other major metropolitan areas. That ecosystem includes education partners like Aviation High School, who we support with Bridge to College programs, partnering on Women in Aviation events, scholarships, and more. Between these two institutions, we are one of the largest producers of technicians to the industry.

Our other outstanding partners include the FAA, who we work closely with to produce high-quality professional maintenance technicians. We also work with the Port Authority of New York and New Jersey, Delta, Endeavor, Republic, JetBlue, United, and the Cradle of Aviation Museum, among others, to provide a clear career pathway.

In order to expand the pipeline, we must create greater awareness at the middle and elementary school levels. Waiting until high school is simply too late. And we need to emphasize math and science confidence and sticking with these subjects, especially for girls who, after eighth grade, are less likely to take technical courses.

At Vaughn we regularly host the scouting community with interactive workshops, are developing a program with a local middle school that will also include a partnership with a high school. Our students do demonstrations—just last week, the Tiny Whoop Fest, using UAVs at the Cradle of Aviation—and we host awareness events in cooperation with JetBlue in the New York Hall of Science, as well as send Vaughn students to participate in a variety of secondary school events.

These programs help to create the early awareness that is needed to draw individuals who are traditionally not well represented in the industry. More could be done with support for programs, such as grants for simulation equipment, curriculum development, and funding for the education and coordination at the FAA's regional offices, which Ms. Lang discussed as—they are in the rebuilding process.

Once we create awareness and students decide that aviation is a field they want to pursue, we have to find a way to make it affordable. The average debt load for a student pursuing aviation maintenance is about $17,500, and for a pilot student they are adding $60,000 to $70,000 on top of the cost of tuition. Many of our families do not qualify for a PLUS loan because of their credit scores or lack of credit, and they have to turn to the alternative loan market, where the interest rates are much higher.

Congress could consider increasing the maximum Pell award from $6,195 annually, and modify the standard academic progress rules, which do not allow students to take more than four consecutive semesters.

By lowering the overall debt load for the neediest students, you provide a lifetime career path with incredible opportunities.

I will stop there.

[Ms. DeVivo's prepared statement follows:]

Prepared Statement of Sharon B. DeVivo, President, Vaughn College of Aeronautics and Technology

Ladies and Gentlemen of the Subcommittee on Aviation, thank you so much for allowing me to speak to this esteemed group. I am honored to be part of this panel of engaged leaders who are working to provide incredible opportunities to tomorrow's aviation leaders.

Vaughn College is in New York City directly across the street from LaGuardia Airport. Founded in 1932, we offer master's, bachelor, associate's and certificate programs in all aspects of aviation including flight, aviation maintenance, air traffic control (FAA approved AT–CTI), flight dispatch, as well as engineering, airport/airline management and other technologies. We serve a population of about 1,650 students (650 students in aviation maintenance, 300 students in flight and airport/airline management and about 300 in engineering and engineering technology); 80 percent are from a minority background and most are first-generation Americans and first-generation college students. Twelve percent are women (nationwide seven percent of pilots are women and less than four percent are maintenance technicians) and we are working to raise our female representation. We also have more than 150 Veterans.

As I'm sure you know, we face an unprecedented need for pilots and maintenance technicians for the next 20 years, according to Boeing and Airbus forecasts. Right now, the United States will not produce enough qualified talent to meet the demand, which is why we must expand the existing pipeline to include opportunities for underserved populations especially minorities and women who have not been exposed to these fields. Prospective students want to know that aviation is a high-tech, in-demand field with well-paying jobs and a solid career outlook.

The average family income for a Vaughn student is about $39,000 and within one year of graduation 99 percent of those students are employed or continuing their education; 83 percent in their field. For those graduates who pursue an aviation maintenance degree or certification those skills are also transferable to a variety of fields including transportation, public utilities and manufacturing.

In 2017, a study done by the Equality of Opportunity Project published in the New York Times looked at more than 2,100 institutions that were the best at moving students from the bottom 40 percent in income to the top, and Vaughn was number one in the country. That is the evidence of the transformation possible with a Vaughn education, and we don't just change that student's life we change the whole family's trajectory. As a result of this overwhelming evidence, we made a strategic decision to offer our full-time bachelor of science and associate in aviation maintenance students the Vaughn Guarantee—if they remain enrolled full-time during their studies and meet regularly with our career services office and are not employed within one year we will pay their federal loans for one year. Our students and families are primarily concerned with affordability and the assurance of a career path, and this Guarantee is a declaration that Vaughn considers this a true partnership for student success.

Queens is incredibly fortunate to have an aviation ecosystem that could act as a model for other major metropolitan areas. That ecosystem includes education partners like Aviation High School who we support with "Bridge to College" programs, partnering on Women in Aviation Events, scholarships and more. Between these two institutions, we are one of the largest producers of technicians to the industry. Our other outstanding partners include the Federal Aviation Administration who we work closely with to produce high quality, professional maintenance technicians. In addition, we work with The Port Authority of New York and New Jersey, Delta, Endeavor, Republic, JetBlue, United and the Cradle of Aviation Museum, among others, to provide a clear career pathway.

In order to expand the pipeline, we must create greater awareness at the middle and elementary school levels—waiting until high school is too late—with an emphasis on math and science confidence and sticking with these subjects, especially for girls who after eighth grade are less likely to take technical courses. At Vaughn, we regularly host the Scouting community with interactive workshops, are developing a program with a local middle school that will also include a partnership with a high school, our students offer demonstrations at museums like the Cradle of Aviation, and we host awareness events in cooperation with JetBlue and the New York Hall of Science, as well as send Vaughn students to participate in a variety of secondary school events. These programs help to create the early awareness that is needed to draw individuals who are traditionally not well represented in the industry. More could be done with support for programs such as grant for simulation

equipment, curriculum development and funding for the education coordination at the Federal Aviation Administration's regional offices.

Once we create awareness and students decide that aviation is a field that they want to pursue, we must find a way to make it this pathway more affordable. The average debt load for a student pursuing aviation maintenance is about $17,500 (tuition is about $9,000 per semester and can be completed as quickly as four semesters but most students take five or six semesters) while the cost of flight training is an additional $60,000 to $70,000 on top of tuition. Many of our families do not qualify for a PLUS loan (the traditional loan offered to parents of students) because of their credit scores or lack of credit and must turn to the alternative loan market where the interest rates are much higher. Congress could consider increasing the maximum Pell award from $6,195 annually and modify the rules which do not allow students to take more than four consecutive semesters of aid in a row before needing to take a one semester break. By lowering the overall debt load for the neediest students, you provide a lifetime career path with incredible opportunities.

Vaughn's more then 85 years of expertise in aviation provides us with a unique vantage point and a legacy of students who fuel one of this nation's leading economic drivers. To meet the need for a qualified and well-trained workforce we must create awareness in communities that can be the greatest contributors to the aviation industry.

Mr. LARSEN. Thank you very much, and I will turn to—sorry, I need my glasses, which I lost—Mr. McDermott, from Delta, for 5 minutes.

You are recognized.

Mr. MCDERMOTT. Thank you, Chairman Larsen and Ranking Member Graves, for the opportunity to testify before you today.

I am Joe McDermott, the managing director in the technical operations division of Delta Air Lines, or TechOps. I am responsible primarily for the strategy surrounding recruitment, training, and cabin maintenance. I have spent my entire civilian career at Delta TechOps, having joined the company in 1991 after leaving the Air Force.

As the largest aviation maintenance, repair, and overhaul group in North America, we employ more than 10,000 highly skilled technicians, engineers, and other support employees. Together we provide maintenance to more than 875 Delta aircraft, and more than 150 other airline, military, and Government customers. The dedication, skill, and hard work of our employees drive Delta's industry-leading operational reliability. Delta TechOps employees truly are the best in the business.

My nearly 30-year tenure at Delta is not unique to me. Our people are proud and passionate about what they do and the company they work for. This is the result of a strong Delta culture grounded in the belief that our employees are at the core of our success. Delta's maintenance workforce receives industry-leading total compensation and benefits.

Within 7½ years at Delta, a mechanic can make an average base salary of more than $100,000 a year. And this compensation does not include Delta's robust profit-sharing program. This Friday our profit-sharing program will pay out $1.6 billion to our employees, about 2 months of an additional salary per employee. And for each of the past 6 years we have returned more than $1 billion in profit-sharing to our deserving workforce.

Our culture, commitment to employees, and, of course, compensation all contribute to a workforce with long, tenured careers. And while that loyalty results in a highly skilled and experienced team, it also deepens the workforce challenge faced by the entire indus-

try. More than 50 percent of our skilled workforce will be eligible to retire this year.

To address this challenge, Delta TechOps launched a comprehensive pipeline strategy, a multipronged recruitment and professional development effort. The strategy is an end-to-end approach focused on leveraging our key partnerships for recruiting, building technical proficiency, and creating internal advancement opportunities. Perhaps the most robust element of the strategy is our AMT school partnership program.

Delta partners with 50 schools across the country, including schools represented by other witnesses here today. Through these partnerships, Delta provides support for the school's curriculum, including training opportunities for instructors, and gives students access to internal Delta training and job-shadowing opportunity.

Delta also donates serviceable parts, engines, and airframes to schools for real-world maintenance experience.

Delta TechOps also works closely with our regional airline partners, a natural connection, given our interlocking workforce needs. Rather than competing for talent, we collaborate to improve AMT schools, enhance recruiting opportunities, and establish progressive employment flow between the organizations.

We are extremely proud of our veteran workforce at Delta. Veterans comprise 20 percent of the TechOps population, and the military is a key part of our recruitment strategy. The Military Potential Employee program provides job training and hands-on experience, as well as mentorships for servicemembers within the final 180 days of their enlistment.

And we are pleased to share, after months of hard work and rigorous application process, Delta has been accepted as the only commercial carrier in the Department of Defense SkillBridge program. As part of this unique effort, servicemembers continue to be paid by the military, while Delta provides housing and on-the-job training. Both the MPE and the SkillBridge are a win-win. Servicemembers have an easier transition to the civilian sector with rewarding, high-paying careers, while Delta recruits hard-to-find skill sets directly from the military.

To meet our future workforce needs, however, we need a steady supply of newly certified mechanics. Unfortunately, the perceived stigma associated with technical education deters young people from pursuing skill-based training. Building interests and careers in aviation maintenance at an earlier age is key to developing a large pool of skilled applicants in the future. The TechOps Outreach program seeks to address this by offering high school students the ability to interact with AMT role models, as well as an opportunity for hands-on practice with tools and aircraft parts.

The workforce challenges ahead, however, can't be solved by the airlines alone. We are proud to advocate for changes at the Federal and State level to expand access to skills and training needed to meet tomorrow's demand. The FAA must implement provisions from the 2018 reauthorization bill to modernize AMT training regulations. The current regulations were put into place decades ago, and are woefully out of date. Thank you again for holding this important hearing, and I look forward to your questions.

[Mr. McDermott's prepared statement follows:]

Prepared Statement of Joseph McDermott, Managing Director, Technical Operations, Delta Air Lines

Thank you, Chairman Larsen and Ranking Member Graves, for the opportunity to testify before you today. I am Joe McDermott, a Managing Director in the Technical Operations division of Delta Air Lines, or TechOps. I am responsible primarily for the strategy surrounding recruitment, training and cabin maintenance.

I've spent my entire civilian career at Delta, having joined the company in 1991 after leaving the Air Force. All that time has been spent in TechOps: from a licensed aviation maintenance technician (AMT) working directly on flight controls and landing gear to overseeing Atlanta's line maintenance with responsibility for 1,000 personnel. Throughout my career I've had the opportunity to learn and grow at a company that truly invests in its employees.

As the largest aviation maintenance repair and overhaul (MRO) group in North America, Delta TechOps employs more than 10,000 highly skilled technicians, engineers, and other support employees. Together, we provide full-service maintenance to more than 875 Delta aircraft, and more than 150 other airline, military and government customers.

Though Delta has a more complex fleet than other commercial carriers, our maintenance teams do an incredible job getting our customers safely to their destination, on-time and with a great onboard experience. The dedication, skill and hard work of our employees drive Delta's industry-leading operational reliability. Delta TechOps employees truly are the best in the business.

My nearly 30-year tenure at Delta is not unique to me—our people are proud and passionate about what they do and the company they work for. This loyalty is the result of a strong Delta culture grounded in the belief that our employees are at the core of our success. Delta invests billions annually in our people and the technology they need to achieve the highest levels of safety and operational excellence.

Delta's maintenance workforce receives industry-leading total compensation and benefits. Top-of-scale mechanics make an average base salary of more than $100,000. And they can achieve this pay after 7.5 years of service—approximately 75% of mechanics currently earn top-of-scale pay, a reflection of the seniority of our workforce.

This compensation does not include Delta's robust profit-sharing program. In fact, this Friday, our profit-sharing program will pay out $1.6 billion to our employees, which equates to 2 months additional salary per employee. For each of the past six years, we have returned more than $1 billion in profit sharing to our deserving workforce.

Our culture, commitment to employees, and of course, our compensation are all factors in the loyalty that our workforce demonstrates through long-tenured careers. Once we start at Delta, we stay at Delta. And while that loyalty results in a highly skilled and experienced team, it also deepens the broader workforce challenge faced by the entire industry—a large portion of our TechOps workforce is nearing retirement. More than 50% of our skilled and trade TechOps workforce will be eligible to retire this year. This challenge is reflected in similar statistics across the industry; the 2019 Boeing Pilot and Technician Outlook projects demand for 632,000 commercial aviation maintenance technicians worldwide over the next 20 years [1].

To address this challenge, Delta has developed and deployed a multi-pronged recruitment and professional development effort. From middle-schoolers to seasoned professionals, Delta is working to build interest in aviation and train the best and brightest for these highly-skilled careers. For TechOps, Delta launched our comprehensive Pipeline Strategy. The strategy is an end-to-end approach focused on leveraging key partnerships for recruiting, building technical proficiency inside and outside the organization, and creating internal development and advancement opportunities.

I'd like to briefly touch on a few of the programs that comprise our Pipeline Strategy, beginning with how we leverage key partnerships. By working across the academic community, regional partners and the military, Delta can recruit and train individuals for highly-skilled positions that do not require a 4-year college degree.

[1] https://www.boeing.com/resources/boeingdotcom/commercial/market/pilot-technician-services/assets/downloads/2019__pto__infographic.pdf

AMT School Partnerships/Potential Full Time Employee

Perhaps the most robust element of the Strategy is Delta's AMT School Partnership program. Delta partners with 50 schools across the U.S., including Everett Community College in Washington State, Aviation High School on Long Island, and Minneapolis College in Minnesota, among others. Delta partners with these schools and technical training programs to identify and mentor the next generation of AMTs. Delta provides support for the school's curriculum, including participating on advisory boards and offering training opportunities for instructors, access for students to internal Delta training, and visits by Delta representatives for job shadowing and career guidance.

Delta also donates serviceable parts, engines, and airframes to schools for real-world, hands-on maintenance experience.

Our school partnership program ensures the student curriculum is aligned with the on-the-job skills mechanics use most, while Delta branding provides a recruitment tool for the school. Providing a clear career path, however, is critical for recruiting well-trained AMTs. Through Delta's Potential Full Time Employee program (PFE), the best students from these partner schools receive additional vocational training and contingent employment at Delta. The PFE program offers a chance for the new graduate to refine their skills and determine whether Delta is a good employment fit. At the same time, it provides us the opportunity to observe a potential candidate's performance, qualifications, and work habits before offering them a permanent position.

To supplement these efforts, in 2018, Delta Air Lines Foundation disbursed grants totaling $350,000 to nine aviation maintenance training programs across the U.S. The grants allow the programs to enhance their curriculum development, projects and material support, increasing students' awareness, knowledge, and skills in the areas of Avionics/Electrical and Composite/Structures.

Regional Airline Partnerships

Delta TechOps also works closely with our regional airline partners on workforce issues, a natural connection given our interlocking workforce needs. Delta's regional partners are critical to our broader network structure, so any issues they have will ultimately affect our mainline operations. Rather than competing for talent, we collaborate to improve AMT schools, enhance recruiting opportunities, provide mentoring opportunities, and establish a progressive employment flow between the organizations. Partnering in this manner exponentially increases the efficiency and effectiveness of hiring strategies for Delta and our regional partners, bolstering the broader pipeline of experienced skilled employees to meet our combined workforce demands.

Military Potential Employee (MPE)

The military is a key part of our recruitment strategy, and we are extremely proud of our veteran workforce at Delta. Across the company, we employ approximately 12,000 veterans; veterans comprise 20% of the TechOps population. Our Military Potential Employee (MPE) program provides structured vocational training—job training and hands-on experience—and mentorships for Service Members within the final 180 days of their enlistment.

We are pleased to share with you today that after months of hard work and a rigorous application process, Delta has been accepted into the Department of Defense (DoD) SkillBridge program. This unique effort, along with the Army's Career Skills Program, builds on our MPE program. Service members continue to be paid by the military while Delta provides housing and on-the-job training. Both the MPE and Skillbridge are a "win-win": facilitating the transition to the civilian sector with rewarding, well-paid jobs, while helping Delta to recruit hard-to-find skillsets directly from the military. Delta is proud to be the only commercial air carrier in the program and to be listed on the Skillbridge website, an important tool for service members to learn about job training opportunities.

Other Elements of the Pipeline Strategy

All three of these programs focus on expanding the recruitment pipeline. However, to ensure we truly can meet future workforce needs, we must also provide advancement and development tools to our current employees.

The Externship Experience is an entry-level mentorship program for active employees who have an airframe and powerplant (A&P) license or are enrolled in an approved Delta Partner school. This program gives participants hands-on practice

and aircraft touch-time in the operation, providing experience that connects to their curriculum and prepares them for the tasks of the Aircraft Support Mechanic (ASM) role. Similarly, the Apprentice Program provides a year-long mentorship opportunity, including quarterly coaching and skills training, for current ASM employees with an A&P license.

Delta's progressive leadership development programs offer structured development opportunities and coaching for high potential employees to develop leadership skills and business acumen. These include on-the-job training, self-paced learning, job shadowing, and leadership mentoring to prepare for future leadership roles. For example, Delta TechOps College Achieve Pathway (CAP) Program seeks to enhance lifelong learning among Delta TechOps employees worldwide through alliances with universities. The program identifies affordable online degree programs that are relevant to career enhancement at Delta.

ENGAGING THE NEXT GENERATION

As the current workforce ages and retirements increase, the ability to meet future workforce needs requires a steady supply of newly certified mechanics. Unfortunately, estimates show that technical schools are operating at only half of their capacity. Approximately 17,000 more students could be accommodated without any school expansion [2]. Often, stigma associated with technical colleges deters young people from pursuing skills-based training. Building interest in careers in aviation maintenance at an earlier age now is pivotal to developing a large pool of skilled applicants in the future.

The TechOps Outreach program seeks to educate our potential workforce on the benefits of a career in TechOps while they are making critical life choices as high school students. It offers these students the ability to interact with and be encouraged by AMT role models, who can give them a realistic day-in-the life overview as well as hands-on practice with tools, aircraft parts and some of the problem solving that is part of the job. The Outreach program also provides a venue to reach the influencers of the next generation, such as parents, teachers, and school counselors to help shape their perception of aviation maintenance as a rewarding, stable career.

This effort promotes aviation maintenance as a quality career choice—and highlights Delta as a desirable employer. More importantly, however, it changes the narrative of a technical career from an alternative to college to that of a pathway into occupations supported by postsecondary degrees, certifications and credentials. A recent internal survey shows that over 50% of TechOps employees have earned an Associate'sdegree or above, and an additional 20% hold a certificate of some kind.

WHAT CAN CONGRESS DO TO HELP

Delta is proud of our efforts to recruit, train, and retain employees. And this extends beyond TechOps: Delta has implemented similar programs in other workgroups, such as the Propel Program for pilots. In 2018, Delta launched this effort to meet our needs for trained pilots; we expect to hire 8,000 pilots over the next decade as our current pilot workforce reaches the mandatory retirement age. Through partnerships with schools and the military, Propel helps aspiring pilots overcome barriers such as career path uncertainty, a shortage of flight instructors and the cost of quality flight training.

The workforce challenges ahead, however, can't be solved by the airlines alone. We are proud to advocate for changes at the federal and state level that will expand access to skills and training needed to meet tomorrow's demand. In Georgia, Delta successfully advocated to place Aviation Technology on the list of programs deemed as a High Career Demand Initiative. This allows those pursuing a career as an aviation mechanic to receive free tuition through the Technical College System of Georgia (TCSG). Additionally, Delta is collaborating with TCSG to modernize the Aviation Technology curriculum to ensure graduates are job ready upon graduation.

And there are measures Congress should take to support the industry. We appreciate the establishment of a grant program for AMT schools in the last FAA bill (Sec. 625), along with the subsequent funding provided through the appropriations process.

From Delta's perspective, however, the more critical measure in the FAA bill is the provision to modernize AMT training regulations (Sec. 624)—FAA's Part 147 requirements. The current regulations were put in place decades ago and everyone agrees they are woefully out of date. They have not kept up with the changes in

[2] https://www.atec-amt.org/pipeline-report.html

the industry and retain requirements that serve no purpose (e.g. wood and cloth aircraft materials). Without reform, Part 147 regulations will continue to be a drag on training.

The FAA bill required a final rule modernizing AMT training requirement by March 2019. While FAA issued a Supplemental Notice of Proposed Rulemaking (SNPRM) in April 2019, it is still not clear when a final rule will be issued. Ensuring FAA issues this rule quickly is the best and most immediate measure Congress could take to address AMT workforce issues.

Thank you again for holding this important hearing, and I look forward to your questions.

Mr. LARSEN. Thank you very much.

I will turn to Mr. Neely, Gulfstream, to be recognized for 5 minutes.

Mr. NEELY. Chairman Larsen, Ranking Member Graves, on behalf of the 17,000 women and men of Gulfstream, thank you for having me here.

The issues that we are dealing with here today are critically important and timely. Earlier testimony has made that abundantly clear. It is important to aviation companies like Gulfstream, like Delta, and others. But, quite frankly, it is most important to the young people in this country whose skill sets are not being fully realized, who don't understand the opportunities that they have in front of them.

As context for my remarks, I would like to quickly outline Gulfstream's two different, but very interrelated businesses. First, quite obviously, we build business jets. Secondly, in what we call our customer support business, we provide maintenance, repair, and overhaul services for our customers' aircraft, nearly 3,000 in service.

Of Gulfstream's 17,000 employees, it is important to note that roughly 4,000 of those employees are in our customer support, or MRO, business, a key part of our business. We have 10 facilities across the country in 9 different States.

Finally, from a balance of trade standpoint, I would like to very much emphasize that roughly 50 percent of Gulfstream sales are international. The way I like to think about that is 50 percent of the salaries of everybody working on airplanes at Gulfstream is paid by somebody outside the United States. We are very proud of that.

A central theme to Gulfstream's workforce development strategy is proactive engagement from K through 12, and forward, but particularly from the middle school and onwards.

It is absolutely important to understand that the point underpinning our strategy is that our younger generations need help understanding what great opportunities are available in the aviation industry. We have not done our kids a good service in the way we have, quite frankly, deemphasized the role and importance and career opportunities in the technical skills, and particularly in aviation. So our strategy, as you will hear, focuses very much on engaging students early on, educating them into the opportunities, helping them build the skill sets that enable them to enter these career paths, and, quite frankly, making sure that it is not just the students, but it is the teachers and the parents, as well. Because if we don't reach the teachers and parents, they will not encourage the kids to head in the right direction.

Our strategy is best illustrated by running through a few examples, examples that I think you will find instructive, and that have been successful. We have a lot of work to do, don't get me wrong, but they have been successful.

First to the middle school. I mentioned that although we engage with students earlier, we really do a full-court press, so to speak, starting with middle school students. That includes multiple STEM programs, aviation-specific awareness programs, and, among other things, annually we tour over 1,000 middle school students through Gulfstream facilities to let them see, up close and personal, exactly what our facilities look like.

We have youth apprenticeship programs that are high school apprenticeship programs in California, Georgia, Texas, Wisconsin; working in over 40 different job functions, from aircraft assembly, cabinet shop, quality control, aircraft maintenance operations, and the like. They are paid between $10 and $13 an hour, depending on location. They work 15 to 25 hours per week.

Another example that highlights the point made earlier of the importance of industry working with school systems and others, and it is an aviation pathway program that Gulfstream has sponsored in Savannah. It is a program sponsored at a primarily predominantly minority school. We have done it in partnership with the local school system and Savannah Technical College—obviously, the local technical college. This 4-year program, again, is an aviation pathway.

So students, they will enter this as—you know, it is somewhat analogous to a major, if you were in a college. You enter this program, and here is how it works. The first 2 years, eighth and ninth grade, you are doing your work in the classroom, in the labs as a high school student in your own high school, taking high school classes. In 11th and 12th grades, you remain on campus. You are still working in the same labs. But your teachers, your professors, are from the technical college. So during those years you are getting both high school credits and technical college credits.

Students come out of this program with, obviously, a high school diploma, but also one or more technical certificates, depending on which sub-pathway they chose that gave them the skill sets they need to walk right out of the high school into my friend, Mr. McDermott's shop, or Gulfstream's shop, or any others in the industry.

On the technical college front, we have partnerships, relationships with 21 different technical colleges across the U.S. Those partnerships include, quite obviously, AMT, structural mechanic, upholstery, aviation cabinetmaking, nondestructive testing, so on and so forth. How do we support those technical schools? On a number of fronts.

Like our friends at Delta, we are on advisory boards. We support with funding, cash money funding. We support with equipment, including giving a Gulfstream airplane to one of the technical schools for them to work. Granted, it was one that was at the end of its useful life. But we partner with those schools to ensure that their curricula are aligned with what our modern needs are, and—back to that modern needs.

Two last points. One, what we call a consortium event that we held last year. That consortium event, we brought 20 representatives from technical schools across the country to Gulfstream to spend 2 days in a workshop, working with us, seeing what—boots on the ground, seeing what our experience is really like for their students, and getting feedback.

Last, but not least, on the military front, we also hire pretty heavily out of the military—very, very strong skill sets coming out of the military—25 percent of Gulfstream's employees are veterans. In our flight operations group, 90 percent of our test pilots are veterans, and 75 percent of our other pilots in our flight operations are veterans.

I look forward to your questions.

[Mr. Neely's prepared statement follows:]

Prepared Statement of John J. Neely III, Vice President, Law and Public Affairs, Gulfstream Aerospace, a General Dynamics Company

Chairman Larsen, Ranking Member Graves and distinguished members of the Aviation Subcommittee, thank you for the opportunity to appear before you today.

I am honored to be here representing the 17,000 women and men of Gulfstream Aerospace. The issues being addressed here are critically important, and timely. They are important to aviation companies like Gulfstream, and even more important to the individuals in this country who are missing great opportunities because their talent is left untapped.

The most valuable asset of any company is its employees, and that is particularly true at Gulfstream. With that in mind, we have evolved a workforce development strategy for the maintenance, manufacturing and other technical skills required in our business. Although this effort is very much a work in progress, Gulfstream is honored to share our experience with this Subcommittee.

1. GULFSTREAM OPERATIONS OVERVIEW.

As context for my remarks, it is important to understand Gulfstream's operations. We have two distinct but very interrelated lines of business. First, we design, manufacture and sell business aircraft. The second distinct area is our Gulfstream aircraft maintenance, repair and overhaul ("MRO") business, which we refer to as Customer Support.

Our current production models include the G280, G500, G550, G600, G650 and G650ER, all of which are in service with customers, plus the recently announced G700 that is moving toward Federal Aviation Administration ("FAA") Certification.

Our business is very international from both competition and sales standpoints. All of our key competitors are located outside of the United States: Bombardier in Canada, Dassault in France and Embraer in Brazil. Approximately fifty percent (50%) of our new aircraft sales are in the United States and approximately fifty percent (50%) are international. From a balance of trade perspective, it is instructive to note that the percentage of our international sales has grown over the last twenty (20) years from roughly twenty percent (20%) to approximately fifty percent (50%).

Gulfstream's corporate headquarters, largest manufacturing site and largest maintenance facilities are in Savannah, Georgia, where approximately eleven thousand (11,000) of our seventeen thousand (17,000) person workforce is based. Our operations also include the following facilities:

- Locations with both Manufacturing and Maintenance Operations
  - Long Beach, California
  - Dallas, Texas
  - Appleton, Wisconsin
- Locations with Maintenance Operations
  - Van Nuys, California
  - Cahokia, Illinois
  - Palm Beach, Florida
  - Brunswick, Georgia
  - Westfield, Massachusetts
  - Las Vegas, Nevada

2. GULFSTREAM'S WORKFORCE DEVELOPMENT STRATEGY.

Over the past several years, Gulfstream has become increasingly proactive in nurturing and recruiting new talent for our technical jobs. We have done so by focusing on four areas:

- Elementary, Middle and High School Student Engagement
- Technical School Engagement and Recruiting
- Military Engagement and Recruiting
- University Engagement and Recruiting

This work also is supplemented by our post-hire internal training programs, which include initial and advanced training using our own employees and FlightSafety International.

A foundational point underpinning this strategy is that our younger generations need help understanding what great opportunities are available in technical fields and how to take advantage of those opportunities. This awareness work must include students and, likely more importantly, their parents and teachers. So, our approach is to start with young students to build awareness, build desire and, through mentoring and other resources, guide them down the path toward those goals.

We continue this same basic approach for Technical Colleges, Military and Universities, but with a more direct connection between the individual and a specific job at Gulfstream for which that person is suited.

3. EXTERNAL WORKFORCE DEVELOPMENT RESOURCES.

Although we indeed do have a technical skills gap in this country, there is a good news side to this story. As evidenced by this hearing itself, there is a growing understanding of the problem and a corresponding application of resources to address it. Gulfstream's experience, in every state in which we do business, is that local, state and federal organizations are investing in new ideas and approaches for changing the paradigm.

Gulfstream's workforce development strategy relies very heavily on these external resources. Indeed, you will hear several examples as I review Gulfstream's specific activities.

4. ELEMENTARY, MIDDLE AND HIGH SCHOOLS.

Gulfstream engages younger students because, in our view, building awareness and excitement early on helps guide students in their academic decisions and other life choices during those formative years. For example, a ninth grader who is excited about a career as an aviation mechanic will have a very different perspective on his or her math and science courses than a classmate with no particular career in mind.

Our younger student engagement falls into two categories: targeted individual student engagement and awareness activities. These two sets of activities work well together by raising awareness across a large population while, through the targeted engagements, providing in-depth substance that validates the message with real-world successes.

a. Targeted Student Engagement.

Youth Apprentice Program ("YAP").

Gulfstream's YAP, which we operate in partnership with local High Schools, allows students to receive High School credits while earning money working part time at Gulfstream. This provides real world experience to students and hands-on mentoring by their direct supervisors and co-workers, which they use to identify and further their personal career paths.

Our 2019–20 YAP has approximately seventy-five (75) High School Juniors and Seniors in Georgia, California, Wisconsin, and Texas. They are working in approximately forty (40) different job functions, including aircraft assembly, cabinet shop, quality control, accounting, aircraft maintenance operations, engineering and our integrated test facility. Just like a potential full-time employee, students fill out applications, apply for specific jobs, and are interviewed in person by their hiring manager. Once hired as apprentices, they work fifteen (15) to twenty-five (25) hours per week, are paid ten dollars ($10) per hour ($13 in CA) and earn High School Credits for their work.

An important aspect of this program is its ability to correlate students' academic study with future job prospects. An apprentice can see first-hand that math and writing skills, for example, are necessary for their future success and not simply abstract concepts.

Technical/Vocational High Schools.

The increase in High Schools with specific technical and aviation curricula is an effective tool in this area as well. By incorporating courses directed at aviation and technical careers, these schools bring technical career opportunities quite literally directly into the classroom.

Gulfstream supports a number of these schools with funding, equipment and mentors, and we encourage others to do so, too. Technical High schools with which we are involved include Woodville-Tompkins Technical and Career High School (Pilot and Aviation Manufacturing—Georgia), Groves High School (Aviation Manufacturing and Maintenance—Georgia), Westfield Vocational School (Aviation—Massachusetts), West Michigan Aviation Academy (Aviation—Michigan) and Effingham County College and Career Academy (Engineering—Georgia).

Example: Westfield, Massachusetts.

Westfield Technical Academy recently opened a new state-of-the-art training hangar across the airport from the Gulfstream's facility at the Westfield-Barnes Airport. The school began an airframe and powerplant (A&P) program five (5) years ago, and it now graduates approximately 15 students annually who are ready to sit for the FAA A&P Exam. Gulfstream has been a major contributor to the school, which paves the way for the state to provide matching funds. Additionally, Gulfstream employees volunteer at the school speaking to students in the program.

Dual High School and Technical College Enrollment.

An example of another program with similar impact is Georgia's Dual Enrollment Program. This allows High School students with an interest in technical jobs to take courses at one of the State's Technical Colleges and simultaneously earn credits toward both High School graduation and a Technical College Degree.

Programs like this get High School students actively engaged in making career choices while also expediting their entry into the workforce and financial independence. We encourage support for programs such as this and are interested in exploring a combination of this type of program with apprenticeships.

Example: Savannah, Georgia

Gulfstream is sponsoring a dual enrollment Aviation Pathway program through the Groves High School in Savannah, Georgia. This program, which begins in ninth (9th) grade and runs through twelfth (12th) grade, is specifically tailored to build math, science and aviation-specific skills necessary for careers in aviation manufacturing and maintenance. Students must apply for and be admitted into this program, and within the program can select from several pathway options depending on their preferences.

During the first two years of this program, the students' classes are within the High School's system. For the last two years, the students remain on the High School campus but are taught by faculty from the Savannah Technical College and, through dual enrollment, receive both High School and College credits. Students graduate with one or more Technical Certificates issued by Savannah Technical College and are well positioned to move directly to jobs with Gulfstream or another aviation company.

Student Leadership Program ("SLP").

Gulfstream also sponsors a Student Leadership Program ("SLP"), which operates in coordination with High Schools in Georgia, Texas and Wisconsin. SLP's curriculum includes building life skills (aka soft skills), guiding students through an exploration of career opportunities in their local area, including aviation, and helping them build and implement plans to achieve their desired career path.

Example: Appleton, Wisconsin.

SLP in Appleton partners with the Appleton Area School District to support the Fox Valley's workforce needs in showcasing high demand manufacturing careers, including aviation manufacturing and maintenance, to High School students. The program is in all three High Schools in the Appleton Area School District and impacts 150 sophomore and junior students annually. Gulfstream lead formation of a six (6) company partnerships that provide career exploratory tours to students in the program. In addition to learning about career opportunities, students learn important work-ready skills including resume building, financial literacy and interview skills.

b. Awareness Activities.

Gulfstream, like many companies, engages in a wide range of activities to raise awareness among students, parents and teachers. Here are a few examples of our activities in this area.

Job Shadow Programs

Our Westfield, Massachusetts, and Dallas, Texas, facilities both have successful job shadow programs. In Westfield, we partner with the Westfield Vocational Technical High School, which has a robust aviation program, to bring students into our maintenance facility and shadow our aircraft maintenance technicians during their workday. This effort is part of the FAA's "Walk In My Boots" initiative aimed at exposing students to the benefit of an aviation maintenance career.

Similarly, in Dallas, we partner with local High Schools and host students for two days of aviation job experiences. Activities include wiring the avionics for an aircraft, working with sheet metal, making a sales pitch and visiting Dallas Love Field's control tower.

GAMA/Build A Plane Aviation Design Challenge

Gulfstream also supports the General Aviation Manufacturer's Association ("GAMA") Build A Plane Design Challenge, which started in 2013 as a way to introduce High School students to aviation careers. For this competition, schools receive student and teacher copies of the Fly to Learn curriculum and software powered by X-Plane. Over the course of six weeks, they learn about topics such as the four forces of flight, aspect ratio, and even advanced subjects such as supersonic flight. They then compete in a fly-off that requires them to modify a virtual airplane to fly a specific tasked mission in a simulator. GAMA takes into account the score from this flyoff, as well as a checklist of the steps they took to complete the flight, a summary of the design changes they made to the airplane, and three videos submitted throughout the competition on what they learned.

Hayesville High School in North Carolina is the winner of the 2019 GAMA Build A Plane Aviation Design Challenge. As the prize, four students, one teacher, and one chaperone traveled to Glasair Aviation in Arlington, Washington, to build a Glasair Sportsman aircraft. For the winning team, the hands-on experience working side-by-side with experts as they build a real airplane is phenomenal.

STARBASE

Gulfstream partners with the U.S. Department of Defense to sponsor week-long camps for fifth-grade students at Hunter Army Airfield in Savannah, Georgia. The program offers "hands-on, mind-on" activities meant to spark student interest in STEM programs. Students interact with military personnel by working on computers, flying aircraft simulators and participating in other hands-on activities.

5. TECHNICAL COLLEGES.

In Gulfstream's business, Technical Colleges are a critical pipeline for developing trades and craftspeople for work in our manufacturing and maintenance operations. Although these schools' existing, standard programs provide a solid skills development base, our most valuable work with them has been in situations where we have helped develop the curricula.

This joint development includes Gulfstream co-developing and even co-teaching Technical School courses. Several examples from Gulfstream's experience, we believe, provide insight.

Example: A&P School.

FAA regulations require that aircraft maintenance technicians have an FAA-issued Airframe and Powerplant license (an "A&P License"). Given our need for qualified A&P technicians, we partnered with the A&P School of the Savannah Technical College to ensure that its courses aligned with our needs.

The school appointed our experts to the Advisory Board. Gulfstream has donated funds (e.g., to purchase avionics training equipment) and items to the school to provide the students with real-world equipment, including a complete Gulfstream aircraft—a model G100 that had reached the end of its useful life. By being an active participant in the A&P School's curriculum development, and ongoing class work, we are able to help the faculty stay aligned with the latest industry techniques and get to know the students.

Example: Advanced Cabinet Maker Course.

As an excellent example of the in-depth approach, a number of years ago Gulfstream was having difficulty finding skilled cabinet makers to build furniture for our aircraft interiors. To address this issue, Gulfstream partnered with Savannah Technical College. In doing so, we learned that other area businesses in the boat and home construction industries were having similar issues.

Gulfstream paired our cabinet shop master craftspeople with the school to develop a course. We also provided a master craftsperson to co-teach the course with the

school's faculty. This provided the double-benefit of ensuring that instruction matched our requirements and it allowed our instructor to identify the top students for recruitment to Gulfstream.

Example: Manufacturing Technology Transition Training.

Gulfstream's G650, which first entered customer service in 2012, is built using significantly different manufacturing techniques than aircraft produced previously. Consequently, ramp up of that production line necessitated transition training for our existing employees moving from other aircraft to the G650.

To assist, we enlisted the help of Georgia's Quick Start Program. Quick Start, which is part of the Technical College System of Georgia, offers tailored employee training services to qualified companies. Quick Start instructors paired with our team to develop transition training programs for specific, proprietary manufacturing techniques used for the G650. Because the program's mandate allows it to enter into Proprietary Information Agreements with its customers, Gulfstream was able to use this resource without jeopardizing our valuable trade secrets.

6. MILITARY.

Recruiting U.S. Military Veterans is a vital part of Gulfstream's strategy for finding employees with the necessary technical skills. As direct evidence of that fact, approximately twenty-five percent (25%) of Gulfstream's domestic employees are U.S. Military Veterans. In our Flight Operations group, approximately ninety percent (90%) of our test pilots are Veterans and approximately seventy five percent (75%) of our other pilots are Veterans. These high percentages are a testament to the quality of training within our Armed Services, and to the cultural fit between them and Gulfstream.

Gulfstream recruits veterans heavily because of the combination of technical skills, disciplined work ethic and leadership skills that they so consistently demonstrate. Aircraft maintenance and avionics technicians, for example, come to Gulfstream with skills and experience that enable them to quickly integrate into our operations.

To recruit Veterans, we use a proactive, comprehensive approach that includes extensive in-person outreach to military bases—including participation in Transition Assistance Program Classes at those bases—customized Veteran recruitment advertising, and active participation in a number of Veterans organizations.

7. ENGINEERING UNIVERSITIES.

Our engagement with Universities relies heavily on our intern and co-op programs with those schools. Also, in keeping with the High Demand Career Initiative concepts discussed above, we are becoming increasingly active in providing input on specific skills-needs and engaging students in for-credit research projects that complement their skills development and our research needs.

Like many companies, we have intern and full co-op programs in our engineering department. Interns and co-ops are hired through a competitive selection process. While working, they are paid a competitive hourly wage and receive 401k and life insurance benefits. Gulfstream also provides housing for students who do not live in the local area. In 2019, we had one hundred fifty-eight (158) interns and one hundred fifty-nine (159) co-ops.

Interns typically work during their summer breaks. Co-ops alternate between a semester of school and a semester at Gulfstream and must complete three (3) semesters at Gulfstream.

These programs provide an excellent resource for hiring students with the right skills, and as importantly the right cultural fit, for Gulfstream. Students work alongside our full-time engineers in our various programs. They also rotate between departments within engineering, so that they and we can find the best fit.

The success of these programs is demonstrated by the hiring. Over ninety percent (90%) of Gulfstream's entry-level engineering positions are filled through our intern and co-op programs.

In conjunction with these programs, we have developed and continue to mature our partnership agreements with Universities. These agreements include both formal and informal arrangements for research projects, mini-sabbatical opportunities for faculty to work at Gulfstream and Gulfstream employee memberships on Advisory Boards.

Mr. Chairman, Members of the Subcommittee, I thank you for the opportunity to share Gulfstream's experience in this critically important issue of ensuring a highly skilled aviation workforce well into the future.

Mr. LARSEN. Thank you.

And finally, I want to call upon Dana Donati, general manager and director of academic programs at LIFT Academy.

You are recognized for 5 minutes.

Ms. DONATI. Good afternoon, Chairman Larsen, Ranking Member Graves, and distinguished members of the subcommittee. My name is Dana Donati, general manager and director of academic programs at LIFT Academy, a Republic Airways company. In addition to leading LIFT Academy, I have spent 11 years as a Republic Airways pilot, type rated on both the De Havilland Dash 8–Q400, and the Embraer 175. In addition, I have held positions as an assistant chief pilot and dean of aviation at a community college. Thank you for the opportunity to share my perspective today.

LIFT is a flight school and technician apprenticeship program focused on addressing the pilot and technician shortage, while ensuring technicians and pilots who enter the aviation workforce at Republic have the appropriate skills and training needed for success.

Republic launched LIFT in September 2018. Since then we have received over 4,000 applications, and secured over 500 student enrollment dates, with 281 flight students enrolled today. In 2019, the Department of Labor approved two LIFT Academy apprenticeship programs, the Aviation Maintenance Technician Apprenticeship program and the Airline Transport Pilot Apprenticeship program. Each provides apprentices with a high-quality career pathway, using the "earn and learn" model.

Republic Airways is a large, regional airline that partners with United, American, and Delta. Like other airlines, Republic has had to overcome pilot and technician workforce challenges that threaten our ability to continue to serve these communities. While Republic is fully staffed today, upcoming retirements are expected to strain supply. About half of today's qualified pilots will reach mandatory retirement age within 15 years. In addition, ATEC projects 30 percent of today's technician workforce is approaching retirement.

Republic Airways invested in pilot and technician training through LIFT Academy, supporting pilots from first flight to attaining 1,500 hours. Our mission at LIFT is to attract a new generation of aviators to flight by providing superior flight training, while addressing the economic and structural barriers to entry. The barriers I will highlight are outreach and awareness, cost of training, technology, and training behaviors.

We know that outreach is crucial for strengthening and diversifying the aviation workforce. At LIFT we have built outreach programs through partnerships and actions designed to attract and support pilots and technicians. LIFT is also targeting under-represented demographics through outreach. We want to improve enrollment from a diverse base of candidates, and have taken steps to do so, which I have discussed in my written testimony.

To help attract candidates to LIFT's maintenance apprenticeship program, we partner with Indiana high schools and career technology centers, introducing them to industry-recognized certification.

Pilot career path inaccessibility has undercut the effectiveness of these outreach programs. Pilot education and training costs associ-

ated with flight education degrees at institutions of higher ed exceed Federal student loan caps. To bridge the gap, students or parents must apply for personal loans. LIFT has been working to address this, providing tuition subsidy, loan assistance, and a guaranteed job, making LIFT Academy one of the most affordable and accessible pilot training programs in the Nation.

Technology advancements in today's commercial aircraft require both pilots and technicians to learn additional technical skills to manage automation. Technician apprentices begin their 30-month apprenticeship, working on the most advanced equipment that general aviation has to offer. With hands-on and classroom training, LIFT's technician apprentices are surrounded in a high-tech training environment.

Classroom training for both pilots and technician apprentices incorporate the best practices of the airline by using documentation that replicates the airline's materials. Simulator training allows for actual systems failure and weather-induced scenario flying, promoting excellent safety practices and industry competencies.

By removing barriers to flight training through industry-recognized apprenticeship programs, LIFT is helping Republic develop their future workforce.

We also have recommendations for policymakers to empower programs like LIFT to do more to strengthen tomorrow's workforce. Expanding the title IV Federal financial aid program will ensure students can finance flight training costs associated with flight education degrees.

Next, Congress can encourage the FAA to update part 147 curriculum, so that mechanics are prepared to work on technologically advanced commercial aircraft.

And lastly, there are too few structured training pathways to meet the demand for training airline pilots, which may force pilots to accumulate flight time on their own, or deter them from the career path, altogether.

Chairman Larsen, Ranking Member Graves, and members of the subcommittee, thank you for making workforce development a priority. It is our privilege to testify today, and I welcome your questions.

[Ms. Donati's prepared statement follows:]

Prepared Statement of Dana Donati, General Manager and Director of Academic Programs, LIFT Academy

Good morning Chairman Larsen, Ranking Member Graves and distinguished members of the Subcommittee. I am Dana Donati, General Manager and Director of Academic Programs at the Leadership in Flight Training (LIFT) Academy, a Republic Airways Company. LIFT Academy is a flight school and technician apprenticeship program focused on addressing our nation's looming pilot and technician shortage, while ensuring technicians and pilots who enter the aviation workforce at Republic Airways have the appropriate skills and training needed for success in the commercial airline environment.

The Aviation Workforce title in the FAA reauthorization Act of 2018 has helped to further critical discussion and action within our industry on the steps we must take to attract the next generation of highly skilled associates and we greatly appreciate this Subcommittee's leadership in advancing those provisions. LIFT Academy and Republic Airways looks forward to partnering with you to ensure our aviation workforce continues to support safe, reliable air service to every corner of the coun-

try. Thank you for holding this important hearing and for the opportunity to share my perspective.

In addition to leading the LIFT Academy and supporting workforce development, I am a professional airline pilot with over 8,000 flight hours. I received my initial professional pilot training from the Community College of Beaver County (CCBC), a Part 141 aviation school. I gained my BS in Aviation Management from Robert Morris University and my MBAA from Embry Riddle and went on to fly as First Officer at another regional airline before moving to Republic, where I spent 11 years and eventually became Assistant Chief Pilot. I have held positions as First Officer on the Embraer 175 and Captain on both the De Havilland Dash8 Q400 and the Embraer 175. Throughout my career at Republic and in higher education, I have had an intimate view of workforce development and training. After spending a few years away from Republic as Dean of CCBC's School of Aviation, I returned in 2017 to focus on workforce development initiatives such as the LIFT Academy, which I lead today.

After nearly a year of detailed advanced planning and design, Republic opened LIFT Academy on September 4, 2018, with a pilot training program and an initial class of 13. Since then, we have received over 4,000 applications and have secured 500 students' enrollment dates, with a current enrollment of 281 flight students and 19 registered apprentices. In 2019, LIFT added a technician program, enrolling five students initially and quickly growing from there. This program will broaden the pool of qualified, licensed aviation maintenance technicians to support the growth of LIFT and Republic Airways.

Today we have training programs for both pilots and mechanics and upon maturity, will graduate 330 pilots and 20 maintenance technicians to the aviation workforce each year. As a point of reference, Republic has averaged approximately 600 new hire pilots and 122 new hire maintenance technicians annually for the last two years; these numbers are expected to grow by approximately 50 percent over the next decade. With expansion plans on the horizon, and with Republic Airways poised to hire 200 new technicians in 2020, LIFT Academy expects to increase its yearly graduates even further.

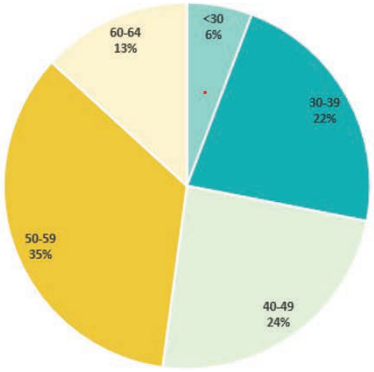
REPUBLIC AIRWAYS

Republic Airways is a large regional airline with over 6,000 employees that operates over 1000 scheduled flights each day in partnership with our major airline partners American, Delta and United. Republic completed more than 337,000 flights in 2019 and served roughly 100 cities in North America, including Canada, Mexico and the Caribbean. According to the Regional Airline Association, regional airlines operated 41 percent of the nation's departures and safely carried more than 159 million passengers on nearly four million departures in 2018, with over 10,500 departures a day. Regional airlines play a critical role in connecting communities large and small to the global air transportation network; in fact, at two-thirds of our nation's airports, regional airlines provide the only source of scheduled passenger air service. While airlines like Republic contribute to aviation's overall $1.6 trillion economic footprint, those communities served exclusively or predominantly by regional airlines generated more than $134 billion in economic activity on their own and supported more than one million jobs in 2018.

Like other airlines, Republic has had to overcome pilot and technician workforce challenges that threaten our ability to continue to serve these passengers and communities. Republic was not alone in facing these challenges; in fact, pilot and technician shortages continue to make headlines with Boeing's 20-year forecast reporting a shortage of 212,000 pilots and 193,000 aviation maintenance technicians in North America alone. While Republic is able to fully staff our flight decks today, FAA airmen data shows the demand for airmen is unrelenting and we anticipate that coming retirements and normal domestic growth demands will continue to strain today's pilot workforce. In fact, nearly half (47.6 percent) of today's qualified pilots who hold ATP AMEL certificates and valid 1st class medicals will reach mandatory retirement age within 15 years (51,762 airmen). Additionally, 13.4 percent of all ATP AMEL airmen with valid 1st class medicals will reach mandatory retirement age within five years (14,616 airmen). For context, the size of today's actively flying regional airline pilot workforce is about 17,000 pilots. Importantly, this retirement data simply looks at known, age-65-related attrition to our domestic airmen workforce. Were we to factor in a continuation of recent four percent to five percent domestic growth departure demands, we could easily see the need for another 15,000 pilots over the next five years.

ATP AMEL Airmen with Valid 1st Class Medicals by Age

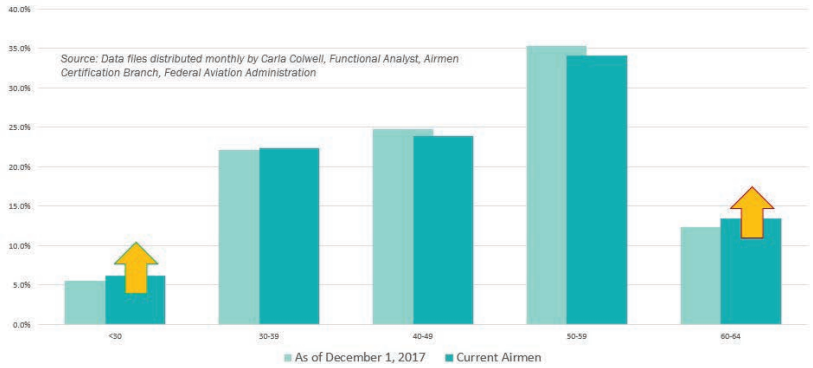
- 51,762 qualified airmen will reach mandatory retirement age within 15 years.
- 14,616 qualified airmen will reach mandatory retirement within 5 years.
- US Regional airlines employ about 17,000 actively flying pilots.



Source: Data files distributed monthly by Carla Colwell, Functional Analyst, Airmen Certification Branch, Federal Aviation Administration

While FAA data shows an uptick in new pilots entering the system, we are seeing an even larger uptick in pilots approaching mandatory retirement, showing that new pilots entering the system are still not keeping pace with retirements.

ATP AMEL Pilots with Valid 1st Class Medicals by Age



Even more critically, regional airline training departments were beginning to report that pilots entering initial training were not performing as well as they did in years past. From 2013–2018, these findings were confirmed by a series of academic studies detailing new hire training performance correlating with various pilot backgrounds. While these studies [1] merit review in full, each showed flight hours alone to be a poor predictor of pilot performance. In fact, data has shown that pilots with lower total flight time have a higher training completion rate and need less remedial training. We believe this is because pilots with lower flight time replaced unsupervised flight time with structured flight time and specific, structured training, incorporating academics, relevant practical experience, experience in a crew environment, flight instruction and other components of training and experience that are stronger predictors of pilot performance than hours alone.

With these factors in mind, Republic Airways made a substantial investment in pilot and technician training by creating our LIFT Academy. As LIFT Academy supports pilots from first flight to attaining 1,500 hours, we incorporate structure throughout and scaffold required flight time with important academic training. Our mission at LIFT Academy is to attract a new generation of aviators to flight by providing superior flight training, while addressing the economic and structural bar-

[1] https://www.pilotsourcestudy.org/new-pss-2018

riers to entry. Three barriers I will discuss today are the cost of training, training behaviors and technology.

LIFT Academy Mission

At Republic and at LIFT, a relentless focus on safety drives everything we do. Our flight crews and maintenance technicians are some of the most experienced and thoroughly trained in the entire airline industry and when we launched LIFT in the face of a growing pilot shortage, Republic Airways was meeting two related, but distinct, challenges. One objective was to expand the pool of qualified pilots. In recent years, fewer pilots have entered the workforce than needed to keep pace with those leaving the workforce due to mandatory age 65 retirements, let alone to accommodate growth in passenger demand. More importantly, while our recruiting departments were still attracting plenty of qualified candidates, Republic's training officials were finding that many of those candidates were qualified on paper but in fact were unable to meet Republic's rigorous training requirements, as detailed above. Considering this, Republic was not satisfied to simply expand the qualified pilot population but aimed instead to ensure an adequate supply of qualified pilots with the core competencies and skills relevant to the commercial flight deck.

Today, Part 121 professional pilots qualify through two types of pathways. In the first instance, a pilot trains to Commercial Pilot Certificate standards and then becomes eligible for Part 121 airline hire by assimilating additional hours in flight until the pilot has attained a total of 1,500 hours. These pilots enter airline initial training programs with an unrestricted Air Transport Pilot (ATP) certificate. The second is where a pilot receives rigorous, highly structured, aviation-related academic training alongside their flight training. This training is focused on the scenarios and tasks the pilot will be presented with in the commercial flight deck. When students in these programs graduate from training, they meet the eligibility criteria for a Restricted Air Transport Pilot (R–ATP) certificate. Republic found that newly hired pilots from these structured training programs were consistently outperforming their counterparts who followed a predominantly hours-based background, where the latter need more remedial training and fail to complete training more often. While candidates coming from hours-based qualification pathways can certainly succeed in initial training and many go on to become competent and valued pilots, this qualification pathway does not provide the hiring carrier with a real sense of where and how the aviator has spent that time. Unfortunately, structured training pathways, traditionally offered by institutions of higher education and the military, are limited in number and other ways that constrain aspiring pilots' access to them.

Considering this, and to meet the anticipated shortfall of suitable pilots, Republic Airways clearly identified the need to ensure a supply of highly trained pilots with a solid background of academics and flight training that would reflect the airline's requirements for a pilot flying under Part 121 regulations. By creating the LIFT Academy, Republic took a unique, proactive approach to addressing the growing shortage of suitably trained pilots, by becoming the only regional airline to operate its own training academy specifically designed to create a direct-to-hire path for its graduates. Students train on state-of-the-art, eco-friendly single and multi-engine training aircraft. This training is supplemented with high-fidelity flight simulators, which are built to achieve the most realistic flight deck environment. Our training aircraft are equipped with state-of-the-art technologies, such as glass cockpits and Full Authority Digital Engine Control (FADEC), that seamlessly transfer learning to the regional jet aircraft flight deck. Our program provides LIFT students with the skills and the commercial airline professionalism required of Republic Airways pilots.

Technology

Technology advancements in today's commercial aircraft require pilots to learn additional technical skills and behave differently. Stick and rudder or pure hand-flying skills remain critical, but flight deck management skills and pilot decision making skills are also required to complete the framework of a well-educated pilot. Recognizing this, we determined that state-of-the-art training facilities and equipment would be required to take the aspiring pilot to the educational and skill level required to enter regional airline initial first officer training. Consequently, a LIFT Academy student trains in Diamond single and multi-engine aircraft, which are state-of-the-art training aircraft designed to give the student exposure to modern technology in the flight deck. For example, the Diamond aircraft are equipped with Garmin G1000NXI avionics. This next-generation flight deck technology provides multi-function information, navigational and instrumentation displays that are in-

creasingly being incorporated into regional and major operators' airliners. The displays can show aircraft position on taxiways and runways and other aircraft converging on one's present position in the air. The synthetic vision technology capability creates a "virtual reality" database landscape with similar terrain, obstacle, flight plan routes, weather, airports and other important details displayed on the Primary Flight Displays. With color coded terrain and WAAS–GPS based precision landing approach guidance, LIFT Academy students train using the highest level of technology in general aviation preparing them for the technology required in passenger aircraft.

TRAINING BEHAVIORS

In the classroom environment, LIFT Academy is developing training material using virtual reality simulation to enhance procedural learning for both flight students and aviation maintenance technician apprentices. In addition to the equipment, the training program incorporates the best practices of the airlines in using documentation that replicates airline checklist and briefing materials and incorporates Threat and Error Management and Crew Resource Management principles in a crew concept program.

Once students complete their training as a Commercial pilot, LIFT trains them to become Certificated Flight Instructors. From that time until they achieve their required 1,500 hours and may enter the Republic New Hire First Officer training program, LIFT students are flying and training other students in an academic, structured training environment. Every lesson taught by an instructor incorporates LIFT Academy syllabus requirements. As instructors teach and critique lessons, they continue to perfect their flying ability and knowledge. Additionally, LIFT Academy students perform training in Class Charlie (controlled) airspace in and around airline traffic and we have specifically created procedures for our students to fly arrivals imitating the FAA arrivals surrounding the Indianapolis International Airport. In this way, students are gaining real world experience in a Part 141 environment under both visual flight rules and instrument flight rules while they instruct at LIFT Academy.

Additionally, flight training in the aircraft allows for controlled simulated system failures and simulated abnormal weather conditions. Examples include partial panel flying, flight instrument failures, aircraft systems failure, unusual attitude recoveries, stall recoveries, emergency assistance, missed approach procedures, wind shear, complicated or sidestep approach maneuvers, approach guidance failures, emergency approach procedures, and more. Flight training in the flight simulation training device (simulator) allows for actual system failures and weather-induced scenario flying. Aircraft, electrical and engine malfunctions, as well as smoke and fire emergency procedures are also incorporated throughout the training syllabus. Simulation training of abnormal and emergency malfunctions promote excellent safety practices, building competence and confidence. Where a pilot accumulating flight time on his or her own will rarely if ever encounter or gain skills on emergency procedures or relevant commercial airline behaviors, at LIFT these are core curriculum components, leaving nothing to chance.

BARRIER TO ENTRY: CAREER AWARENESS

As this Subcommittee knows, one of the most important aspects of strengthening and diversifying the aviation workforce takes place through outreach. At LIFT, we have built outreach into our program through partnerships and direct actions to appeal to and support a broad complement of potential pilots and technicians. One element showing strong success is the LIFT Lab, which travels to K–12 schools, recruiting events, air shows, STEM fairs, Girl Scouts and Boy Scouts events and provides everyone the ability to 'experience flight' using virtual reality. The LIFT Lab also provides the ability for offsite applicant testing; traveling to cities outside of Indianapolis to interview and test applicants increases outreach.

LIFT Academy is also specifically targeting underrepresented demographics through our outreach activities and have taken the following steps to encourage and support such applicants. Today, about 20 percent of the applications LIFT Academy attracts come from women and about 8 percent of our total enrollees are women. LIFT competes for enrollees with other academies, including those offered by mainline air carriers, as well as other STEM professions and some women enroll elsewhere. However, we are constantly scrutinizing our data to identify bias, or unique circumstances that might be preventing women from enrolling in the numbers we

want to see. For example, studies[2] have found small, if any, differences in academic and cognitive abilities between genders. Yet high school course selections vary between boys and girls, measuring different academic performances. We believe these facts may influence scoring on our screening tests and are consistently evaluating more appropriate ways to weigh varying criteria in our selection process.

Drawing on my experience in pilot training and education, I know how important it is to get in front of girls at a young age, to successfully encourage them toward a career in aviation. In order to close the gender gap in aviation, we instituted programs such as career days, STEM events, and aviation camps for K–12 girls to help them prepare for training at LIFT Academy. Presently, LIFT partners with dozens of organizations to expand our reach. The Girl Scouts and Boy Scouts of Indiana, Project Lead the Way, Junior Achievement, the Indiana Black Expo, Diversity in Aviation, the Organization of Black Aerospace Professionals, and the Latino Education Summit are just a few examples of how we are reaching new candidates, including those who may not have had many prior aviation experiences.

Barrier to Entry: Cost of Training

Pilot career path inaccessibility is a policy problem undermining the effectiveness of workforce outreach programs. Pilot education and training costs associated with flight education degrees at institutions of higher education dramatically exceed Federal student loan caps. Subsidized and Unsubsidized Aggregate Loan Limits for Independent Students is $57,500 for a four-year degree program and $20,000 for a two-year degree program but the total degree costs for a bachelor's degree, alongside the added expense of flight training, can often exceed $200,000. To bridge this substantial funding shortfall, students or their parents must apply for personal loans to make up the funding shortfall, yet not every family has the financial background or credit scores needed to access these loans. This is even more true among the underrepresented minority population in aviation. Today, students do not have equal access to pilot training; those without wealth or access to capital are often barred from the career path because they cannot raise or borrow the funds needed for training. According to a 2018 Government Accountability Office report surveying collegiate aviation schools, the high cost of flight education degrees presented one of the primary challenges to recruiting and retaining students. In my experience, this remains a significant barrier of entry today.

LIFT has been working to address this. As a vocational program, the cost of qualifying for an Air Transport Pilot Certificate through LIFT Academy is substantially lower than the cost of a two- or four-year aviation flight education degree program. The cost to a student training at LIFT Academy is $65,000, after a $20,000 per student tuition subsidy from Republic Airways. This subsidy is the only one of its kind offered by a US airline to flight-training candidates. Republic additionally offers graduates who work for Republic for five years another $15,000 in loan forgiveness. With a guaranteed job at Republic for all graduates, and competitive pay for Flight Instruction during the course of the program, these combined supports make the LIFT Academy one of the most affordable and accessible pilot training programs in the nation.

Unfortunately, most pilots who train outside of two- and four-year degree programs—even at highly-structured programs such as LIFT—have no access to Title IV Federal student financial aid at all. While such funding is available for other vocational training, the process for accreditation of highly structured programs like LIFT can be difficult, and accreditation is a required component of Title IV funding. LIFT plans to commence the accreditation process that will allow our students to qualify for Title IV in September 2020. In the interim, we help students address this challenge by working with private lenders to help students fund flight training and establish payback options that align with their career progression. Students who successfully complete our training program are guaranteed a job that will allow them to comfortably repay their loan obligations. Moreover, a Brown Aviation Lease review of career earnings data from the Bureau of Labor Statistics, Embry-Riddle Aeronautical University, Association of American Medical Colleges and the American Bar Association found that the Return on a pilot's training investment exceeds those of doctors and lawyers.

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[2] https://courses.lumenlearning.com/suny-educationalpsychology/chapter/gender-differences-in-the-classroom/

Through subsidized training, reduced-cost training, loan forgiveness and tuition assistance, LIFT Academy is making a true investment in a young person's future. Doing so has opened new opportunities for students from diverse backgrounds who could not otherwise have attained training and will have a guaranteed Republic pilot job waiting for them when they graduate from the program. At LIFT we understand, despite our best screening and up-front testing, some students will simply not make it. Unlike some "for profit" flight training institutions who will continue to provide training as long as the student continues to pay, LIFT seeks to quickly identify individuals who do not show long term potential and remove them from the training programs quickly so that they do not needlessly waste their resources. Considering this, loans obtained by LIFT students today are "money good;" yet, about 25 percent of LIFT Academy candidates who pass initial screening cannot obtain these private loans, even with support from LIFT. This is not surprising, because LIFT outreach programs reach talented candidates with high aptitude, but who may have been exposed to life circumstances that have impacted their ability to maintain the necessary credit scores.

One of the first applicants who was accepted to LIFT Academy has been unable to secure the loan needed to cover funding. This applicant had been living with limited means for some time and could not get his credit score up despite taking advantage of credit counseling from our lender. This talented student, from an underrepresented demographic, wants to become a pilot and has the drive to do so. He passed our initial screenings comfortably. The only thing standing between him and a life-changing career in aviation is a credit score that has blocked his education financing. If LIFT Academy students like this had access to Title IV Funding, otherwise known as guaranteed student loans, we could help these candidates overcome the financial barricades that block this career.

MAINTENANCE TECHNICIAN PROGRAM

In addition to reducing barriers of entry for aspiring pilots, LIFT Academy has expanded its focus on aviation maintenance technicians, another profession in short supply. In fact, the Aviation Technician Education Council (ATEC) projects that the mechanic population will decrease by 5 percent in the next 15 years and indicates 30 percent of the workforce is at or near retirement age. Forecasts by the U.S. government and Boeing project a need for thousands of additional mechanics in the next 10–20 years. ATEC tells us that some of the toughest challenges to growing the maintenance technician pipeline include maintaining qualified instructors, testing costs, lack of mechanic examiners, and a lack of awareness of the career path or its advantages.

To help attract candidates, LIFT Academy works closely with Indiana high schools and career technology centers by presenting students with alternative training pathways, such as LIFT Academy's Aviation Maintenance Technician Apprenticeship program. The "earn and learn" model helps students with various financial

backgrounds, because they are paid for their training and receive an industry recognized certification upon successful completion of the program.

Moreover, the Department of Labor has approved two LIFT Academy apprenticeship programs, the Aviation Maintenance Technician Apprenticeship Program and the Airline Transport Pilot Apprenticeship Program. Each provides apprentices with a high-quality career pathway using the earn and learn model. Technician apprentices gain paid work experience alongside licensed Airframe & Powerplant (A&P) professionals while they receive classroom instruction preparing them to obtain industry-recognized credentials. During the program, apprentices gain experience working on LIFT's fleet of Diamond single- and multi-engine DA40 and DA42 aircraft and Republic's Embraer 170/175 jets. Upon completion of the 30-month program, graduates will benefit from job offers at Republic Airways as an aviation maintenance technician.

RECOMMENDED POLICY ACTIONS

By removing the barriers to flight training and offering industry recognized apprenticeship programs, LIFT Academy is helping Republic Airways develop their future workforce. We additionally have recommendations for policymakers that would empower programs like LIFT to do even more to strengthen tomorrow's pilot and technician workforce.

Expanding the Title IV Federal financial aid program will ensure students can cover additional flight training costs associated with flight education degrees. While the LIFT program represents an excellent alternative for students, as an industry, we are committed to dramatically increasing the supply of pilots from all sources, including degree programs at institutions of higher learning. Next, Congress can encourage the Federal Aviation Administration to update the Part 147 curriculum so that mechanics are prepared to work on technologically advanced commercial aircraft. We applaud Rep. Young (R–AK) for introducing legislation directing FAA to issue a performance-based regulation and ensure that FAA incorporates Department of Education expertise. Next, we need to make it easier for America's veterans to use their GI Bill benefits to pay for flight training, including their private pilot's license. These are high demand jobs and America's veterans are among the most deserving and should be able to fully benefit from their promised benefits on educational financial assistance. Lastly, I have personally seen the difference that a structured pilot training pathway makes for pilot performance when compared with pilots who have simply accumulated unstructured, fair-weather flying hours on their own. While structured training pathways offered by traditional providers such as military and institutions of higher education produce strong candidates, many aspiring pilots cannot access these pathways and will instead qualify through unstructured flying time. Others will be deterred from the career path altogether. Institutions like the LIFT Academy have stepped up by creating additional, highly structured pilot training pathways and would be able to further improve access to workforce training if our potential students could realize Federal funding support. This is especially true if we want to expand the underrepresented demographics in the flight deck of tomorrow. We understand Title IV funding mechanisms are relatively fixed; but we encourage Congress to think creatively about assisting our students and potential students, who cannot access funding today but would enroll tomorrow if they could access guaranteed student loans or similar supports. As we request these considerations, LIFT and Republic will continue to do our part so more students can access high quality structured training.

CONCLUSION

Chairman Larsen, Ranking Member Graves, and members of the Subcommittee, thank you for taking the time to hold this hearing and making workforce development a priority. It is a privilege to testify today, and I welcome any questions you may have.

Mr. LARSEN. Thank you very much. I will now turn to Member questions, and I will start by recognizing myself for 5 minutes. And I am going to just maybe randomly pick just one of—it will be Mr. McDermott.

On the part 147 mechanics curriculum, how ready are you—and maybe you could talk to the industry, and if not I will call on others—to flip the switch on that curriculum? If the FAA were to come out today with a rule—and we heard it may be later this fall—if

they were to come out with a rule, how quickly could you flip the switch on the curriculum? The training people, the equipment to support that curriculum, and so on.

Mr. MCDERMOTT. From a Delta——

Mr. LARSEN. Get that microphone.

Mr. MCDERMOTT. Yes. From a Delta perspective, we are absolutely ready to go. In our partnerships, and having the discussions at all the schools, we are making it very clear that, once the curriculum has been updated, we will find ways to be able to assist them in many, many ways we have already been doing.

It is too important to the industry to be able to get that modified curriculum—specifically, in avionics, as well as composites. We have done some payments out of our foundation to different schools to start building on that today. We are not going to wait. But certainly, as this progresses, we will be ready to go.

Mr. LARSEN. Ms. Donati, can you discuss that question, as well, from an educator's perspective? And I will go back to Aviation High School on this question, as well. How quickly could you flip the switch to an updated curriculum?

Ms. DONATI. Well, for LIFT Academy, it is a little different, because we are an apprenticeship program. So our entire fleet at LIFT is composite, because we are training what Republic Airways needs, which is technicians to work on composite aircraft.

We are meeting the requirements of part 147 through, you know, different teaching models to teach dope and fabric. But those students, other than learning it in the classroom, they are not really experiencing it. So, as far as, you know, how quickly we can adjust to new curriculum, it could happen overnight at LIFT Academy.

Mr. LARSEN. Mr. Jackson, could you respond to that question?

Mr. JACKSON. Sure, and I want to first thank you for having two of us represent the school.

So it is a great question, because, as a New York City public high school, as I mentioned in my statement, we have a lot of regulations, not just FAA, but New York City and State requirements to follow.

Mr. LARSEN. Yes, right.

Mr. JACKSON. So it is definitely a challenge for us.

And Mr. Cotumaccio oversees the aviation maintenance program, so I would like him to address that aspect of it.

Mr. COTUMACCIO. Good morning, thank you. I know we have been speaking quite—very clearly today on the modernization of curriculum, and the words "composite" and "avionics" come to mind. Avionics and composites, as it addresses a part 147 school, becomes a difficult challenge. Just in budget alone, it would seriously affect our school budget to support such technology. However, we at Aviation High School are working very closely in collaboration with our local FSDO, with Delta Air Lines—thank you, Delta—and with JetBlue to move in that direction.

I have with me here today a project that was designed locally at our school, in collaboration with the parties mentioned, where we do just that. We have taken an old design—going back to Ms. Donati's testimony concerning wood and fabric. This wing bay—and we call this a wing bay, and this is a section of an aircraft wing with the associated aileron, a flight control. For many years at

Aviation High School it was constructed out of wood, dope, and fabric. We have moved to composites, where we now have our youngsters incorporate advanced sheet metal and composite technology, where we actually do the repairs that our airline partners are so desperately in need of.

So very quickly, just to wrap this up, can we flip a switch? My answer is no. We cannot. It will take some time. It will take a collaboration of all parties mentioned. However, it is doable, absolutely. We are proving it. It can be done.

Mr. LARSEN. Great, yes. Thank you.

And, Ms. DeVivo, can you answer the same question?

Ms. DEVIVO. Yes, similar. There is—it is not a flip of a switch. It would take some time. You would need to give us an opportunity to make sure we had budget dedicated, then to work with the FAA to work through the whole process of the manual update and the laboratories.

I mean we are fortunate, as a Hispanic-serving institution, to qualify for title V and title III grants, and have actually just added a state-of-the-art composites lab. So in some ways we are ahead of the curve, knowing this was coming, right?

But it is unclear to us exactly what all the rule changes will look like, so having an opportunity to have time to implement would be helpful.

Mr. LARSEN. Yes. Excellent. Sorry, just a moment.

Mr. Neely, can you kind of come up with—in the 5 minutes there—sorry, I am out of—can you address your veterans program, veterans outreach program?

Mr. NEELY. Actually, it is——

Mr. LARSEN. More directly.

Mr. NEELY. I am sorry, actually, it is multiple programs that—the first layer, quite frankly, is taking advantage of the fact that we have so many veterans in our business, and they have colleagues that they worked with in the military, and so there is direct outreach. And that is true with—at all of the jobs within Gulfstream, where we recruit veterans.

The—another example is the transition support program, where—I am sure you are familiar—active members of the military during the last—I think it is 6 months of their active service can go and work in industry. We are very much involved in that. We think that is a wonderful program. Two great examples.

Mr. LARSEN. That is good, thank you. Thank you, and I will recognize Representative Graves of Louisiana for 5 minutes.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman.

You have all described various steps and programs that we can take to help address this gap that was identified in some of the opening statements, and the first panel's statements. Two questions, and I am happy to hear from any of you on this.

Number one, if we were to implement all of your recommendations, does that close the gap? Does it close the gap?

Secondly, if you are us—mainly, him—what is the one thing that Congress—and again, I can't emphasize this enough. A lot of times people like to jump out of their lanes and do other people's jobs, but what is the one biggest thing that Congress could work on to

help address the gap that we are now facing and expect to be much greater in the future?

Again, any, all of you. Don't pretend like you are shy.

Ms. DEVIVO. So I would—just want to reemphasize this idea of increasing Pell, especially for under-represented populations, right? Our average family income is $39,000. They just don't have enough funding, right? The average debt load is about $17,500. Now, they are going to get great-paying jobs and be able to pay back that debt. But to make that choice, they could use some extra support.

In New York they have done things like dedicate a certain amount of funding to STEM fields. Could Congress take that route, given that this is such a demand, and such an area where we need extra support? Could they do some kind of supplemental funding for something like a student who wanted to pursue aviation maintenance?

And I think all the things that have been discussed on this panel, the work that we are doing in Queens, in terms of who we serve, we are going to close this gap. But you have to see it to be it, right? So getting more people into those role model positions will definitely change the story.

Mr. GRAVES OF LOUISIANA. Great, thank you.

Mr. JACKSON. And, I agree, definitely funding is a huge part of it, especially for our school, as well.

But in addition, as you heard us state earlier——

Mr. GRAVES OF LOUISIANA. Can I interrupt you on that? Just a quick question.

So you talk about funding being an obstacle. So do all of you perceive the fact that this—that aviation programs, particularly pilot and others, because of the specialized training and the length of training, that the cost is one of the biggest barriers or obstacles?

Mr. JACKSON. So, speaking on behalf of a high school—and again, a public high school—it is a bit different than a college or technical school. For us, for sure. We get funding from the city, State, and the Federal Perkins grant, of course. But it is very, very expensive for a school to run.

And, for example, we get $500,000 for Perkins. It doesn't go very far. It looks like a big number on paper, but you are talking about aviation equipment, and mockups, and engines, and aircraft that will eat up most of that money.

So definitely funding, for us, is an issue. And we could definitely improve our equipment and experiences for our students.

But I want to add, in addition to that, going back to the earlier statements on elementary and middle school, we definitely have a challenge, as a high school, of students coming in—they will work on their licensing, they will be—they will learn to love aviation from our staff, who are graduates of our school and also work in industry. But they have also heard college and university since they were born, understandably.

So it is really a shift of mindset of looking at it as a lucrative career, and definitely Delta paying out a large part of their profit-sharing definitely helps, and all the wages that are going up across industry is definitely helping, as well. But that is definitely a big part of it. If we are talking about high school students, students that are coming in at 14, applying to high school as a 13-year-old,

it is the image and the allure of the field that we have to really promote younger.

So if we can get students working with their hands, understanding how systems work, seeing what it might be like to do as a career, or at least portions of it, that would go a long way, as well, for us, especially.

Mr. GRAVES OF LOUISIANA. Thank you.

Others?

Ms. DONATI. I support that, as well. The funding is a huge barrier. So, you know, almost 25 percent of our applicants who have been accepted into our program cannot receive personal loans—because we don't qualify for title IV funding as of yet. So you know, that is a huge barrier.

So these are applicants that have the aptitude skills, and they have the motivation to get through a 12-month, intense training program, but they just don't have the funds to do it. So if there were opportunities out there to help them, we would see more people coming through the program.

Mr. GRAVES OF LOUISIANA. Ms. Donati, while you are on the mic, you run a successful pilot training program. Now that you are migrating into repair, mechanic-type activities, what are some of the lessons learned from the pilot training that we can apply to some of the other fields, including repair?

Ms. DONATI. I believe it is all structure. So you know, as we are training for an airline, we are focused on replicating what the airline's needs are in a training environment. Under the apprenticeship program, the apprentices have to be with us for 30 months. So why not give them the most structured training environment for 30 months, versus just checking off boxes that they know how to do something that won't correlate into Republic?

Mr. GRAVES OF LOUISIANA. Yes, thank you. You know, we have Fletcher Technical Community College in our district, and they have actually brought in the real workers from the field, bring them into the classroom. They donate the equipment, and they have those folks that are going to be their bosses on day one in the workforce actually doing the training, and just these seamless transitions—of course, not in the aviation space, but in other technical fields. And it has worked out really well.

So thank you all very much. I yield back.

Mr. LARSEN. I now turn to Ms. Plaskett from U.S. Virgin Islands for 5 minutes.

Ms. PLASKETT. Thank you very much, Mr. Chair, and thank you all for your testimony and for the work that you are doing.

Mr. McDermott, I wanted to talk with you a little bit about your testimony. When you discuss in your testimony Delta's pride in paying competitive wages and investment heavily in workforce, can you talk about how that has helped Delta weather any workforce challenges in this strategically sustainable workforce? How is it making you more competitive?

Mr. MCDERMOTT. Certainly, from a brand standpoint, the Delta name is substantially out in the marketplace now as a great place to work. That certainly doesn't hurt.

Delta contributes 1 percent of all our earnings back into communities to be able to drive opportunities for people to be able to develop, to come to the workforce at Delta Air Lines.

And then our ability to go out into the marketplace—which we promote, every city, every State to go out and get involved within the communities—allows us to get into the schools to be able to work with our 50 aviation partners, the AMT school partners, to be able to go out and actually drive interest in the aviation fields. That includes everything from us talking about pilots, all the way through engineers, as well as AMT mechanics.

Ms. PLASKETT. So how do you create this collaborative nature of your work? You talk about the mentoring programs you have, collaborating with regionals. How does that work? And how are you able to sustain that?

Mr. MCDERMOTT. We have actually reached out and approached all our regional partners, as well as the AMT schools, and we developed a strategy early on.

We know, from the A&P perspective, there were three things we were focused on: one is diversity inclusion; the other one was community service; and then our overall volume of A&P mechanics we are going to need for the future.

As we looked at our 35 maintenance bases that we have across the country, we tried to pair up those maintenance bases with local schools, so we could make sure that we are actually engaged at that local level, and providing the services that the schools would need, and advise what the schools would need to be able to continue with their support.

We did the same thing with our regional partners. We are going to do the same thing, and continue to be able to expand the program, and we have to make sure we keep up with the overall pipeline strategy to get that—to get our needs filled for the future.

Ms. PLASKETT. Great, thank you. That is—I am wishing you continued success in that, and that it be an example for others on how to get that done. And, you know, just keep talking with us. I would love to talk with you more about how you are able to keep that collaboration going.

Mr. Jackson, I don't have any questions for you, but just wanted you to know, although I represent the Virgin Islands, I was born and raised in New York City. And everyone knows the great success of Aviation High School. In my own middle school, at Grace Lutheran in Queens Village, that was someplace that a lot of young people in my class applied to, your school. So thank you for the tremendous work that you are doing.

Mr. JACKSON. Thank you very much.

Ms. PLASKETT. Thank you.

I wanted to follow up with Ms. Donati about the LIFT Academy. Some of the work that you are doing is really incredible. And I was hoping that you could talk a little bit more about some of the certification, and how you are able to improve the supply of maintenance technicians and mechanics in the field.

Ms. DONATI. So last year we were approved for an Aviation Maintenance Technician Apprenticeship program through the Department of Labor. And we have reached out and partnered with Indiana high schools, as well as career technology centers to find

students who have the mechanical aptitude, who would be interested in a career in aviation.

These students are provided compensation, day one. And it is an "earn and learn" model, so they are working under supervision of a licensed A&P, so hands-on experience in the hangar, and then classroom experience, as well, to ensure that they will be ready for their test with the FAA at the end of the 30th month.

Ms. PLASKETT. Great. I have no further questions. Thank you so much for having this hearing, and us being able to question and learn about these best practices in the field.

Mr. LARSEN. Thank you. I recognize Representative Woodall from Georgia for 5 minutes.

Mr. WOODALL. Thank you, Mr. Chairman. I wanted to ask you, Ms. DeVivo, thinking about the different programs that you all have, and the stamp of disapproval that our high schools are well aware of, of going into that maintenance workload, you have got certificate programs, you have got bachelor's programs. Is there a greater demand for your bachelor of science in aviation maintenance than there is for a certificate program in aviation maintenance, just to try to get beyond that stigma that Mom and Dad put in your head?

Ms. DEVIVO. So the way that we have our program structured is you have to finish the certification program before you can get into a bachelor's degree.

So—and what will often happen, and it is especially true right now because they are paying so well, is that students go off as soon as they have been certified, and then will come back to us at some later point for the bachelor of science degree, when somebody else is going to pick up the tab.

Mr. WOODALL. But the almighty dollar has motivated folks to use their value today not to just get a piece of paper that may add no additional value to——

Ms. DEVIVO. Correct, correct. And they are—the airlines are not necessarily interested, until they are at a manager's or supervisor's role. What they really need is to be certified.

Mr. WOODALL. Ms. Donati, I was really interested in what you said to the chairman, that you could flip the switch tomorrow because—I don't want to misquote you—something to the effect of, we are actually training our folks for what our customers demand, so we are just backwards training to meet FAA requirements. But if we get rid of those outdated requirements, we will just keep teaching the skills that we are teaching, because these are the skills our customers demand.

Is there something, as you look forward, that you are thinking—this fall, when the new standards come out—that you are going to have to improve your curriculum because you are not preparing folks properly for your customers' needs today?

Ms. DONATI. I would like to emphasize an apprenticeship program is much different than a 2-year or, you know, 4-year degree program. So we have the flexibility in our program. We don't have the high cost of operation. We don't have, you know, sheet metal stations and painting labs and welding. So, in that sense, we can quickly adapt to what the FAA needs us to teach.

We are teaching everything in the curriculum to meet the certification of the apprenticeship program. But if there was anything that they would introduce that we are not currently teaching now, we just add that into their time with us.

So again, dope and fabric, we are teaching it, but we are not—we don't have a station designated for that. So, therefore, we don't have to have the expense of updating our equipment.

Mr. WOODALL. Mr. Neely, because we are focused on safety, and I do believe you care more about your customers' safety than any of us on the dais do, what is it that you expect to see this fall, in terms of a new Government training standard, that you are not training your current mechanics and maintenance personnel up to that standard today?

Mr. NEELY. It works better if I push the button.

So you are absolutely right, we are focused like a laser beam, as the saying goes, on our customers' safety and our employees' safety, quite frankly. The two go hand in hand.

We do have extensive, in-house training capabilities. We have an on-the-job training facility that we built over the last number of years that has real Gulfstream aircraft in them, modern Gulfstream aircraft, where new hires and more experienced workers can come in, update their skills, do recurrent training, et cetera.

So we are—you are right, we are already doing, for our own employees, all of the work that we think they need to have the right skill sets. We do that internally, we do that with our partners at Flight Safety, which is a training organization we use both for pilots and for, obviously, our maintenance personnel.

I mean there is certainly a role for—clearly, there is a role for the FAA and regulations related to that training, and we very much look forward to seeing the new regulations, and hopefully it allows for a lot more flexibility.

Mr. WOODALL. And tell me about that role, because I think there is, clearly, a role for the FAA in terms of safety. But you are not going to allow an unqualified mechanic to be on your line. Delta is not going to allow—if you come to Delta, and you are not prepared, Mr. McDermott is going to train you up or he is going to move you on. I am trying to understand what the benefit is, what the value add is of 60 years of Government stumbling down the pavement on promulgating new training standards.

Of course, in 1940 this was a conversation, and 1950, and 1960. But in 2020, you all have to be ahead of us. As good as our chairman is, you have to be moving faster than we are. I am trying to understand if our role needs to continue to be to set a floor of standards, or if our role needs to be to set some safety standards for an airline that then you all will hire, and your training partners will train to meet those globally, not line by line.

Mr. NEELY. Right. I think the—you know, the—this concept of having the safety regulations that are more flexible and less detailed, prescriptive, I think there is actually some precedent in that, and some of the other parts of the FAA. There is a lot of benefit to that, because it allows the FAA themselves to be a lot more nimble, ensuring that their people—that, you know, that are part of the team that we are part of, we—Mr. McDermott, myself, Gulfstream, the FAA, et cetera—for overall safety.

But that flexibility, I think, is key, because technology—as you pointed out, technology is moving at the speed of light these days, and that is especially true on the maintenance side of the airplanes. No doubt about it.

Mr. WOODALL. Mr. Chairman, if you have had a hearing with two finer Georgia companies represented, I can't remember when it was. So thank you for doing that today.

Mr. LARSEN. For the record, so noted.

I don't think 2½ hours exhausted this subject, so I do think there is more work to do.

I think you have outlined very well a good curriculum for the FAA and Ms. Lang to follow up on, as well. And we will look forward to tracking the progress of the rule, as well as some of these initiatives we discussed today.

I see no further questions from members of the subcommittee. And, seeing none, I want to thank each of the witnesses today for your testimony. Your contribution to today's discussion was very informative, it was very helpful.

I ask unanimous consent the record of today's hearing remain open until such time as our witnesses have provided answers to any questions that may be submitted to them in writing, and unanimous consent that the record remain open for 15 days for any additional comments and information submitted by Members or witnesses to be included in the record of today's hearing.

Without objection, so ordered.

If Members have nothing else to add, the subcommittee stands adjourned.

[Whereupon, at 12:26 p.m., the subcommittee was adjourned.]

SUBMISSIONS FOR THE RECORD

Prepared Statement of Hon. Peter A. DeFazio, a Representative in Congress from the State of Oregon, and Chairman, Committee on Transportation and Infrastructure

Thank you, Chair Larsen, for calling today's hearing on the outlook for the workforce of women and men who build airplanes and those who maintain them.

Challenges in sustaining this workforce are looming, if not already upon us. According to Federal Aviation Administration (FAA) data, half of the 330,000 mechanics and repairmen in the United States were between 50 and 70 years old at the end of 2018. And the industry anticipates a need for 193,000 new mechanics and technicians in North America over the next 20 years.

The current generation of airplanes is extraordinarily complex. There are between 60 and 70 miles of electrical wire in a single Boeing 787. The Airbus A350 performed the world's first fully automated takeoff last month. Gulfstream's G650 jet is built using significantly different manufacturing techniques than previous designs, which required the company to provide specialized training to manufacturing workers.

And U.S. firms' global competition is intense and unyielding. The transport airplane market is essentially a duopoly between Boeing and Airbus, but China is resolute about entering that market with serious contenders in every size category except the largest airplanes over the next 20 years. French, Canadian, and Brazilian firms compete with business jet manufacturers in the United States, including Gulfstream, which is represented on our second panel.

If the government and industry don't take the right steps now to prepare the next generation of aerospace workers in the United States, there's a new generation in multiple other countries ready to assume our mantle of the world's leader in aviation innovation.

Data reflecting a shortfall between the supply of new workers and the industry's demand for them is the canary in the coal mine. According to the Government Accountability Office (GAO), the Labor Department predicts roughly 11,800 job openings per year from 2018 through 2028 for mechanics and technicians, but the FAA certificated only about 8,600 per year over the last four years.

This is also a decidedly non-diverse workforce in many respects. For example, according to the GAO, only three percent of aviation maintenance workers with FAA certificates are women. In order to expand the pipeline and meet the growing industry demand for FAA-certificated workers, we can and must do better.

I look forward to hearing from today's witnesses regarding what this Committee can do to foster the education, training, and hiring of the next generation of aerospace workers—and to ensure that women, people of color, and other minority groups are amply represented. However, rolling back training requirements for mechanics is not on the table.

Before I conclude, let me just say that I expect today's discussion will also touch on the supply of airline pilots, even though that is not the intended focus of this hearing. To the extent there is a shortage of qualified airline pilots, the airlines are stepping up to resolve it. As recently as five years ago, regional airlines were paying new pilots unsustainably low wages: as little as $20,000 per year, according to a 2017 report by the Department of Transportation Inspector General. The first officer of Colgan flight 3407, which crashed near Buffalo in 2009, 11 years ago tomorrow, earned just $15,800 the year before the accident and was recorded by the cockpit voice recorder just before the crash saying "that her husband had earned more in one weekend of military drill exercises than she earned in an entire pay cycle."

But the airlines have recognized that very few young people will take on a debt of as much as $250,000 for college and pilot training to make just $20,000 per year. Indeed, Republic Airways, which is represented on the second panel, pays new first officers a base salary of approximately $41,000 per year.

We now have the strongest airline pilot training standards in history and in the world. And airlines are finally starting to pay new pilots a salary commensurate with their professional responsibilities. This is good news and something we want to encourage.

Thank you, Chair Larsen, and I yield back.

Letter of February 11, 2020, from Christian A. Klein, Executive Vice President, Aeronautical Repair Station Association, Submitted for the Record by Hon. Rick Larsen

AERONAUTICAL REPAIR STATION ASSOCIATION,
121 NORTH HENRY STREET,
Alexandria, VA 22314–2903, February 11, 2020.

The Honorable RICK LARSEN,
Chairman,
Aviation Subcommittee, U.S. House of Representatives, Washington, DC.

The Honorable GARRET GRAVES,
Ranking Member,
Aviation Subcommittee, U.S. House of Representatives, Washington, DC.

DEAR CHAIRMAN LARSEN AND RANKING MEMBER GRAVES:

The Aeronautical Repair Station Association (ARSA) commends the subcommittee for holding today's hearing on aviation workforce challenges, which represent a significant threat to the vitality of all sectors of the U.S. aviation industry.

ARSA is the trade association for the global aviation maintenance industry, which employs more than 288,000 Americans in all 50 states and contributes more than $50 billion each year to the U.S. economy. A state-by-state overview of the industry's employment and economic impact is available at arsa.org/news-media/economic-data.

While ARSA's core members are companies certificated by the FAA and other safety regulators to perform work on civil aviation products and articles, our membership also includes manufacturers, airlines, industry service providers, educators and others with an interest in regulatory and legislative issues affecting the maintenance sector.

BACKGROUND

The U.S. aviation industry is facing a technician shortage that threatens to undermine the growth and competitiveness of one of the most important sectors of our economy. More than two-thirds of U.S. companies responding to ARSA's 2019 member survey reported vacant technician positions, a total of 4,615 openings. Those empty positions have real consequences: increasing time to complete work, driving up overtime and training costs and preventing new business development. Based on that data, ARSA projects the technician shortage is costing the U.S. aviation maintenance industry $118.416 million per month ($1.421 billion per year) in lost economic opportunity while well-paying jobs in a growing, high-tech global industry remain vacant.

Underscoring the long-term challenge, the Aviation Technician Education Council projects that the mechanic population will decrease five percent in the next 15 years and that new entrants make up just two percent of the technician workforce annually, while 30 percent is at or near retirement age. Underscoring that latter point, a Government Accountability Office (GAO) report requested by Congress and released on Feb. 6, found that more than half of the maintenance technicians certificated by the FAA as of December 2018 were between 50 and 70 years old. Similarly, Boeing recently projected that North America will require 193,000 new technicians over the next 20 years.

The 2018 Federal Aviation Administration (FAA) Reauthorization Act of 2018 (Pub. L. No. 115–254) ("the act" or "the law") included many important provisions designed to address workforce challenges confronting both the aviation industry and the FAA itself. We commend the subcommittee for recognizing the problem during the reauthorization process and making workforce a priority in the bill. ARSA appreciates that the new law gave the FAA a sizeable "to-do" list and that the agency is navigating an important and high-profile safety-related investigation. However, given that neither the agency nor the industry can function effectively without well-trained and capable employees, we are frustrated by the FAA's slowness in implementing key provisions of the law. It is imperative that the subcommittee keep pres-

sure on to ensure the FAA accomplishes its workforce-related tasks. ARSA considers the following to be among the most important.

AVIATION TECHNICIAN AND PILOT WORKFORCE GRANT PROGRAMS

Sec. 625 of the act directed the Department of Transportation (DOT) to establish grant programs to help recruit and train aviation maintenance technicians and educate pilots. The programs enjoy broad, bipartisan support on Capitol Hill and throughout the industry. A letter to House appropriators in support of including full funding in the FY 2020 Transportation, Housing and Urban Development and Related Agencies (T–HUD) appropriations bill was signed by 50 House members, including more than 20 from the House Aviation Subcommittee. S. 2506, the 115th Congress Senate bill that formed the basis for the technician program, attracted 25 cosponsors representing both parties; H.R. 5701, the House companion bill, had 24. More than 40 national and state level aviation organizations are involved in our coalition to secure funding for the new grant programs.

The technician and pilot grant programs are each authorized at $5 million per year for fiscal years 2019 to 2023. In a significant and positive development, Congress provided full funding for the programs as part of the FY 2020 appropriations process. However, disappointingly, the FAA has not yet initiated the grant programs. That implementation delay is unacceptable given the current impact of the technician shortage and predictions that it is only going to get worse.

The Sec. 625 grant program confronts the challenge by incentivizing collaboration among businesses, labor organizations, schools and state and local governmental entities. We urge the subcommittee to request the agency rapidly implement the programs so that grant applications can be received in late winter or spring of 2020 and grants can be awarded this summer, prior to the start of the 2020–21 academic year. Each day of inaction represents a lost opportunity to collectively confront a problem with major consequences for the nation's aviation system.

ENHANCING THE VALUE OF REPAIRMAN CERTIFICATES

Sec. 582 of the act directed the FAA administrator to task the agency's Aviation Rulemaking Advisory Committee (ARAC) with "making recommendations with respect to the regulatory and policy changes . . . to allow a repairman certificate issued under section 65.101 of title 14, Code of Federal Regulations, to be portable from one employing certificate holder to another." The law states that the administrator must take appropriate action within one year of receiving the recommendations.

Under current regulations (14 CFR part 65, subpart E), individuals employed by an FAA-certificated repair station or air carrier may apply for and obtain a repairman certificate allowing him or her to supervise and/or approve for return to service the maintenance, preventive maintenance, or alteration of civil aviation aircraft or aircraft components. The repairman certificate differs from the airframe and/or powerplant (A&P) mechanic certificate issued under part 65, subpart D in that it only qualifies the individual to work under an existing repair station or air carrier certificate, whereas an A&P mechanic can perform, supervise and approve work under his or her own authority.

When the repairman leaves the employ of the endorsing repair station or air carrier, the certificate must be surrendered and the individual must reapply with a recommendation from his or her new employer. Not only does the individual's certificate not follow him or her into the new position—which in some cases is true even when moving to another role within the same company—there is no opportunity to speed the application process based on previously holding the certificate. The current rules undermine labor mobility, create unnecessary regulatory burdens for the individual and employer, and are an inefficient use of agency resources because regulators must process new applications each time qualified individuals move from one job to another. Making repairman certificates portable would enhance the value of the credential and encourage more individuals to seek it.

It is important to note that ARSA is not proposing to alter the requirement that repairmen must work under an employing certificate holder's quality system, nor to eliminate the requirement that repair stations and air carriers ensure the individual be qualified to exercise the privileges of the repairman certificate by being capable of performing any tasks assigned. Our hope is that the ARAC recommendations will result in improvements to part 65 that better recognize the varied (and constantly evolving) skills and knowledge required in the aviation maintenance industry, enhance the value of the certificate for the technicians who earn it, and increase efficiency in the certification process to the benefit of workers, employers and the FAA itself.

However, more than a year after enactment, the task has not been assigned to ARAC. We appreciate that the FAA is working to fulfill many complex directives; however, the purpose of ARAC is to leverage stakeholder expertise to help support the agency's safety and oversight mission. Assigning tasks to ARAC consumes comparatively few resources (particularly given that ARSA has sent the agency a draft task that achieves the objectives of the law) and puts the onus on ARAC members to initially fulfill FAA's obligation under the act. We hope the subcommittee will urge the agency to expeditiously initiate this task.

FAA Safety Workforce Training

Recognizing that a sufficient number of well-trained FAA personnel is also essential to a safe and efficient industry, Sec. 231 of the act directed the Administrator to review and revise the agency's safety workforce training strategy to ensure, *inter alia*, that it "seeks knowledge-sharing opportunities between the FAA and the aviation industry in new technologies, equipment and systems, best practices, and other areas of interest related to safety oversight".

ARSA views this provision of the act as a significant opportunity to improve FAA operations. Our members are constantly frustrated by a lack of understanding within the FAA's own workforce about the plain meaning of regulations. This lack of basic knowledge leads to inconsistency between rules and guidance and in enforcement from inspector to inspector and region to region. That, in turn, undermines efficiency, compliance and confidence.

In addition to creating opportunities for a better-trained FAA workforce, if properly implemented, Sec. 231 could also enhance industry access to FAA training so that regulators and certificate holders are trained to the same standards. In furtherance of this effort, ARSA has urged the executive directors of the Flight Standards and Aircraft Certification Services to develop criteria for determining whether FAA Academy training will be accessible to non-FAA attendees. ARSA has also recommended that the FAA accept external training providers to facilitate the knowledge sharing between the agency and industry contemplated by the act.

We urge the subcommittee to make improving FAA workforce training an ongoing priority.

Updating Technician Education Standards

Sec. 624(a) directed the FAA to issue a final rule within 180 days of enactment to modernize the schools certificated by the FAA under 14 CFR part 147 to train aviation mechanics. Sec. 624(b) further directs the agency to coordinate with stakeholders to develop and publish guidance or model curricula for AMT schools "to ensure workforce readiness for industry needs."

Part 147 desperately needs updating and this provision enjoyed broad industry support. Frankly, it is unconscionable that curricula designed to train mechanics for jobs in the rapidly evolving aviation sector are five decades old. These ossified, out-of-date standards make it more difficult for educators to teach, for students to learn and for businesses to find capable workers. Indeed, a recent ARSA survey found that it takes repair stations an average of nine months to make a technician educated by a part 147 school a profitable employee (with some ARSA members saying that it takes as long as two years).

In furtherance of the act's directive, FAA issued a Supplemental Notice of Proposed Rulemaking (SNPRM) related to its part 147 rulemaking on April 16, 2019. However, as reflected by industry comments on the SNPRM that ARSA joined, the FAA's proposal to update the rules falls far short of needs. ARSA and its allies are asking the agency to reconsider its overly prescriptive policies, to adopt an outcomes-based approach for dual enrollment programs and to give deference to Department of Education requirements in matters concerning the quality of education.

Despite the broad recognition that part 147 is in desperate need of overhaul, the FAA has not yet issued a final rule. The introduction of the Promoting Aviation Regulations for Technical Training (PARTT) 147 Act (H.R. 5427/S. 3043) by a bipartisan group of lawmakers last year is a reflection of the frustration on Capitol Hill and within the industry about FAA's inaction. The PARTT 147 Act not only directs the agency to issue new technician school regulations within 90 days of enactment, but would also establish specific certification, operational and quality control requirements to improve part 147.

We urge support for the PARTT 147 Act and encourage the subcommittee to ensure that FAA rapidly complies with Congress's mandate to update part 147 to reflect 21st century industry needs and learning tools.

WORKFORCE-RELATED GAO REPORTS

We were pleased that the act requested several GAO reports on workforce issues. Specifically:

- Sec. 232 directed GAO to assess FAA Office of Aviation Safety workforce and training needs, including reviewing "safety inspector and aviation safety engineer hiring, training, and recurrent training requirements" and ways FAA can work with industry and labor to establish knowledge sharing opportunities.
- Sec. 567 directed GAO to study, *inter alia*, FAA's long-term workforce and training needs, skills and qualifications needed by FAA workforce, and opportunities for knowledge sharing between FAA and industry.
- Sec. 622 directed GAO to study, *inter alia*, the current and future supply of aviation and aerospace workers, factors and barriers influencing supply, best practices for recruitment and retention.
- Sec. 624(e) directed GAO to conduct a study on maintenance industry technical workers, including analysis of Standard Occupational Classification system, Federal employment classification, impact of regulations, recommendations on how FAA regs and policies could be improved, ways to improve coordination between business, schools and government, resources for training. This report was released on Feb. 6. It recommends that the FAA take steps to use existing agency data and coordinate with other federal agencies to identify and gather the information the FAA needs to measure progress and target resources toward its goal of promoting a robust, qualified, and diverse aviation maintenance workforce.

Since enactment, ARSA, its members and allies have been contacted by GAO personnel involved in these and other reports. We look forward to their completion, seeing what insights they provide into FAA and industry workforce issues and working with the subcommittee to use the information to shape future policy.

WORKFORCE-RELATED STAKEHOLDER PANELS

Sec. 602 of the act directed Administrator to establish a Youth Access to American Jobs in Aviation Task Force. Similarly, Sec. 612 directs the Administrator to establish a Women in Aviation Advisory Board. Acting according to the Federal Advisory Committee Act, the FAA solicited and received nominations to each body during the fall of 2019. According to agency sources, FAA received more than 300 applications—a sign of the high-level of interest in such industry-government collaboration—and the FAA is working with the Department of Transportation to vet candidates. ARSA believes that both initiatives will help identify opportunities to grow the aviation workforce and looks forward to engaging with the agency and other industry stakeholders to make them successful.

CONCLUSION

We commend the subcommittee for making workforce a priority in the recent FAA bill and for maintaining its focus in this area. If properly implemented, the workforce mandates will do much to position the agency and industry for long-term success. We look forward to continuing to work with the subcommittee, the FAA and our industry partners to fulfill the law's objectives.

Sincerely,

CHRISTIAN A. KLEIN,
Executive Vice President.

cc: All members of the House Transportation & Infrastructure Committee

Statement of the Aircraft Mechanics Fraternal Association, Submitted for the Record by Hon. Rick Larsen

The Aircraft Mechanics Fraternal Association (AMFA) would like to thank Chairman Larsen for bringing attention to the important issues regarding America's future aircraft maintenance workforce via this hearing. AMFA is a craft-specific labor union that represents aircraft mechanics at several airlines and advocates for the craft as a whole.

We would like to begin our comments by echoing Chairman Larsen's astute questioning of the Federal Aviation Administration (FAA) regarding how they plan to approach a common effort.

AMFA is concerned that without the FAA directly involved in the effort, various segments of stakeholders will develop individual strategies towards solving individual problems rather than working together towards a holistic solution that solves not only a recruitment issue, but also the lack of diversity and possible barriers of entry to aviation careers. An individual corporation developing a workforce plan, for instance, is not being criticized here; however, if the solution is solely individual, then we believe that any common effort will be thwarted, and the lack of a cohesive overarching plan will be supplanted for intense competition of what is left of the workforce.

To accomplish this common effort, we believe that multiple stakeholders should be involved, as it is, in fact, a common effort. The FAA should engage and recruit people from academia, industry, and labor to help develop and maintain solutions that ensure the pipeline of aviation workers is always producing a highly trained and skilled workforce representative of the population as a whole. We suggest a steering committee made up of the above-mentioned stakeholders to advise the Administrator or his designee. Excluding stakeholders will likely lead to a lack of consensus at implementation, and could produce failure, whereas including all segments will help mitigate that risk.

Like many of the Members of Congress who brought up Section 625 of the 2018 FAA Reauthorization Act, AMFA agrees that the program needs to be stood up as soon as possible. Along with a coalition of stakeholders, we were instrumental in helping to achieve this language and the appropriations necessary to accomplish it, and furthermore believe this is an integral part of the common effort.

Another issue brought up by various Members of Congress was the lack of an updated Part 147 and the timeframe to accomplish a new rule. AMFA agrees that it has taken far too long to produce this rule, and therefore supports The Promoting Aviation Regulations for Technical Training (PARTT) 147 Act (S.3043/H.R.5427). It is difficult to understand how we plan to address workforce pipeline issues in a timely manner when the pathway that is Part 147 schools must sit idly by in anticipation of a rule that has been delayed for years. The proposed legislation is a direct replacement and was a collaboration of academia, industry, and labor, and will allow our Part 147 schools the nimbleness they require to produce a highly educated workforce while ensuring proper FAA oversight.

We are growing concerned that there is a "wait-and-see" approach being taken on this issue, and although we understand and appreciate a deliberative approach, one must ask themselves how much further behind in fixing the workforce pipeline we will become if the FAA rule is incompatible with what is actually needed. We ask all Members of Congress to become familiar with and support The Promoting Aviation Regulations for Technical Training (PARTT) 147 Act (S.3043/H.R.5427).

Finally, as the FAA goes about researching possible solutions, there is no question that the FAA should seek out proven methods and best practices from other industries; however, we posit that they should also think outside of the box and engage a suite of solutions that can help serve the common effort. One such program that should be considered is chooseaerospace.org, a collaboration of academia, industry, and labor that is attempting to find solutions concerning the aircraft mechanic workforce and related pipeline issues. They are in the process of conducting research that will help us understand what motivates students to choose an aerospace career, and ultimately want to provide guidance and best practices to schools and other institutions that have an influence over young people to help them choose aircraft maintenance as a career.

We look forward to the continuation of discussion regarding this topic and again thank the Chairman for conducting the hearing.

Statement of Mark Baker, President and CEO, Aircraft Owners and Pilots Association, Submitted for the Record by Hon. Rick Larsen

Thank you for the opportunity to provide the Aircraft Owners and Pilots Association's (AOPA) perspectives to the Aviation Subcommittee hearing on "Looking Forward: The Future of America's Aviation Maintenance and Manufacturing Workforce."

AOPA represents more than 300,000 of America's pilots and aviation enthusiasts. We were founded in 1939 with the simple mission: to give a united voice to what was then called "miscellaneous aviation." Through the decades, we have been faithful to our core missions—promoting safety, preserving the freedom to fly and building the next generation of pilots.

General aviation generates over $219 billion in total economic output, supports 1.1 million jobs, and includes a network of thousands of airports that connect communities across the nation. According to FAA data, there are over 633,317 active private pilots, flying 25 million fight hours in over 200,000 aircraft every year in the United States.

PILOT AND AVIATION TECHNICIAN WORKFORCE GRANT PROGRAMS

Getting the next generation of Americans interested in aviation and aerospace is a key component of the aviation industry's future. Boeing's 2019 Pilot & Technician Outlook for aviation jobs projects that 804,000 new civil aviation pilots, 769,000 new maintenance technicians and 914,000 new cabin crew will be needed to operate and maintain the global aircraft fleet over the next 20 years. In North America alone, Boeing suggests 212,000 new pilots and 193,000 new technicians will be needed over the next two decades.

While the number of pilot certificates issued by the FAA has decreased more than 60 percent since 1980, this mismatch of supply and demand offers a tremendous opportunity for students to pursue aviation careers, including aviation opportunities in the military. This will be a formidable challenge and one we must confront together—industry and government.

Congress, and this subcommittee specifically, recognized the need to support aviation workforce development programs by authorizing two new grant programs under Section 625 of the Federal Aviation Administration Reauthorization Act of 2018 (PL115–254) to recruit and train the next generation of pilots and aerospace workers. This is an important provision intended to introduce high school students and others to STEM aviation education and opportunities, as well as training in aviation and aerospace skills. This issue is a top priority for AOPA.

Most people that aspire to become aviators start in general aviation, so it is vital that we collaborate on efforts to ensure that this pipeline remains open to all. The new FAA Aircraft Pilots Workforce Development Grant Program would support the creation and delivery of curriculum designed to provide high school students with meaningful science, technology, engineering, math and aviation education and encouraging our nation's youth to become the next generation of commercial, general aviation, drone or military pilots. The aviation technical workforce grant program includes scholarships, apprenticeships, establishing new training programs, purchasing equipment for schools and supporting career transition for members of the armed forces.

We were pleased Congress provided full funding in FY2020 for both grant programs under the FY2020 Further Consolidated Appropriations Act (P.L. 116–93). We hope that these grant programs will continue to be funded at their full authorized levels over the next several years to help ensure the future of our nation's aviation industry will have the pilots and aviation technical workforce needed to meet the growing demand for a well-trained aviation workforce.

AOPA EFFORTS TO DEVELOP AVIATION WORKFORCE

AOPA has taken a leadership role in developing our future aviation workforce by getting young people interested in aviation. As the world's largest aviation community, AOPA is building aviation STEM curriculum for high schools across America. By providing high-quality STEM-based aviation education to high school students nationwide, AOPA is opening the door to aviation careers for thousands of teens.

We are creating these courses as part of two career and technical education (CTE) pathways: pilot (manned aircraft) and unmanned aircraft systems (drones). Each pathway will be four years in length, and schools can decide to implement one or more complete pathways, or select individual courses to use as standalone electives.

The courses are designed to capture the imagination and give students from diverse backgrounds the tools to pursue advanced education and careers in aviation fields. Working with professional instructional designers, AOPA is currently offering three years of a four-year high school aviation STEM program. The fourth year of the program is currently in development.

In the current 2019–2020 academic year, there are more than 5,000 students using the AOPA curriculum in more than 160 high schools across 34 states. Participating students represent a diverse group of American youth, including approximately 22 percent females and 37 percent people of color. These students attend schools of all sizes in rural, suburban, and urban settings.

When complete, the program will be the first of its kind, offering students comprehensive four-year aviation study options that are aligned to rigorous math and science standards, including Next Generation Science Standards (NGSS) and Common Core standards used in many states nationwide.

In addition, the annual AOPA High School Aviation STEM Symposium brings dedicated educators from around the nation for two full days of sharing insights, ideas, and best practices for starting and building aviation STEM programs. This Symposium is the ONLY high school event in the nation that specifically targets aviation and aerospace content and it is a great opportunity for educators and administrators to discover how they can prepare students for success in these exciting and well-paying careers.

Hundreds of educators from across the country participated in the 2019 Symposium and the 2020 Symposium is already scheduled for November 16–17 at the Hyatt Regency at the Orlando International Airport in Florida, where participants will have the opportunity to learn more about preparing students to fill the ecosystem of aviation-related STEM careers available in the U.S. military services, airlines, and at airports nationwide.

AOPA's goal is to make our curriculum available to the twenty-five thousand high schools across the country. While the interest in our curriculum has been overwhelming, we cannot do it alone. Funding the FAA Aircraft Pilots Workforce Development Grant Program mandated by Section 625 of the FAA Reauthorization of 2018, Public Law 115–254 will help but we need to do more.

We look forward to working with the Subcommittee and others throughout our industry to ensure that high schools who want to teach students about aviation and all that if offers actually have that opportunity.

AOPA High School Scholarships

In addition to the AOPA High School Initiative, a total of $1 million in AOPA scholarships were awarded in 2019 to exceptional, aviation-minded students age 15 to 18, and teachers dedicated to advancing aviation education in their classrooms.

Last year, AOPA announced 80 high school students and 20 teachers won scholarships of $10,000 each as part of the 2019 AOPA You Can Fly High School Flight Training Scholarship program.

Scholarship recipients can use the money for direct flight training expenses to pursue a primary pilot certificate. They must also complete a flight training milestone, achieving either solo or earning a primary pilot certificate, within one year of receiving a scholarship.

Looking Forward on Aviation Workforce

While the FAA Reauthorization Act of 2018, Public Law 115–254 provides a five-year authorization, each sector of aviation, civil, commercial, and military will still face significant challenges in preparing for the future. There are hundreds of programs and projects being undertaken today to address these challenges whether they be workforce, technology, environmental, commercial space, air redesign, unmanned aircraft, and several others. More coordination and knowledge sharing are seriously warranted in these areas.

Private and governmental organizations working together to address the development and sustainability of the aviation workforce, conducting and coordinating research activities and developing new aviation materials, training programs, and procedures, and leveraging the knowledge of organizations and federal agencies are all vital to protect and grow the aviation industry.

National Center for the Advancement of Aviation

As the subcommittee is aware, in order to meet bold challenges, we need bold initiatives. Recognizing this, I am hopeful the subcommittee will work with Senator Jim Inhofe (R–OK) and Senator Tammy Duckworth (D–IL) and others to establish a National Center for the Advancement of Aviation. We strongly believe standing up such a center will facilitate cooperation, collaboration, and coordination across all sectors of aviation; civil, commercial, and military—and which is so desperately needed.

A national aviation center would bring the industry together by fostering such things as programs that create a diverse and skilled aviation workforce, ensuring the deployment of STEM aviation educational opportunities for high school students, leveraging the sharing of new and emerging flight training methods, and conducting safety and economic data analysis. A national aviation center would do more to grow, develop, and promote aviation and bring the needed and long overdue collaboration of our collective industry that is so vital to our nation's economy. We welcome the subcommittee's support for this proposal.

Again, thank you for the opportunity to provide the Aircraft Owners and Pilots Association's perspectives on the future of our aviation workforce.

Letter of February 26, 2020, from Crystal Maguire, Executive Director, Aviation Technician Education Council, Submitted for the Record by Hon. Rick Larsen

AVIATION TECHNICIAN EDUCATION COUNCIL,
PO BOX 234,
Jenks, OK 74037, February 26, 2020.

The Honorable RICK LARSEN,
Chairman,
Aviation Subcommittee, U.S. House of Representatives, Washington, DC.

The Honorable GARRET GRAVES,
Ranking Member,
Aviation Subcommittee, U.S. House of Representatives, Washington, DC.

Re: Statement for the Hearing Record, "Looking Forward: The Future of America's Aviation Maintenance and Manufacturing Workforce" before the U.S. House of Representatives Aviation Subcommittee

DEAR CHAIRMAN LARSEN AND RANKING MEMBER GRAVES:

On behalf of the aviation maintenance education community, thank you for your leadership and for providing a forum to discuss the workforce challenges facing our industry. Continued aviation growth is threatened by our ability to produce the qualified individuals required to support all industry sectors, including commercial flight, general aviation, business aviation, manufacturing, and repair. We appreciate the committee's work to highlight the issue and support proffered solutions to meet future workforce needs.

The Aviation Technician Education Council (ATEC) represents aviation maintenance technical programs across the United States, including the 171 educational institutions holding a Federal Aviation Administration (FAA) Title 14 Code of Federal Regulations (CFR) part 147 certificate, and the companies that employ their students. "Part 147" schools supply 64% of the entering aviation mechanic workforce (the remaining 36% are individuals that obtain mechanic certification by virtue of civil or military experience) and work closely with industry partners to bring jobs to our local communities. Workforce development initiatives discussed at the Feb. 11 hearing, many of which are set forth in the 2018 Federal Aviation Administration (FAA) Reauthorization Act of 2018, directly impact our efforts to create future aviators in support of industry's growth trajectory.

Our schools know first-hand the increasing demand for aviation mechanics, and the opportunities that exist for those that choose a career in aviation maintenance. Our students are in school for relatively short periods, 21 months on average. Sixty percent of graduates are employed upon graduation. Alumni enter high-paying careers, with an average starting annual salary of $45,000. And they leave school with little debt, tuition rates across the system average $16,351 per year.

While student placement and return on investment is high, aviation maintenance student populations have stayed relatively flat over the last few decades, and only three out of every five seats available in aviation mechanic programs are filled. Schools report that the biggest barrier to growing our student population is finding qualified instructors—evidencing technical education's own workforce challenges—followed closely by career awareness. FAA regulatory burdens and lack of technical equipment was cited as the third and fourth leading impediments to program growth.

ATEC supports recently passed and proposed legislative initiatives that would address several of these obstacles. The FAA Reauthorization Act included several workforce-related directives, most notably the establishment of a grant program to help recruit and train aviation maintenance technicians. The education community—in collaboration with our industry partners—is eager to take advantage of the opportunity and stands by to assist the FAA with program development and implementation. We ask members of the subcommittee to continue encouraging agency officials to rapidly implement the program so that we can put 2020 fiscal year dollars to work.

The Promoting Service in Transportation Act (H.R. 5118), introduced by Representatives Rick Larsen (WA–2), Don Young (R–AK), and Angie Craig (MN–2), would help raise aviation career awareness, and ultimately get more would-be aviators in the workforce pipeline.

The Promoting Aviation Regulations for Technical Training (PARTT) 147 Act (H.R. 5427) would direct the FAA to modernize aviation maintenance curriculum, something our community desperately needs to make a more meaningful impact.

Seeing no consequential regulatory relief in sight, the bill has broad support from a coalition of aviation groups. We ask you to schedule the PARTT 147 Act for committee markup, the next step towards giving schools the flexibility to better educate our students and prepare them for today's high-tech jobs in aviation.

On behalf of aviation education, thank you for your consideration of these priorities, and for the opportunity to submit this statement for the record.

Sincerely,

CRYSTAL MAGUIRE,
Executive Director.

Statement of Ed Bolen, President and CEO, National Business Aviation Association, Submitted for the Record by Hon. Rick Larsen

Chairman Larsen, Ranking Member Graves, and members of the Subcommittee on Aviation thank you for holding this hearing to address the future of America's Aviation Maintenance and Manufacturing Workforce. On behalf of the National Business Aviation Association's (NBAA's) 11,000-member companies, we are pleased to provide this statement for the record.

NBAA's members, many of which are small businesses, rely on business aircraft to meet some portion of their transportation challenges. Business aircraft provide connectivity to communities in nearly every Congressional district, many of which are not served by commercial airlines. While the airlines serve only around 500 airports, business aviation can reach 5,000.

Business aviation is part of the general aviation industry, which includes all operations and manufacturing other than those supporting scheduled commercial air service or the military. Our industry supports nearly 1.2 million jobs and more than $240 billion in economic output. In 2018 alone, highly skilled American workers produced new aircraft and components worth more than $30 billion. Further, the U.S. civil aviation industry is a vital part of international trade, providing a $75 billion favorable balance of trade in 2018.

However, for general aviation to continue growing and supporting communities, we must address the significant workforce challenges, including the growing shortage of pilots and technicians. According to the Boeing company outlook, 645,000 new commercial pilots and nearly 100,000 new business aircraft pilots will be needed worldwide between 2019 and 2038. In the maintenance sector, there is a projected worldwide demand for almost 770,000 new technicians over the next 20 years.

Another challenge we face is the aging pilot population, with the average age of commercial pilots at 51, and a mandatory retirement age of 65 for airline pilots, future demand will only increase. New entrants to the workforce are also not choosing aviation careers as they did in the past, and the supply of pilots has decreased by 30% since 1987.

With the worldwide demand for air travel continuing to increase, we must come together and take bold actions that will enable the U.S. to maintain its role as the world leader in aviation. To help support those efforts, NBAA worked with Chairman Larsen, Congressman Don Young, and Congresswoman Angie Craig on the introduction of H.R. 5118, the Promoting Service in Transportation Act. This legislation would authorize the Department of Transportation to develop a series of broadcast, digital and print public service announcements to promote career opportunities and improve diversity in the transportation workforce.

Through these public service announcements, we will raise awareness of careers across all modes of transportation, including aviation. There will also be synergies with the President's efforts to grow the STEM workforce and related educational opportunities. While momentum around the future STEM workforce is strong, aircraft pilot and aviation technician careers are often not considered by students. That is why the passage of H.R. 5118 is critical as it will help address these challenges by building linkages between STEM programs and the significant career opportunities for pilots and technicians.

We also applaud the efforts of this Committee to secure passage of the FAA Reauthorization Act of 2018, which includes numerous workforce development initiatives. Specifically, the bill establishes grant programs to support the education of future aircraft pilots and the recruitment of much-needed aviation maintenance technicians. Both programs received the full $5 million in funding through this year's appropriations process, and we encourage the FAA to stand up the infrastructure to evaluate grant applications and begin awarding funds. We also support full funding of both programs next year as part of the FY2021 appropriations process.

NBAA is leading several significant initiatives to attract the next generation of pilots and technicians to the general aviation industry. At our largest event, NBAA-BACE, which attracts nearly 26,000 attendees, we host a "Careers in Business Aviation Day" that draws hundreds of students and provides three days of workforce development programming as part of the "Collegiate Connect" effort. During our most recent event, students heard from FAA Administrator Steve Dickson and leaders of the Perlan Project, which is responsible for record-breaking high altitude glider flights.

We continue these efforts at NBAA's regional events and targeted educational programs each year by offering student-focused programming to educate young people about the many business aviation career opportunities. Utilizing our events to introduce students to business aviation allows us to build networking opportunities and expand a dedicated mentoring program—all of which create valuable connections between students and industry professionals.

Some of the most qualified potential business aviation employees are our dedicated military professionals that are transitioning to civilian careers. These individuals often have advanced technical training and can successfully move into rewarding general aviation careers. We are currently working with Hiring Our Heroes and the U.S. Air Force to increase awareness of business aviation career opportunities to members of the military.

Finally, through NBAA's Young Professionals in Business Aviation group, we are using social media to highlight the positive personal and societal impact of a career in aviation. These efforts are paying off, with thousands of young people following and engaging with our YoPro Instagram and Facebook groups. We plan to leverage these social media opportunities with focused content for students in *Business Aviation Insider*, NBAA's print publication for the community.

With the passage of the FAA Reauthorization bill and introduction of H.R. 5118, Congress has already shown strong leadership in addressing aviation workforce challenges. With rapidly advancing technology, including electric aircraft and unmanned systems, our industry is ready to grow; however, to be successful, we must all work to attract the next generation of employees. As the Subcommittee continues to bring stakeholders together in developing solutions to workforce challenges, NBAA looks forward to being part of the process and highlighting the importance of general aviation to the nation.

Statement of Faye Malarkey Black, President and CEO, Regional Airline Association, Submitted for the Record by Hon. Rick Larsen

The Regional Airline Association (RAA) would like to express strong support for the February 11, 2020 Aviation Subcommittee hearing entitled, "Looking Forward: The Future of America's Aviation Maintenance and Manufacturing Workforce" and submits this statement for the record to inform the Committee on actions that the regional airline industry is taking to attract, recruit, and retain a robust aviation maintenance workforce.

As you know, the U.S. aviation system drives $1.6 trillion in annual economic activity and supports 10.6 million jobs, with $446.8 billion in earnings. Regional airlines play a critical role in upholding this system and operate 41 percent of all commercial airline departures and serve approximately 153 million passengers each year. In fact, fully 409 airports (about two-thirds of our nation's commercial airports) are too small to support air service from larger airlines with larger aircraft, yet still need reliable air service to connect with loved ones, business contacts, travel destinations and the global economy. For these 409 airports, regional airlines provide the only source of scheduled, commercial air service. Regional airlines therefore play a singular, critical role for smaller communities and this air service to smaller communities also supports the nation's economy writ large. In fact, regional airline service to the nation's smallest airports alone (non-hub and small hub) drives a conservatively estimated $134 billion in annual economic activity and supports more than 1 million jobs, with $36.4 billion in earnings.

We applaud the committee for including an Aviation Workforce Title in the FAA Reauthorization Act of 2018. This title includes several initiatives that are critical for the advancement of the aviation maintenance profession, and we look forward to working with the Committee and FAA to implement those provisions.

REGIONAL AIRLINES ARE A CAREER ENTRY POINT FOR MAINTENANCE TECHNICIANS

Our industry has focused a lot of attention on the pilot shortage, and rightly so; in recent years, this urgent issue has undermined the ability of our member airlines

to continue serving some smaller communities. As we continue to work toward combatting this challenge, airlines also face an acute maintenance technician shortage. As the career entry point for many aviation maintenance technicians, regional airlines have high exposure to this workforce shortage.

There is a missing generation of aircraft maintenance technicians in the United States. According to the Aviation Technician Education Council (ATEC) the mechanic population will decrease by five percent in the next 15 years and approximately 30 percent of the workforce is at or near retirement age today. At the same time, new entrants make up only two percent of the annual workforce. The Boeing 2019 Technician Forecast further highlighted the need for additional maintenance technicians and predicts the need for 193,000 new technicians over the next twenty years. Meanwhile, technicians continue to retire faster than they are being replaced, even without accounting for industry growth. Additionally, high-tech maintenance workers are needed across a host of industries. Aviation is competing with the automotive industry and the robotics industry to attract new technicians and in the face of this fierce competition, some existing workers are being drawn away from the aviation sector altogether.

The financial health of the regional airline industry, but also the economic prosperity for the numerous small and rural communities that completely rely on our air service depends on our ability to reverse these trends and to recruit and support the next generation of maintenance technicians. A future with too few maintenance workers could bring similar impacts to those associated with the early stages of the pilot shortage, where an inability to staff all routes led to air service losses and reductions at hundreds of smaller U.S. communities.

Unfortunately, vocational education has gone out of vogue in the U.S. over the past several decades. At the same time, aircraft maintenance has really evolved over the last 10–15 years, creating a more dynamic—and, in some ways, more complicated—workforce. Many technicians today are using computers as much as wrenches. As an industry, we must do more outreach with schools, helping to instill a sense of wonder about aviation and to get them to start thinking about a career in aviation maintenance. We need to differentiate A&P mechanics vs. repairmen vs. general maintenance staff and prioritize action accordingly. A technician plugging a laptop into an aircraft and analyzing data needs a different skillset than the mechanic using a wrench to affix a replacement part. Each of these jobs are important, and we need to recruit for all of them. To succeed on all levels, it is imperative that we reach populations who have not historically gone into aviation maintenance, including women and people of color. This win-win will help connect young people to outstanding jobs with a high return on investment. As the Subcommittee considers this challenge, I would like to share a few programs our member airlines have offered, to help address technician workforce challenges.

ACTIONS TAKEN BY REGIONAL AIRLINES TO ATTRACT MAINTENANCE TECHNICIANS

As the career entry point for many maintenance technicians, it is incumbent on the regional airline industry to create a talent pipeline. The pipeline must not only connect regional airlines with students who have shown an interest in joining a skills workforce by partnering with Aircraft Maintenance Technician (AMT) schools and vocation high schools, but it must also reach new populations by seeking to inspire those who have never considered aviation industry as a career destination for them. To attract the next generation, regional airlines are partnering with AMT schools, vocational high schools, and starting their own apprenticeship programs for recent high school graduates to create a talent pipeline. In addition to partnerships, some carriers take it a step further and offer apprenticeship programs for recent high school graduates who want to work in the industry but lack experience. In these programs, carriers follow a "earn and learn" career pathway model, which offers paid training along with pay and benefits that improve as the student progresses through their education and training courses. Carriers will also often pay for FAA testing. In the apprenticeship program, trainees work next to licensed airframe and powerplant professionals, getting important hands-on experience while maintaining in service aircraft. Upon completion, graduates will receive formal job offers as aviation maintenance technicians. Some of these apprenticeship programs have been formally recognized by the U.S. Department of Labor.

Carriers have also set up transition programs for military personnel with aviation maintenance experience to help them get their A&P license so that they can use their skills and experience in civilian life. Veterans are highly regarded and sought after as employees because they are the best of the best, having worked on the world's most advanced aircraft and have demonstrated leadership and a strong work ethic throughout their military careers. These programs typically include a transi-

tion or signing bonus, paid training, training stipend, and free testing upon commitment to the carrier. A non-exhaustive sampling of RAA member outreach programs follows.

One RAA member, Republic Airways, has launched LIFT Academy and you will hear more about that today. Another RAA member airline Envoy Air, has started an Apprenticeship Program, certified through DOL and TransPORTs, and is designing components of its Cadet programs to bring more AMTs into the pipeline. Envoy has also launched a military transition program, where the airline put AMTs through schools for training and licensing, pays for testing, and helps them purchase tools. Like many carriers, Envoy is also partnering with schools to get young people engaged in the career. RAA member Piedmont Airlines also highlights outreach as crucial and has worked with the MikeRoweWORKS Foundation, which aims to "make work cool again" by sponsoring Work Ethic Scholarships that recognizes the hardworking people across the country who keep the lights on, water running, air flowing and planes flying; in other words, the next generation of skilled workers. Piedmont and other members point to the aviation industry campaign "Choose Aerospace" as undertaking some of the industry's most important work fostering interest in aerospace careers and noting the cross-industry participation that includes industry trade associations, airlines, labor unions and educational institutions and RAA endorses their determined approach.

RAA member Horizon Air details several programs and notes the importance of formalizing partnerships with schools and offering tangible support such as scholarships. Horizon is also sponsoring job fairs and maintenance competitions as a means of reaching and sparking interest from young people.

As part of these outreach programs, company maintenance employees volunteer their time to meet with students and share with them the work, techniques, and technology they use day to day. RAA member Cape Air emphasizes the importance of airlines supporting technician education materially, with donated aircraft and engine components to a partner technical school. Donating these materials helps to ensure that students have recent technology to study and train on. Cape Air has also created a paid internship program, where students shadow licensed Airframe and Powerplant professionals, providing them with an opportunity to see how their coursework is applied in the hanger. During these internships, students become familiar with the technology they will be working on after they have been awarded their airframe and powerplant licenses. Being an A&P mechanic is the first step for a lot of different paths in the company given the central role of technology in modern aircraft. For many carriers, flow is important and thoughtful programs have established pathways between technician education and airlines through preferred hiring agreements. In some cases, flow is also established between regional and mainline partners. These represent just a few examples of the industry-wide recruitment programs instituted by regional airlines. While programs vary from carrier to carrier, the overwhelming trend is one of outreach and support.

Given the competition for talent, these programs and initiatives are built on a foundation of competitive pay that includes signing and retention bonuses; medical, dental, vision, and life insurance; retirement benefits; and flight benefits along with discounts for the employee and their family. Despite these comprehensive measures, ensuring sufficient maintenance personnel are available for airlines to attract remains challenging. To amplify the efficacy of individual airline programs and airline industry collective outreach, Congress, the FAA and aviation stakeholders must work together to advance key workforce measures that were advanced through your leadership in the FAA Reauthorization Act of 2018.

FULLY FUND AND IMPLEMENT THE AVIATION TECHNICIAN AND PILOT WORKFORCE GRANT PROGRAMS

As you know, Section 625 of the FAA Reauthorization Bill created two new workforce development grant programs to help grow the technician and pilot workforce. The bill authorizes $5 million per year over five years to support stakeholder initiatives to recruit and train maintenance technicians and $5 million per year over five years to advance aviation curriculum in high schools to help address the pilot shortage. Now that these programs have been secured, the RAA hopes that the FAA will work with stakeholders to quickly stand up these programs.

Additionally, it is critical for Congress and the FAA to continue investing in both of these programs over the course of the reauthorization; we hope the Administration and Congress will continue to prioritize funding to these grant programs and conduct appropriate oversight to ensure that they are implemented as intended. Importantly, the maintenance technician grant program requires an application to be jointly submitted by multiple stakeholders to further collaboration and help develop

the talent pipeline. RAA wholeheartedly supports this approach, since collaborating with other stakeholders is one of the main strategies that regional airlines are deploying to address their workforce needs.

RAA Urges Congress to Quickly Update Part 147 Curriculum

As the industry focuses on recruiting and encouraging the next generation of maintenance technicians, RAA also urges Congress to ensure tomorrow's workers receive the appropriate training. A study by the Government Accountability Office in 2003 noted that certified programs today do not fully prepare A&P mechanics to work on technologically advanced commercial aircraft and emphasized that modern aircraft require a different set of skills than those being taught at aviation technician maintenance schools.

In practice, outdated curricula in Part 147 aviation technician schools leads to an enormous skills gap. Airlines report that it takes over a year of on-the-job training to close the skills gap introduced by a lack of rudimentary skills demanded by today's modern industry. Section 624(a) of H.R. 302 (P.L. 115–254), the FAA Reauthorization Act of 2018, directed FAA to issue a final rule within 180 days of enactment to modernize Part 147 curricula standards for aviation mechanics, and Sec 624(b) further directs the agency to work with stakeholders to develop and publish guidance and model curricula for AMT schools so that classroom instruction and training reflect industry needs. Unfortunately, the FAA has not yet undertaken this work. While we recognize the constraints FAA faces in attempting to meet each deadline in this very comprehensive law, especially in view of a government shutdown last year, the supplemental notice of proposed rulemaking (SNPRM) published on April 16, 2019 does not match the urgency of the moment and fails to meet the needs of the industry.

RAA, alongside ATEC, the Aeronautical Repair Station Association and other aviation stakeholders has urged the FAA to create an outcome-based model for dual enrollment programs and completely defer to the Department of Education as it relates to concerns of quality of education through the accreditation process. It is our understanding that the FAA could publish a final rule towards the end of 2020 at the earliest; we hope it grants schools the appropriate flexibility to fully train students to current industry standards. Reflecting a desire to maintain congressional engagement on this issue, RAA joined many other aviation stakeholders in supporting the Promoting Aviation Regulations for Technical Training (PARTT) 147 Act, which was introduced on Dec. 12, 2019 by Congressman Young (R–AK) and would require FAA promulgation of community-draft language to replace the current part 147.

Lack of progress on this issue has undermined industry efforts to maximize this talent pipeline. The FAA has placed a burden on employers to educate technicians who attended a part 147 school, further exacerbating the shortage by preventing companies from optimizing their workforce. The FAA must make aviation education a rulemaking priority and provide AMT schools with the flexibility to meet industry's demands for technicians who are proficient and adequately trained to maintain the modern aircraft our members operate.

Conclusion

A healthy, reliable and safe aviation system is only possible with the collaboration and cooperation of all aviation stakeholders and the federal government. We must all work together to recruit, attract, and retain a robust maintenance technician workforce.

The Regional Airline Association stands ready to support the Committee in its work to address the maintenance and pilot shortage while upholding the very highest level of safety across all workforce populations. Ultimately, successful resolution of these challenges is critical so that passengers from communities of all sizes can access the nation's air transportation network.

Thank you for this opportunity to provide comments.

Statement of Airbus, Submitted for the Record by Hon. Garret Graves of Louisiana

FLIGHTPATH9

In 2015, Airbus opened its first U.S.-based commercial aircraft manufacturing facility in Mobile, Alabama to assemble and deliver A320 Family single-aisle aircraft. Airbus delivered its first aircraft in April 2016 (an A321 to JetBlue) and is currently producing at least 70 A320 Family aircraft each year. In 2017, the company announced it would begin producing the A220 Family of aircraft in Mobile. Production of the first aircraft (an A220–300 destined for Delta Air Lines) began in 2019 and will be delivered in Q3 2020. The facility will produce nearly 50 aircraft a year by the middle of the decade. The Mobile production facility—a $1 billion investment—is part of Airbus' strategy to enhance its global competitiveness by meeting the growing needs of its customers in the United States and beyond. As the Airbus aircraft production rate grows, proportionately so does the number of employees at the site. In order to address its current and future workforce needs, Airbus has created partnerships with local education institutions, local industries and municipal and state governments.

In 2018, Airbus and the State of Alabama, collaborated to create Flight Works Alabama, an aviation education center. This center will focus on career awareness, skills-based training, and workforce development delivery for the U.S. Gulf Coast. As a part of this initiative, FlightPath9 was designed, developed, and launched.

FlightPath9 is a unique pre-employment training program for high school seniors created through a partnership between Flight Works Alabama and Airbus. Following the completion of training and high school graduation, participating high school seniors, enrolled at accredited schools in Mobile or Baldwin County, are guaranteed full-time employment at the Airbus Final Assembly Line in Mobile. The ideal candidate has decided they will not attend college or enlist in the military but would prefer to begin a career and are committed to attend all classes throughout the program.

Flight Works Alabama, a member of the National Coalition of Certification Centers (NC3), and through its partnership with Embry-Riddle Aeronautical University, provides industry-recognized certifications in Tools@Height, Precision Measurement Instruments, Precision Electrical Termination, Multimeter, Structural Sheetmetal, and Mechanical and Electrical Torque. In addition, the students will receive skills-based training and certifications in safety, aviation basics, lean manufacturing, critical thinking skills, and leadership.

FlightPath9's inaugural class of twenty-five attend class every Tuesday and Thursday evening from September to May. In order to provide the students the best atmosphere for success, Flight Works Alabama, with an array of community and industry partners, creates a safe workplace environment through providing real world applications inside the classroom. On day one, each student is issued a uniform including pocketless pants, t-shirts, steel-toe shoes, a bump-cap and FOD bag. Students are required to wear these uniforms and have their personal protective equipment on them at all times. Great work habits are introduced and enforced throughout the class time.

To ensure the success of the students, Flight Works Alabama hired a "Success Coach". A former educator from the local school system, our "Coach" is the dedicated point of contact for the students, parents and school counselors. Not only does she assist in teaching basic math and comprehension during class as necessary, she also maintains an open line of communication with the students to understand any issues they may have in or outside of FligthPath9 class. Additionally, Flight Works Alabama has recruited and matched Airbus employee mentors to each student. Mentors attend classes, encourage the students, help them as they learn certain skills, and provide answers to questions students may have about their future workplace. As a result, when this class enters the workforce at Airbus they will have an enormous support group.

The cost of the program is $7,550 per student. For the inaugural class, the cost of every student was funded by the federal Workforce Innovation & Opportunity Act legislation (WIOA), Airbus, and local school systems. There were no out-of-pocket expenses paid by the students or their families.

This creative and innovative program is changing the lives of these students and their families along the Gulf Coast. Mr. Larry Mouton, Assistant Superintendent of Workforce Development and Career Technical Education, stated recently, "At the Mobile County Public School System, we are always searching for new and innova-

tive ways to prepare our students for successful careers. The FlightPath9 program answers this call and is the most impressive workforce development program I have seen in the last 10 years."

Letter of March 4, 2020, from Jordan G. Lyons, Associate Professor, Louis Waller Endowed Professorship, Department of Professional Aviation, Louisiana Tech University, Submitted for the Record by Hon. Garret Graves of Louisiana

MARCH 4, 2020.

Hon. GARRET GRAVES.
Ranking Member,
Subcommittee on Aviation, U.S. House of Representatives, Washington, DC.

Hon. RICK LARSEN.
Chairman,
Subcommittee on Aviation, U.S. House of Representatives, Washington, DC.

GREETINGS:

Beginning in 1967, the Department of Professional Aviation at Louisiana Tech University currently offers Bachelor of Science (B.S.) degrees in Professional Aviation and Aviation Management. Like many collegiate aviation programs in the United States accredited through the Aviation Accreditation Board International (AABI), we are experiencing a high demand for our degree programs from both in-state and out-of-state students. For the past decade, Department resources have not needed to accommodate more than 60 new students in an academic year. However, the B.S. Professional Aviation program experienced a 380% increase in applications from students intending to start in Fall 2018. We believe this demand is likely attributed to industry needs, our AABI-accredited status, and the affordability of our degree programs. In response, a new selective admission policy was implemented in August 2017 to help our academic unit manage this growth.

Our program admission policy helps us better ensure that all enrolled students can progress with limited interruptions to their flight training continuity. At Louisiana Tech, a maximum 10:1 student to flight instructor ratio yields efficient flight training continuity and a satisfactory level of safety and supervision. Therefore, the number of flight instructors available sets our Department's enrollment capacity each academic quarter. The ongoing challenge for our team is that many of our graduates working as flight instructors will leave Louisiana Tech within 12 months of graduation as first-year pay in the industry now exceeds $70,000. Also, graduates of our B.S. Professional Aviation program can enter the professional airlines sooner under our 14 CFR Part 61.160 institutional authority.

In the end, aviation employers are hiring our graduates almost as quickly as we can train them; however, we remain committed to safely training aviation professionals in support of their needs. We continue to enroll the maximum number of students each academic quarter based on our available flight instructor resources. However, any additional support from the Federal Aviation Administration in providing other Designated Pilot Examiners in our area or authorizing examining authority under 14 CFR Part 141 would be beneficial to our students. In doing so, our students could more efficiently gain the requisite aeronautical experience needed for employment after Louisiana Tech.

Your support is appreciated.

Very Respectfully,

MR. JORDAN G. LYONS,
Associate Professor, Louis Waller Endowed Professorship, Department of Professional Aviation, Louisiana Tech University.

Enclosure: Program Admission Summary

cc: Col. Tom Garza, Interim Chair, Department of Professional Aviation

Louisiana Tech University
Department Professional Aviation
B.S. Professional Aviation (PRAV)

PROGRAM ADMISSION SUMMARY

Situation: Exponential increase in applications declaring PRAV from Fall 2016 to Fall 2018

Student Demand

- 48% increase in enrollment from Fall 2010 to Fall 2017
- Program demand historically below 30 students per quarter
- Fall 2017—90 new applications received

In response, new admission criteria were approved to manage our growth (effective Fall 2018)

HS GPA (unweighted) 3.0
ACT composite score 23
Transfer GPA 3.0 (if applicable)
Interview with Department Chair
Early application (December of year prior to intended start)
Medically qualify to be a pilot

- Fall 2018—126 applications received
  - 46 students qualified and were admitted
  - 80 students did not meet one or more of the above criteria
- All qualified students have been enrolled since Fall 2018
  - Students that do not initially qualify are encouraged to attend Louisiana Tech in another degree program and compete for a major change based on earned GPA
    - The Department has enrolled 100% of current Louisiana Tech students that request a major change and meet the minimum GPA requirement

Flight Training

- Enrollment capacity defined by the number of flight instructors available
- A 10:1 student to instructor ratio or less is required to yield efficient flight training continuity and a satisfactory level of safety and supervision
  - Fall 2017—17:1 ratio
  - Fall 2020—8:1 ratio
- Very limited flight instructor pool outside of our program

Press Release, "United Airlines To Become Only Major U.S. Carrier To Own and Operate a Flight Training Academy," Submitted for the Record by Hon. Garret Graves of Louisiana

UNITED AIRLINES TO BECOME ONLY MAJOR U.S. CARRIER TO OWN AND OPERATE A FLIGHT TRAINING ACADEMY

February 05, 2020

CHICAGO, Feb. 5, 2020/PRNewswire/—United Airlines today further expanded its innovative Aviate pilot program by signing a purchase agreement to become the only major U.S. carrier to own a flight training academy. The United Aviate Academy will give the airline more visibility and direction over the recruitment, development and training of future pilots, enabling United to increase the percentage of women and minorities who become pilots. United expects approximately 300 students to graduate from the United Aviate Academy in its first full year of operation.

The flight training academy—currently operating as Westwind School of Aeronautics in Phoenix, Arizona—will be an extension of the airline's Aviate program, a pilot development and recruitment program that offers aspiring aviators the most direct path to achieve their dreams of becoming a United pilot. The airline anticipates hiring more than 10,000 pilots by 2029.

"We have developed the Aviate program in collaboration with the Air Line Pilots Association, International to have greater influence on the next generation of aviators at United," said Captain Bebe O'Neil, United's managing director of Aviate. "Launching our own academy provides us with the unique opportunity to not only ensure we maintain the ideal number of quality candidates within our pilot pipeline, but also play a significant role in recruiting, developing and welcoming those with diverse backgrounds to the United family."

In addition to launching the flight academy, United plans to reduce financial barriers to joining the program, making the dream of becoming a United pilot even more accessible to more individuals. The carrier is currently engaging with financial institutions with the goal of making attractive financing terms—such as industry-tailored grace periods and competitive interest rates—available to qualified individuals. Additionally, United plans to launch a scholarship program specifically focused on encouraging women and minorities to consider joining the United family. The airline will provide more details regarding these financing options as they become available.

Aviate partners currently include:

- Embry-Riddle Aeronautical University
- Western Michigan University
- Lufthansa Aviation Training Academy
- University of North Dakota
- Hillsboro Aero Academy
- US Aviation Academy
- FlightSafety International
- Ameriflight
- Boutique Air
- ATP Flight School
- ExpressJet
- CommutAir
- Air Wisconsin
- Mesa Airlines
- Florida Institute of Technology

AVIATE: LOVE TO FLY, BORN TO LEAD

Last year, United launched Aviate, its innovative pilot recruitment and development program. Those who apply to Aviate and are successful in the selection process will receive a program acceptance job offer with United. Aviate also provides support and coaching for pilots to develop into leaders who exemplify the professionalism, level of excellence and commitment to providing safe, caring, dependable and efficient service that United expects from its pilots. Additionally, Aviate provides those who aspire to a career as a United captain with the most direct route to achieving that goal.

United's Aviate career path program offers pilots competitive benefits, including:

- The most direct path within the industry to a major airline, with an Aviate regional partner minimum requirement of 24 months and 2,000 hours
- More options in program entry points throughout a pilot's career and choice of select United Express carriers
- Increased transparency and clarity along the path from program entry to flying for United
- Improved career development, mentoring and access to United pilots and learning tools.
- Immediate inclusion in the United family, with access to senior leadership, site visits and tours, and certain travel privileges

For more information on Aviate, please visit unitedaviate.com

ABOUT UNITED

United's shared purpose is "Connecting People. Uniting the World." We are more focused than ever on our commitment to customers through a series of innovations and improvements designed to help build a great experience: Every customer. Every flight. Every day. Together, United and United Express operate approximately 4,900 flights a day to 362 airports across six continents. In 2019, United and United Express operated more than 1.7 million flights carrying more than 162 million customers. United is proud to have the world's most comprehensive route network, including U.S. mainland hubs in Chicago, Denver, Houston, Los Angeles, New York/Newark, San Francisco and Washington, D.C. United operates 791 mainline aircraft and the airline's United Express partners operate 581 regional aircraft. United is a founding member of Star Alliance, which provides service to 195 countries via 26 member airlines. For more information, visit united.com, follow @United on Twitter and Instagram or connect on Facebook. The common stock of United's parent, United Airlines Holdings, Inc., is traded on the Nasdaq under the symbol "UAL".

APPENDIX

QUESTIONS FROM HON. SALUD O. CARBAJAL TO CATHERINE LANG, SENIOR ADVISOR FOR AVIATION WORKFORCE OUTREACH, FEDERAL AVIATION ADMINISTRATION

Question 1. What progress has FAA achieved in determining the criteria and application process under Section 632 of the FAA Reauthorization Act of 2018 for community colleges or universities to become designated by the FAA as a Collegiate Training Initiative (CTI) for unmanned aircraft systems?

ANSWER. A response was not received at the time of publication.

Question 2. The FAA is also responsible for overseeing AMT schools and establishing the minimum curriculum and training requirements students need. What progress has the FAA achieved in modernizing these training requirements?

ANSWER. A response was not received at the time of publication.

Question 3. Do you expect that training programs like these will help with the potential labor shortage for aircraft mechanics or aerospace engineers identified by a recent analysis by the Government Accountability Office (GAO)?

ANSWER. A response was not received at the time of publication.

Question 4. With only 13 percent of aerospace engineers being women and over 75 percent being white, what are some recommendations for Congress to consider in order to make our workforce more representative of our current population?

ANSWER. A response was not received at the time of publication.

QUESTION FROM HON. SAM GRAVES OF MISSOURI TO CATHERINE LANG, SENIOR ADVISOR FOR AVIATION WORKFORCE OUTREACH, FEDERAL AVIATION ADMINISTRATION

Question 1. What do you hope to get out of the two advisory committees on women and youth in aviation that were set up by the FAA Reauthorization Act of 2018?

ANSWER. The Women in Aviation Advisory Board (WIAAB) is tasked to provide the FAA with a comprehensive plan of strategies to attract more women and girls into the field of aviation. The FAA needs the knowledge and expertise of stakeholders from the entire aviation community to help identify the potential barriers to women entering into the aviation workforce, and more importantly, to develop coordinated efforts across the industry to address the issue. The barriers identified by the WIAAB will assist the FAA in finding ways to expand outreach (e.g. identification of women and girls' organizations and clubs) and attract more women in order to help diversify the workforce. Additionally, the WIAAB's work will allow the FAA to build upon work-life balance tools to help facilitate the recruitment and retention of women in the workplace. The WIABB's report to the FAA and Congress will outline a comprehensive plan and will include avenues to promote organizations and programs that are providing education, training, mentorship, outreach, and recruitment of women in the aviation industry.

The Youth Access to American Jobs in Aviation Task Force presents the opportunity to exchange ideas, recommendations, and best practices for establishing and growing a reliable source of qualified aviation professionals for the future of the industry. The task force will engage in robust discussions about barriers to entry (i.e. geographical, socio-economic), awareness of aviation careers among American youth, and traditional and non-traditional aviation career pathways. Leveraging the recommendations and strategies of the Task Force, the FAA hopes to identify specific actions to improve current efforts or create new programs to encourage American youth to enroll in and matriculate from an aviation course of study. The FAA also hopes to establish partnerships among government, industry, academia, and community organizations to implement programs and recommendations that will ensure a robust pipeline of aviation professionals. The task force's report to the FAA and Congress will include recommendations and strategies to facilitate and encourage high school students to pursue aviation careers.

QUESTION FROM HON. GARRET GRAVES OF LOUISIANA TO CATHERINE LANG, SENIOR ADVISOR FOR AVIATION WORKFORCE OUTREACH, FEDERAL AVIATION ADMINISTRATION

Question 2. As FAA works to strengthen its oversight of aviation workforce development while continuing to prioritize the safety of our national air space, how does the FAA intend to ensure a balance between safety regulation and the need to encourage qualified individuals to pursue an aviation career?

ANSWER. Safety is the core of the FAA's mission, and our top priority. While we have made significant strides in commercial aviation safety, our efforts to improve will never stop. Though technological advancements have helped us to minimize risks, ultimately, it is people who will take us to the next level of safety and operational excellence. The FAA's efforts are focused in part on ensuring that our own workforce is up to the challenge of setting and enforcing the standards for the broader aviation workforce, and we recognize the important role of all aviation stakeholders in maintaining safety. The U.S. aviation system is the safest, most dynamic, and innovative in the world, largely due to the collaborative approach to safety championed by the FAA, and shared by our partners in industry, academia, and government. To that end, an increasing share of the industry's technical workforce is moving toward retirement, and the pipeline of aviation professionals that support the industry has shown signs of slowing. For this reason, we are examining these trends and working with our industry partners to identify and take steps to avoid it. We are committed to partnering with industry, the academic community, and government agencies to remove unnecessary barriers for entry into aviation careers, as well as to enhance education pathways and build the pipeline of qualified aviation professionals. However, as the nation's aviation safety regulator, our first and foremost priority is always safety.

QUESTIONS FROM HON. SAM GRAVES OF MISSOURI TO HEATHER KRAUSE, DIRECTOR, PHYSICAL INFRASTRUCTURE, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Question 1. What are the main barriers to people pursuing aerospace careers?

ANSWER. Our prior work identified a variety of barriers to entering aerospace careers—specifically, with regard to commercial airline pilots and aviation maintenance technicians.

AIRLINE PILOTS

In our prior work on pilot supply, stakeholders identified several barriers to entry into a pilot career, including:

- *Cost of pilot training*: We reported in 2018 that pilot training programs can be particularly expensive, and therefore unaffordable to many students.[1] Professional pilot students incur flight training "lab fees" in addition to general college tuition and fees that together often exceed $100,000.[2]
- *Limited sources of financial assistance*: We reported in 2014 that many private banks have tightened restrictions on financing available to potential new-pilot students, which has made it more difficult for students to qualify for financial aid.[3]
- *Schools' retention of flight instructors*: In 2018, we reported that some schools are unable to recruit and retain enough flight instructors to train all the pilots that they otherwise could accept in their pilot programs. School representatives told us that most pilots work as flight instructors to accrue the required flight time to become an airline pilot and generally seek employment with an airline as soon as they are eligible.
- *ATP qualification requirements*: Additionally, in 2014 we reported that the requirements for pilots to have an Air Transport Pilot (ATP) certificate to qualify as a first officer have required pilots to spend more time accruing flight hours (i.e., 1–2 additional years) prior to being qualified to work for an airline. Pilots receive relatively low wages during this time, which increases the length of time before they may be financially able to begin repaying their student loan debt.

Some stakeholders we interviewed said the federal government could help by revising existing student loan requirements as they pertain to pilot education, such as increasing the maximum loan amount, extending the loan repayment period, de-

[1] GAO, *Collegiate Aviation Schools: Stakeholders' Views on Challenges for Initial Pilot Training Programs*, GAO–18–403 (Washington, D.C.: May 15, 2018).

[2] In 2018, associations representing pilot training providers and pilots told us that mainline airlines prefer pilots with a 4-year degree. See GAO–18–403.

[3] GAO, *Aviation Workforce: Current and Future Availability of Airline Pilots*, GAO–14–232 (Washington, D.C.: February 28, 2014).

ferring the start of loan repayment, or establishing a student-loan repayment or forgiveness program for airline pilots. Stakeholders also told us that FAA should consider creating additional pathways to achieving an ATP certificate.

AVIATION MAINTENANCE

In our 2014 report on the aviation maintenance workforce [4], aviation stakeholders identified several challenges associated with aviation maintenance workforce supply, including:

- *Changes in K–12 education*: Several employers cited the absence of vocational and shop classes in high school as a reason that interest and critical knowledge in aviation maintenance are waning.
- *Perceived emphasis on earning a four-year degree*: Several employers and stakeholders said that with parents and counselors insisting that a college degree is needed to do well in society today, students may not be aware that there are well-paying professions, such as in aviation maintenance, which do not require a four-year degree.
- *Perceived decreased desirability of working in aviation*: Several employers and stakeholders noted that aviation used to be viewed as a more "exciting" industry, which attracted people even though wages were often lower than other similar industries. They said that events including 9/11 and airline bankruptcies and mergers have resulted in the aviation industry being viewed as unstable, compared to other industries.
- *Focus of aviation maintenance technician school curriculum on outdated technologies*. Stakeholders indicated that the core curriculum at these schools provides mechanics with a solid understanding of basic repair principles, but some parts of the curriculum are obsolete and cover aspects of aviation repair that are rarely needed or used by A&P mechanics.

We were not able to verify these concerns with available data. However, if a labor shortage were to develop, it could be expected that employers would continue to take actions at their disposal, such as adjusting wages or changing recruiting and training practices.

Question 2. What do you believe is the most appropriate role for the FAA in terms of addressing workforce shortages and barriers to entry?

ANSWER. Our previous work has found that federal agencies have a limited role in helping to attract people to aviation careers. On the other hand, employers may be the first to identify a developing shortage of workers in an occupation when they encounter difficulty filling vacancies at the current wage rate. Generally, employers in need of labor are likely to respond to difficulty hiring workers by increasing recruiting efforts, providing training for new hires, improving working conditions, reducing the minimum qualifications for the job, offering bonuses, improving wages and fringe benefits, contracting out the work, and turning down work.[5] For example, in 2018, we reported that compensation for commercial airline pilots has increased in recent years, most noticeably in new-hire compensation at regional airlines.[6]

The most appropriate role for the FAA in addressing workforce shortages is to continue to effectively implement and leverage its programs and initiatives that aim to grow the pipeline of individuals seeking to work in aviation. For example, FAA's STEM Aviation and Space Education (AVSED) program allows FAA to partner with groups like Aviation Career Education Academy and Women in Aviation to promote aviation careers to young people across the country. FAA should also continue to use institutional mechanisms like its Aviation Workforce Steering Committee to develop short- and long-term strategies to attract people to aviation careers. Other initiatives that FAA has recently established to address workforce shortages include its Aviation Workforce Expansion Aviation Rulemaking Committee and its partnership with the Air Force to review pilot supply challenges.

Regarding barriers to entry into aviation careers, FAA has a direct role in addressing certain barriers, while others are less directly within its control. For example, FAA's ongoing rulemaking to amend 14 C.F.R. Part 147, which governs the curriculum of FAA-certificated Aviation Maintenance Technician Schools, could help address concerns that out-of-date curriculum is impeding graduates from attaining the jobs they seek in the aviation industry. Additionally, as we previously reported, FAA could consider developing alternative pathways to qualification for an ATP—

[4] GAO, *Aviation Workforce: Current and Future Availability of Aviation Engineering and Maintenance Professionals*, GAO–14–237 (Washington, D.C.: February 28, 2014).

[5] GAO–14–232.

[6] GAO, *Military Personnel: Collecting Additional Data Could Enhance Pilot Retention Efforts*, GAO–18–439 (Washington, D.C.: June 21, 2018).

an option some stakeholders suggested in our 2014 work—if it is clear that the first officer qualification requirements are discouraging a sufficient number of students from pursuing pilot careers. On the other hand, efforts to address such barriers as the cost of a pilot education and the limited financial assistance available, or the perceived attractiveness of aviation maintenance careers, would likely involve stakeholders across the public and private sectors, such as the Department of Education, collegiate aviation schools, airlines, and manufacturers.

QUESTION FROM HON. GARRET GRAVES OF LOUISIANA TO HEATHER KRAUSE, DIRECTOR, PHYSICAL INFRASTRUCTURE, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Question 3. GAO was directed to conduct a study to evaluate the current and future workforce needs. Can you provide the Committee with a status update on the GAO's workforce of the future study?

ANSWER. We are currently completing our audit work and anticipate issuing a final report this summer.

QUESTIONS FROM HON. SAM GRAVES OF MISSOURI TO STEVEN R. JACKSON, PRINCIPAL, AVIATION HIGH SCHOOL

Question 1. What are your thoughts on Military AMP experience? In your opinion, should the hours those military professionals accumulate during their military service be transferable or be counted towards an FAA certification?

ANSWER. As a New York City public school that does not deal with military technicians who are transitioning to the commercial aviation maintenance field, it may be better to address this question to post-secondary Aviation Maintenance Technician Schools (AMTS) and the Federal Aviation Administration (FAA). With that being said, our input, based on the experiences of some of our staff members who earned their aviation maintenance licenses through their military training, we believe that military aviation work is very highly specialized and it may be difficult to transfer enough skills or experiences to cover all requirements of the Federal Aviation Administration General, Airframe and Powerplant license hour requirements. However, as we stated in our written testimony we suggest stripping away the extraneous tasks of having a military aircraft technician demonstrate such outdated skills as the proper method for preforming a scarf splice repair on an aircraft wood structure which may help experienced military technicians to cross directly into the workplace based a proven track record and verifiable training to back up their credentials. Moreover, give AMTS programs the flexibility in assessing and evaluating Military Occupation Specialty Code (MOS), Air Force Specialty Code (AFSC), and Navy Enlisted Classification system (NEC) military credentials. Please note that these are our brief opinions, and we suggest that you ask this question of post-secondary AMTS programs such as Vaughn College for a more detailed, informed answer.

Question 2. What types of incentives does a career in the aerospace industry provide to a younger generation who do not have an aviation or aerospace background? In your opinion, what might make them want to pursue such a career path?

ANSWER. As a New York City public school that has a student body comprised of very diverse ethnic and cultural backgrounds, as well as many first generation American students who are looking to find a pathway to a better quality of life for themselves and their families, the incentives are plentiful for the high school students we encounter. Currently young students are attracted by the increased pay, incentives, bonuses, profit sharing, tuition reimbursement, etc. that will help them improve their quality of life and enable them to live an upper middle-class life, especially in an expensive city such as New York. Additionally, many young people today also value experiences over monetary rewards and the fact that working for commercial airlines means that young people can travel the world, virtually for free, is also another major incentive for youth today. Though we are eager to provide input on how to address the looming aviation maintenance technician shortage, it must also be said that there is a wide world of career opportunities in the aviation industry and attending a school such as Aviation High School can also encourage students to begin as a technician, but possibly go on to related, high needs positions such as engineers, air traffic controllers, pilots, managers, etc.

The overall question of what may make a young person pursue the aviation maintenance career path is the fundamental question that we are facing as a school and industry today. We strongly believe that the Congress, FAA and industry partners can help entice young people to explore and enter the aviation maintenance field through the development, broadcasting and investment in public service announcements, advertisements and experiences that expose not only young people, but their

parents to the exciting, rewarding and lucrative career choice that aviation maintenance (and the wider aviation industry) can provide for today's youth. In conjunction with greater expose and positive messaging, it is important for our nation to provide elementary, middle and high school students with aviation industry related experiences, such as hangar and maintenance facility visits, airport events and fun, hands on activities where students who are drawn to more tactile learning (and work) will become encouraged to enroll in an aviation maintenance technician high school or college.

Lastly, we also believe that young people need to be provided with more experiences that match their modern day interests, such as exposure to aviation maintenance work on advanced technologies, modern, sophisticated machinery, computer programming based avionics work, and the various adventurous real-work based experiences that would further attract young people into the aviation maintenance field. All of the points in the answer to this question would help young people and their parents learn that the aviation maintenance technician (preferably called an aircraft engineer) is not an employee that works a simple nine to five job.

Question 3. Can you characterize any collaborative discussions with the other tech-schools in your area? What type of feedback have you received from the school boards regarding the incorporation of more "hands-on" courses? Are they generally receptive? What do officials highlight as major obstacles to reinstituting more hands-on, "shop"-like courses?

ANSWER. The New York City public education system is comprised of all the public schools of the five boroughs of New York City and as such, Aviation High School is a part of a subset of Career and Technical Education (CTE) schools and programs that are located throughout the city. Our CTE school community does collaborate to explore ways to improve technical, hand skill training, align program outcomes with industry need, and gain input from local industries to improve the quality of CTE programs. We not only participate in such CTE school committee meetings, but each CTE school also has an advisory board comprised of industry partners and post-secondary institutions to gain input on how well a school's program is aligned to industry need and job entry expectations. Discussion and collaborations with these groups support the idea of improving young students' hand skills (as well as soft skills) through improvements in curriculum, mentoring, internship and on-the-job training opportunities. New York State is also currently in the process of requiring middle schools to develop CTE based experiences for students that would hopefully better align with the CTE high school programs offered to the students of New York City and help improve alignment of student interest with the careers available to them. (Please note this is currently in the early stages of being developed.)

In addition to the obstacles referred to in the answers above, additional obstacles include funding for schools to maintain and add appropriate, modern equipment and supplies for students to work with and learn by "doing." (It must also be stated that the cost of tuition, personal supplies and tools are an obstacle for many post-secondary school students, and additional grant funds would help more students attend and complete these programs.) Speaking on behalf of public schools (both primary and secondary), an additional obstacle is the fact that such schools face a great many local, state and federal mandates, expectations and oversight agencies (local boards, central office supervisors, politicians, etc.) that create logistical and scheduling difficulties for schools to add additional hands on "shop" type classes. The great array of mandated expectations may serve as a hindrance for many primary and secondary schools to offer appropriate (but not required) hands on courses.

Lastly, we must also remind everyone that the current aviation maintenance technician shortage is also creating a shortage of FAA certified, industry experienced aviation maintenance technician teachers who are available to teach at any one of the 176 AMTS schools across the nation.

We would also like to add, that though there are real and challenging obstacles that schools such as ours face, by working through these obstacles to provide young students with more hands on shop courses, we believe that AMTS schools can ensure that their programs create entry-level ready young technicians (engineers) who:

- are able to read, interpret, and understand maintenance manuals and wiring diagrams
- display solid hand skills while incorporating proper safety procedures
- effectively use a multimeter for troubleshooting purposes
- have basic computer knowledge to complete basic BITE tests on aircraft systems
- have an overall understanding of how aircraft systems work
- are able to think critically and "outside of the box"

We hope that our (and the entire panel's) testimony and answers provide the Subcommittee with enough insight and ideas to enable the Congress to support the FAA, aviation industry and Aviation Maintenance Technician Schools to entice young people to enter aviation maintenance programs and schools, develop proper entry-level skills and become career aircraft engineers.

QUESTION FROM HON. GARRET GRAVES OF LOUISIANA TO STEVEN R. JACKSON, PRINCIPAL, AVIATION HIGH SCHOOL

Question 1. What are ways to expose students who attend non-aviation specific high schools to aerospace careers?

ANSWER. In addition to the above suggestions and input, we believe that governmental agencies (such as the FAA), aviation industry partners and local school boards need to create opportunities for elementary and middle school students to be exposed to the exciting world of aviation. As an example of plans our advisory board is developing, we are looking into the possibility of having a site (such as the TWA Hotel at JFK International Airport) host an aviation themed event for young students followed by an event based at Aviation High School where young students can work on aviation related projects and create something with their own hands and see what type of fun jobs an aircraft engineer can do in the aviation maintenance career field. Creating the interest, excitement and pathways to a school such as Aviation High School would also potentially lead to increased enrollment in post-secondary AMTS schools such as Vaughn College.

QUESTIONS FROM HON. SAM GRAVES OF MISSOURI TO SHARON B. DEVIVO, PRESIDENT, VAUGHN COLLEGE OF AERONAUTICS AND TECHNOLOGY

Question 1. What types of incentives does a career in the aerospace industry provide to a younger generation who do not have an aviation or aerospace background? In your opinion, what might make them want to pursue such a career path?

ANSWER. Most of Vaughn's graduates, based on our location in New York City, go to the regional airlines (e.g. Endeavor, Envoy, Republic) for a short tenure (roughly one to two years) and then make their way to the major airlines. The greatest incentive to take a position in aviation in the last three years has been the increase in the hourly wage, which has topped $25 per hour to start and can go higher than $80 per hour at the major airlines. We have heard anecdotal information that crew chiefs at a major airline are making $125,000 without overtime.

In addition to the increasing salaries, aviation maintenance technicians with the airlines enjoy medical, retirement and flight benefits. Graduates also have the option to take positions with public utilities such as Consolidated Edison and Keyspan, or public transportation entities such as Long Island Railroad, the MTA and companies such as Kawasaki Railcar (all located regionally). These are good union positions offering competitive salaries and benefits.

In order to get more young people to pursue these careers we need to reach them earlier (high school is too late) and we need a way to reach adults who may have decided that college was not their path. Students and families will be motivated to make the investment in education if they can see a clear career pathway with demand and long-term stability.

Question 2. What are your thoughts on Military AMP experience? In your opinion, should the hours those military professionals accumulate during their military service be transferable or be counted towards an FAA certification?

ANSWER. Most of the Veteran students that Vaughn enrolls come with very specific aviation skills, but generally not a solid understanding of the entire aircraft. For example, they may have only worked as sheet metal technicians while in the military and have a good understanding of aircraft structures, but have no understanding of electricity, aircraft weight and balance, or basic knowledge of FAA required maintenance records, and how these systems interact with each other. We counsel students to get as much of their experience listed on their discharge papers, and along with their military occupational specialty codes. We guide students to the local Flight Standards District Office of the Federal Aviation Administration to assist them on any areas that they can effectively "bypass." Many Veteran students qualify as applicable for an authorization to test and may bypass further training, but most feel that they require a more thorough understanding of aircraft systems and operations, so they choose to retrain with us to better prepare them for industry.

Veteran students also have the opportunity to directly bypass components of their education at Vaughn College through bypass exams based on the education received at military technical specialty schools. The amount of credit is determined by a test

that is equivalent to one given to students who complete comparable subject matter at Vaughn College. Credit for previous experience is granted only when experience is comparable to curricula subject matter. The amount of credit allowed is verified by documentation of experience and by an examination equal to that given to students who complete comparable required subjects.

Question 3. There are concerns about workforce shortages across the industry, including pilots—two questions:

a. What do you believe is the greatest barrier to pursuing a career as a pilot?
b. What do you believe Congress, the Federal Government, and industry can do to address that barrier?

ANSWER. The greatest barrier for underserved populations to becoming a pilot is the cost. For students enrolled in Vaughn's bachelor's degree in aircraft operations (flight), tuition and fees are about $26,000 per year and the cost of achieving your private pilot, instrument, commercial, certified flight instructor and certified flight instructor-instrument is between $60,000 and $70,000, but it very much depends on the individual student and could go higher if one or more licenses require additional hours to capture the concepts.

The other issue for underserved populations from a low socioeconomic background is their access to PLUS loans—these are the federal loans granted to the parents of students. Vaughn's average family income is $39,000 and many families do not have the credit history and/or the credit scores to qualify for loans so they have to try and get funding in the form of an alternative loan, which can come with high interest rates making the payback even more difficult. To aid this issue, the best course for the federal government is to increase the federal student Pell amount, and provide access to government-secured loan amounts beyond Pell to cover the cost of flight training. In addition, because of the Pell rules governing "Standard Academic Progress" students are not currently able to use more than four straight semesters of Pell meaning that they have difficulty using those funds to fly every summer. The federal government could provide expanded SAP rules for students in programs where we face a nationwide demand issue.

While students' long-term salary prospects are very good, when a student graduates they need to build their time as a certified flight instructor which typically pays a fairly low hourly rate and can make paying back any loans fairly difficult in the beginning of their professional careers. Providing greater access to federal funds with repayment tied to graduates' income would significantly increase underserved students access to this career path.

Question 4. Do you think Vaughn's US. vs. Foreign enrollment is typical? Are the other degree programs enrolling more or fewer international students?

ANSWER. Out of our entire population of 1,650 Vaughn students about five percent are international. However, many of our students came to America when they were children or are the first in their family to be born in the United States. Just in terms of the aviation maintenance program, there are 650 students. We have a collaboration with an institution in China: Jian Jiao University in Shanghai. Students complete three years at Jian Jiao and then come to Vaughn to complete their certification. We have 82 students currently enrolled from that program, and just had our first three graduates in December. Those students are already employed in China with Boeing Shanghai. Given the demand for pilots and aviation maintenance technicians worldwide, we can assist developing nations with standing up their aviation workforce. In terms of flight, we can accept international students into our program, but the numbers remain relatively small.

QUESTIONS FROM HON. GARRET GRAVES OF LOUISIANA TO SHARON B. DEVIVO, PRESIDENT, VAUGHN COLLEGE OF AERONAUTICS AND TECHNOLOGY

Question 5. What challenges, if any, does Vaughn College face in terms of recruiting and retaining students? How do you compare with other schools facing similar challenges?

ANSWER. In terms of recruiting, our typical aviation maintenance student is slightly older with an average age of 23 and they come to us having pursued careers that do not have long-term growth opportunities. The best way to reach them is with digital advertising which, we do on a year-round basis to drive students to campus. We offer a "white paper" on our website that provides information on the education we offer and the career path along with information about the demand. We provide this information to assist in driving visits to campus. We have about 100 unfilled seats at this point and battle the image of a maintenance technician as a "grease monkey" when they are in fact using high-tech tools to diagnose and repair aircraft. The other issue that can be unappealing is working nights and week-

ends (generally what will happen in the beginning of their careers before they gain some seniority) often in uncomfortable settings (e.g. freezing, raining, etc.), but we convey this during information sessions and balance that with the great long-term prospects and benefits to working in the industry.

In terms of retaining students, our greatest challenges are tool aptitude and basic math skills. Students no longer come to us with experience with tools, and, in response, we are adding several Snap-on (the tool company) certifications that students will take prior to enrolling to build familiarization and also to assist with some basic math skills with measurement exercises. Our retention rate for students in this program is 67.7 percent year-to-year and this is up from roughly 57.5 percent three years ago. We attribute this to standardizing the curriculum, providing more tutoring and the increasing demand for technicians.

In terms of our flight program, we recruit a more traditional aged student of 18, and host groups throughout the year to campus where they see our flight and air traffic control simulators, our small fleet of aircraft and speak with current students and faculty. We also regularly host Scouting groups through aviation and STEM activities to expose them to these fields.

Our students are also active in their outreach to middle and high school students in the region through their activities as part of our student chapters of Women in Aviation, the Society of Women Engineers and our Unmanned Aerial Vehicle Club. In the future, having access to funds that would allow us to take simulators to K–12 students (e.g. a mobile unit with a flight, air traffic control and drone simulator) would vastly increase our ability to expose underserved students at an earlier age and get them excited about these fields.

Question 6. When Vaughn College holds outreach events for the young people, what best grabs their attention to get them focused on an aerospace career path?

ANSWER. Vaughn regularly hosts open house events and provides tours to groups as well as on a one-on-one basis. At those events, we provide information about all of the opportunities available, the conditions they will work in, the benefits, the curriculum and knowledge they will acquire as a result of the program. Students are motivated by changing their, and their family's, trajectory, and so the career path as well as the salary and benefit opportunities are important.

Vaughn is also able to demonstrate our terrific outcomes by promoting the fact that we have a 99 percent placement rate within one year of graduation; 83 percent in their field. The institution has also been recognized as the number one institution in the nation by a report published in The New York Times and we are the best at moving students from the bottom 40 percent in income to the top 40 percent. These two statistics lead us to develop the "Vaughn Guarantee" for students enrolled in our bachelor of science degrees or the aviation maintenance program (where they can achieve a certificate or an associate's in occupational studies). In order to qualify, students must stay continuously enrolled full-time and meet regularly with career services. If those students do not have a position in their field within one year, we will pay their federal loans for one year. We want students and families to know that we value their investment and want to truly partner for their success.

Finally, many are motivated by the opportunity to pursue their passion. These are the same people who crane their necks every time an aircraft passes overhead, and in our community they are surrounded by likeminded individuals. We think that an additional motivator will be the updated Part 147 rules which will put emphasis, we think, on newer technologies such as composites. We are also exploring the opportunity with one of our airline partners to experience engine technology with virtual reality, which could help to change the fundamental understanding of aviation maintenance and further the image that this is a high-tech field.

QUESTIONS FROM HON. SAM GRAVES OF MISSOURI TO JOSEPH MCDERMOTT, MANAGING DIRECTOR, TECHNICAL OPERATIONS, DELTA AIR LINES

Question 1. What are your thoughts on Military AMP experience? In your opinion, should the hours those military professionals accumulate during their military service be transferable or be counted towards an FAA certification?

ANSWER. Military experience is valuable in any number of careers in the aviation industry. At Delta, we are extremely proud of our veteran workforce: across the company we employ approximately 12,000 veterans, and veterans comprise 20% of the TechOps population. The military is a key part of our recruitment strategy as it allows Delta to connect with hard-to-find skill sets and specialized training provided by the military.

Since each airline has a unique fleet and maintenance program, every new hire must go through Delta specific training once they are brought on-board at TechOps.

We find that veterans with AMP backgrounds have the skills needed to excel in this training and throughout their careers at Delta, making their military experience highly transferable and a strong indicator of future performance.

Question 2. In your opinion, how do we overcome the "stigma" associated with technical colleges or other vocational programs?

ANSWER. In order to overcome the possible stigma associated with technical colleges, vocational programs and other skills-based training, we must directly connect with students early to advance interest in aviation careers. That is why the TechOps Outreach program seeks to educate our potential workforce on the benefits of a career in TechOps while they are making critical life choices as high school students. It offers these students the ability to interact with and be encouraged by AMT role models, who can give them a realistic day-in-the life overview as well as hands-on practice with tools, aircraft parts and some of the problem solving that is part of the job. The Outreach program also provides a venue to reach the influencers of the next generation, such as parents, teachers, and school counselors to help shape their perception of aviation maintenance as a rewarding, stable career.

In addition, we must highlight the significant benefits of a career in the aviation industry—including high-paying jobs, steady careers with advancement opportunities, lifelong learning potential and other associated perks. As noted at the hearing, Delta's best recruiting tool is the fact that our maintenance workforce receives industry-leading total compensation and benefits. Top-of-scale mechanics make an average base salary of more than $100,000. And they can achieve this pay after 7.5 years of service—approximately 75% of mechanics currently earn top-of-scale pay, a reflection of the seniority of our workforce. This compensation does not include Delta's robust profit-sharing program. On February 14, Delta paid out $1.6 billion to our employees, which equates to 2 months additional salary per employee. For each of the past six years, we have returned more than $1 billion in profit sharing to our deserving workforce.

QUESTIONS FROM HON. GARRET GRAVES OF LOUISIANA TO JOSEPH MCDERMOTT, MANAGING DIRECTOR, TECHNICAL OPERATIONS, DELTA AIR LINES

Question 3. Delta was recently accepted into the DoD Skillbridge Program. Is your company finding it easier to fill positions now that you are able to pull from such a large potential employee base?

ANSWER. We believe the DOD Skillbridge Program will make it much easier for both Delta to meet our workforce demands and for veterans to find meaningful, well-compensated employment. As our program was just approved recently, however, we are in the early stages of this partnership and do not have data to evaluate our experience. We are happy to follow up with your staff in the coming months as we truly begin to leverage this important tool.

Question 4. Through the Skillbridge Program, are you finding that employees hire from this pool offer skill sets that non-military personnel do not?

ANSWER. As noted above, we are in the early stages of the Skillbridge Program and it is too soon to do an assessment. We are happy to follow up with your office as we learn more.

Question 5. What types of incentives does a career in the aerospace industry provide to a younger generation who do not have an aviation or aerospace background? In your opinion, what might make them want to pursue such a career path?

ANSWER. Our culture, commitment to employees, and of course, our compensation are all factors in the loyalty that our workforce demonstrates in long-tenured careers at Delta. One reason the TechOps jobs at Delta are attractive is because our employees receive industry leading compensation and benefits. However, what we think what makes Delta a leader in the industry is our culture—we take pride in connecting the world and being the best in the business.

QUESTIONS FROM HON. SAM GRAVES OF MISSOURI TO JOHN J. NEELY III, VICE PRESIDENT, LAW AND PUBLIC AFFAIRS, GULFSTREAM AEROSPACE, A GENERAL DYNAMICS COMPANY

Question 1. What are your thoughts on Military AMP experience? In your opinion, should the hours those military professionals accumulate during their military service be transferable or be counted towards an FAA certification?

ANSWER. A response was not received at the time of publication.

Question 2. In your testimony, you reference Gulfstream's success in implementing the Advanced Cabin Maker course [in response to having difficulty finding skilled cabinet makers], what percentage of those who successfully completed this

program went on to full-time employment at Gulfstream or other aviation-related company?

ANSWER. A response was not received at the time of publication.

QUESTIONS FROM HON. GARRET GRAVES OF LOUISIANA TO JOHN J. NEELY III, VICE PRESIDENT, LAW AND PUBLIC AFFAIRS, GULFSTREAM AEROSPACE, A GENERAL DYNAMICS COMPANY

Question 3. How do colleges and high schools reach out to Gulfstream to establish programs with your company?

ANSWER. A response was not received at the time of publication.

Question 4. What types of incentives does a career in the aerospace industry provide to a younger generation who do not have an aviation or aerospace background? In your opinion, what might make them want to pursue such a career path?

ANSWER. A response was not received at the time of publication.

QUESTIONS FROM HON. SAM GRAVES OF MISSOURI TO DANA DONATI, GENERAL MANAGER AND DIRECTOR OF ACADEMIC PROGRAMS, LIFT ACADEMY

Question 1. In your experience, would you recommend that all flight schools and pilot training programs take a more structured approach to flight training, similar to your program?

ANSWER. It is important for student pilots pursuing an aviation career as an airline pilot to receive training from a structured flight training program. Structured flight training programs teach students the behaviors needed to successfully pass a Part 121 airline training event. It's important for students to experience flying in a controlled airspace environment, and to fly the same arrivals and departure procedures that airline pilots fly. It's important for pilots to learn complex avionics systems and engine systems similar to the aircraft systems knowledge needed in a Part 121 airline. Overall, the procedures that airline pilots are required to know should be taught in all training programs leading up to airline training rather than a pilot having to relearn a behavior in first officer new hire training.

Question 2. Why are simulators so important to the Academy's pilot training program?

ANSWER. Simulators are an important training tool at LIFT Academy. We can increase the intensity of training in a simulator that we can't necessarily train for in the aircraft. We can introduce abnormal procedures or emergency procedures in a simulator, which teach decision making skills and checklist procedural training. For example, lowering the weather minimums or introducing wind shear in a simulator allows the Academy to test the decision-making skills of a pilot.

Question 3. What are your thoughts on Military AMP experience? In your opinion, should the hours those military professionals accumulate during their military service be transferable or be counted towards an FAA certification?

ANSWER. Title 14 CFR Part 65 provides guidance regarding the transfer of military AMP experience. Regulations state that all experience must add up to 18 or 30 months for the rating(s) sought. As the FAA updates Part 147 curriculum, we would recommend a review of the Part 65 regulations to ensure that military service experience is being used to its full potential.

QUESTIONS FROM HON. GARRET GRAVES OF LOUISIANA TO DANA DONATI, GENERAL MANAGER AND DIRECTOR OF ACADEMIC PROGRAMS, LIFT ACADEMY

Question 4. In your experience, have you seen a big difference between pilots who completed a structured flight school versus those who did not? If so, in what way?

ANSWER. There are differences in pilots who have trained in a structured flight school environment versus those who have not trained in a structured flight school environment. In a structured training environment, students follow a FAA approved curriculum, completing the requirements they need to become certified. Once certified with a Commercial Pilot certificate, pilots have an option to build hours in a structured environment teaching structured procedures and building experience in controlled airspace following visual and instrument flight rules.

In a non-structured flight school environment, pilots will meet the FAA Part 61 certification requirements. After pilots are certified, they could build their flight hours by flying in visual flight conditions and in many cases, flying the same maneuvers repeatedly until they have met the Part 121 flight time minimums. This type of time building does not require the pilot to utilize procedural training, fly arrivals and departure procedures in controlled airspace, or practice emergency proce-

dures that reflect the airlines safety protocols. Instead, a pilot is merely flying around in a non-structured environment without gaining relevant experience and as often discovered by the airline training programs, learning negative behaviors. In the worst case, repeating these behaviors for 1250 flight hours, to meet the 1500-hour requirement, results in a student airline pilot failing new hire training events and/or requiring remedial training. Relearning deeply embedded behaviors can be challenging for those who have been flying in a less structured environment and inevitably they do worse in training.

New hire training at any airline is highly structured. Pilots are required to have the knowledge and skill needed to meet the airline's expectation, yet 1500 hours only represents total flight time and does not provide insight into the training and experience a pilot has received.

If structure is not introduced or practice within the first 1500 hours of flight time, pilots may not have the experience needed to successfully pass a Part 121 new hire training event. Just because a pilot meets the flight time requirements for Part 121 training and certification, does not mean they are quality pilots.

Question 5. Can you tell me more about how your program is lowering the cost of pilot training and any challenges you have encountered in attracting minorities, women, and other underrepresented groups into your program?

ANSWER. Republic Airways subsidizes $20,000 per student, lowering the total cost of flight training to $65,000. Once a student successfully graduates from the program, they will receive $15,000 in loan assistance and a guaranteed job.

The challenges we have encountered in attracting underrepresented groups is the cost of flight training and the available means to borrow funds. With the help of Republic Airways, the cost of training has significantly been lowered but LIFT Academy applicants are seeking private loans to pay for training. The lenders LIFT Academy work with, provide credit counseling to those applicants who are unable to be approved for a loan. These are applicants who have met the standards of the aptitude test and have passed the verbal interview but are unable to find the funds needed to enroll and participate in the program. The approval of Title IV financial aid would help students pay for structured training from LIFT Academy and allow us a bigger reach to underrepresented groups.

Question 6. What types of incentives does a career in the aerospace industry provide to a younger generation who do not have an aviation or aerospace background? In your opinion, what might make them want to pursue such a career path?

ANSWER. Having a background in aviation and aerospace is not required to be a pilot or a technician. What is needed by an interested applicant is the aptitude skills, mechanical skills and the motivation to get through training.

As a LIFT Academy student, Republic Airways offers financial subsidy and loan assistance as well as Republic Airways tailored training material. An airline pilot's salary has increased at all levels of the aviation industry, and incentives, such as high 401K matching benefits and travel benefits, are offered by airlines as well.

When comparing an aviation career to careers in medicine, law and education, the aviation industry is providing students a higher return on investment. The financial incentives and added benefits offered by Republic Airways makes a career in aviation a very rewarding pathway.

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