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# *Office of Inspector General*

# *Audit Report*

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## **FAA CONTINUES TO FACE CHALLENGES IN IMPLEMENTING A RISK-BASED APPROACH FOR REPAIR STATION OVERSIGHT**

*Federal Aviation Administration*

*Report Number: AV-2013-073*

*Date Issued: May 1, 2013*





# Memorandum

U.S. Department of  
Transportation

Office of the Secretary  
of Transportation  
Office of Inspector General

Subject: **ACTION:** FAA Continues To Face Challenges in  
Implementing a Risk-Based Approach for Repair  
Station Oversight  
Report No. AV-2013-073

Date: May 1, 2013

From: Jeffrey B. Guzzetti  
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Reply to  
Attn. of: JA-10

To: Federal Aviation Administrator

Over the past 15 years, major U.S. air carriers increased spending for contract maintenance by nearly \$2.7 billion.<sup>1</sup> Industry experts expect this trend to continue as airlines increasingly attempt to cut maintenance costs and maximize profitability. Currently, the Federal Aviation Administration (FAA) is responsible for overseeing nearly 4,800 aircraft repair stations<sup>2</sup> used worldwide by U.S. air carriers.

In July 2003 and September 2008,<sup>3</sup> we reported that FAA's oversight did not ensure that work completed at repair stations met FAA standards, and we made recommendations aimed at improving this oversight. In response to our 2003 report, FAA implemented a new process intended to provide comprehensive, standardized, and risk-based oversight of repair stations.

At the request of the former Chairman of the House Committee on Transportation and Infrastructure, Subcommittee on Aviation, we evaluated the Agency's progress since our last review. Specifically, we (1) determined whether FAA's oversight includes accurate and timely risk assessments of repair stations, and (2) evaluated the effectiveness of FAA's oversight of foreign and domestic repair stations.

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<sup>1</sup> In 1996, air carriers spent over \$1.5 billion for contract maintenance services. In 2011, that amount rose to \$4.2 billion.

<sup>2</sup> Repair stations conduct a range of repairs and maintenance, from critical components—such as landing gear and engine overhauls—to heavy airframe checks, which involve a complete teardown and overhaul of the aircraft.

<sup>3</sup> OIG Report No. AV-2003-047, "Review of Air Carriers' Use of Aircraft Repair Stations," July 8, 2003, and OIG Report No. AV-2008-090, "Air Carriers' Outsourcing of Aircraft Maintenance," September 30, 2008. OIG reports are available on our Web site at <http://www.oig.dot.gov/>.

To conduct our work, we visited or contacted FAA inspection offices and repair stations located in the United States, Brazil, China, New Zealand, Peru, and Singapore. We randomly selected 27 repair stations<sup>4</sup> for review from a FAA-provided list of facilities performing work for U.S. Part 121 airlines.<sup>5</sup> In addition, as part of this audit, we selected a statistical sample of 119 aircraft work orders for which we analyzed, among other things, the adequacy of maintenance documentation and reviewed training records. This review allowed us to project the total number of systemic deficiencies.

We conducted this review in accordance with Government auditing standards prescribed by the Comptroller General of the United States. Exhibit A provides more details on our scope and methodology. Exhibit B includes a list of FAA offices and repair stations we visited or contacted.

## **RESULTS IN BRIEF**

FAA developed a risk assessment process to aid repair station inspectors in identifying areas of greatest concern. Despite FAA's efforts, its oversight emphasizes completing mandatory inspections instead of targeting resources to where they are needed based on risk. Of the 16 established repair station inspection areas, FAA guidance only requires 7 to be assessed for risk; the other 9 are inspected annually regardless of risk. Additionally, FAA inspectors do not use this system at foreign repair stations. Instead, they review all inspection elements annually at these facilities. Further, FAA's risk assessment tool was designed to only include the prior year's inspection data. As a result, inspectors cannot conduct trend analysis due to insufficient historical data. In addition, FAA has not provided inspectors with national-level data analyses that would enhance their ability to assess repair station performance, though these data were promised when the system was implemented 5 years ago. Finally, FAA provided ineffective training to inspectors on how to use the oversight system tools, further hindering inspectors' ability to conduct adequate repair station risk assessments. Due to weaknesses in FAA's oversight system, inspectors are not effectively targeting surveillance to repair stations with the greatest risk.

FAA's oversight of foreign and domestic repair stations lacks the rigor needed to identify deficiencies and verify that they have been addressed. This is because FAA inspectors typically do not use comprehensive and standardized procedures for conducting inspections and reporting inspection findings, resulting in inadequate and inconsistent inspection practices. For example, foreign repair

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<sup>4</sup> Our sample of repair stations was derived from a list provided by FAA. Our universe of 559 repair stations included all facilities not covered under Bilateral Aviation Safety Agreements-Maintenance Implementation Procedures, and those that had at least one 14 CFR Part 121 customer.

<sup>5</sup> This refers to large, commercial operators regulated under 14 CFR Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations. These carriers operate larger aircraft with primarily scheduled flights.

station officials could not develop a suitable corrective action plan because FAA inspectors did not clearly communicate the results of their findings (e.g., cited regulations without connecting them to the deficiency the inspector identified). Additionally, inspectors overlooked repair station discrepancies and did not ensure that corrective actions addressed previously identified problems. For example, an FAA inspector determined that a repair station failed to maintain a current list of required mechanic training 3 years in a row, yet the inspector accepted the repair station's corrective actions each time. Our review identified numerous other deficiencies—57 of 119 work orders<sup>6</sup> we reviewed contained errors—such as inadequate maintenance procedure training, use of tools with expired calibration due dates, and inaccurate work order documentation. Uncorrected maintenance deficiencies such as these could lead to the use of improperly repaired aircraft parts on U.S. air carriers. As a result of FAA's insufficient oversight, some repair stations may not be operating in full compliance with Federal aviation regulations.

We are making recommendations to improve FAA's risk-based oversight of foreign and domestic repair stations.

## **BACKGROUND**

In 2003, we reported that despite the increase in air carriers' use of external repair facilities, FAA concentrated its oversight of airline maintenance on work performed at the air carrier's in-house facilities. In 2008, we reported that while FAA moved its safety oversight toward a risk-based system, it still relied too heavily on air carriers' oversight procedures, which are not always sufficient. We made several recommendations to FAA aimed at improving its oversight of repair stations. In response, FAA developed and implemented a risk-based oversight system designed to target its inspector resources to areas with the greatest risk.

FAA inspectors conduct annual safety inspections of all FAA-certificated repair stations located within the United States. For those repair stations located outside of the United States, the responsibility for oversight varies. FAA inspectors assigned to international field offices oversee 564 of the 726 FAA-certificated foreign repair stations (see exhibit C). The responsibility for the remaining repair stations falls under reciprocal Bilateral Aviation Safety Agreements-Maintenance Implementation Procedures (BASA-MIP)<sup>7</sup> that permit national aviation authorities located in France, Germany, and Ireland to inspect repair stations on FAA's behalf.

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<sup>6</sup> We reviewed a statistical sample of 119 work orders out of 49,859 from 27 repair stations in our review.

<sup>7</sup> A Bilateral Aviation Safety Agreement is a government-to-government agreement that lays out a framework for the aviation authorities to cooperate on aviation safety issues. Maintenance Implementation Procedures define the terms and conditions under which the authorities accept each other's maintenance facility inspections, thereby reducing redundant regulatory oversight. Repair stations under BASA-MIP procedures were not included in our review.

Prior to FAA implementing its risk-based oversight system in 2007, each repair station principal inspector performed *one* required inspection item per repair station annually. Each inspector determined which areas to review during these inspections, but often did not document areas they inspected. Today, inspectors must still perform at least one annual inspection to evaluate the facility and determine whether its employees are qualified to perform maintenance functions. These inspections now include 16 sub-inspection items, or elements, such as quality control, training, manuals, and tools and equipment.

## **FAA OVERSIGHT DOES NOT PROVIDE FOR ACCURATE OR TIMELY RISK ASSESSMENTS OF REPAIR STATIONS**

FAA does not have an effective system for accurate and timely risk assessment of foreign and domestic repair stations because of critical weaknesses in its repair station oversight process. First, less than half of its inspection elements are evaluated based on risk, and foreign repair stations are not inspected using this system. In addition, tools designed to assist inspectors in assessing risk are not effective, and inspectors are not using them. Finally, a lack of effective training and availability of consolidated repair station data for inspectors is leading to inconsistencies in oversight and hindering FAA's ability to prioritize surveillance based on risk.

### **FAA Inspectors Use a Limited Risk-Based Approach to Repair Station Oversight**

FAA's guidance recommends inspectors conduct annual inspections at repair stations covering as many as 16 inspection elements, but not all are evaluated based on risk. FAA requires that as many as nine elements be inspected annually, regardless of risk. However, FAA's guidance does not explain why these specific elements must be inspected each year. As shown in table 1 below, less than half—7 of 16—of the inspection elements are actually inspected based on risk.

**Table 1. Inspection Elements and Frequency of Inspection**

<b>Required Annually</b>	<b>Based on Risk**</b>
Maintenance Process	Certificate Requirements
Quality Control	Housing and Facilities
Technical Data	Manuals
Training	Parts and Materials
Air Carrier Requirements*	Personnel Records
Contract Maintenance (certificated repair facility)*	Records Systems
Contract Maintenance (non certificated repair facility)*	Tools and Equipment
Domestic EASA Oversight Audit*	
Work Away from Station*	

\* Only inspected if element applies to the repair station

\*\* If no risk is detected, these elements are required to be inspected once every 3 years

Source: FAA

Moreover, inspectors have not conducted inspections of the risk-based elements at repair stations within appropriate time intervals. FAA requires inspectors to complete these inspections at least once every 3 years so they can determine whether repair station operations have changed (e.g., the repair station began contracting out maintenance to another facility). However, FAA's inspection database for fiscal years 2009 to 2012 showed that FAA inspectors did not complete timely inspections at 20 of the 27 repair stations in our sample, leaving inspectors unaware of any changes in operations that could impact risk levels. We also found that inspectors continued to perform inspections in areas of repair station operations where little or no risk was previously detected. For example, during fiscal years 2009 to 2012, FAA completed inspections at 24 of 27 repair stations where little or no risk was previously identified.

FAA also does not use its risk-based oversight system to inspect foreign repair stations. Instead, inspectors review all inspection elements annually, regardless of risk. For example, from fiscal years 2009 to 2012, inspectors responsible for oversight of 8 of the 13 foreign repair stations in our sample inspected every element in a particular year regardless of risk. According to FAA guidance, inspectors should use a risk-based oversight approach for all repair stations, both domestic and foreign.<sup>8</sup> Yet, over half of the foreign repair station inspectors we interviewed on this issue—7 of 12— said they did not use, or did not see the need

<sup>8</sup> Except those repair stations under a BASA-MIP agreement.

for using, a risk-based oversight approach. Because foreign repair stations must be re-certified each year, inspectors feel they must inspect all elements during the recertification process.

### **FAA Developed Risk-Based Inspection Tools, but the Tools Are Ineffective and Inspectors Do Not Use Them**

Since implementing risk-based oversight, FAA has developed two tools for inspectors—the Repair Station Assessment Tool (RSAT) and the Risk Management Process (RMP). However, limitations in tool versatility, data availability, and data quality have precluded inspectors from using these tools, which in turn has hindered FAA’s ability to conduct effective risk-based oversight.

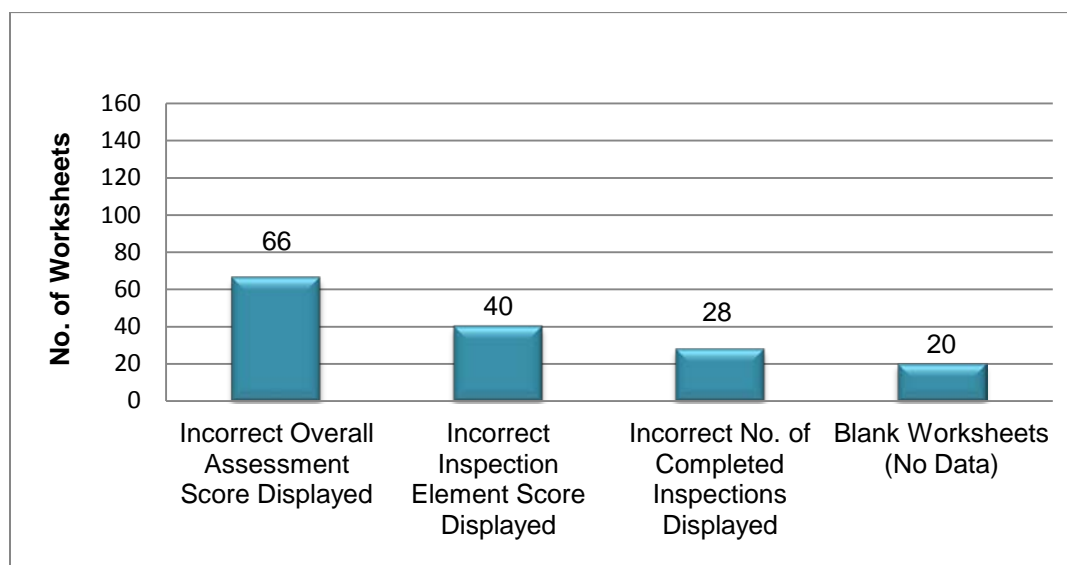
#### *Repair Station Assessment Tool (RSAT)*

The RSAT, while developed to assist inspectors with planning surveillance and analyzing risk, has limited effectiveness. The tool is comprised of a Web-based spreadsheet that displays 16 inspection elements, which together represent an annual repair station inspection (see exhibit D). The spreadsheet is populated with inspection results captured as risk assessment scores from the previous year, which inspectors use to analyze risk and prioritize their surveillance for the upcoming year. Shortcomings with the design and data have created a number of problems for inspectors using the RSAT. For example:

- **Lack of versatility.** Due to its design, inspectors can only complete the RSAT *once annually* as part of their national work program at the beginning of each fiscal year, and cannot update changes in risk until the following year. As a result, the RSAT tool is not useful to inspectors for monitoring changes in risk levels occurring throughout the year. Instead, inspectors must consult another inspection database to track changes in risk and adjust their oversight priorities.
- **Limited data availability.** The RSAT was designed to include risk assessment data only from the previous year, making it impossible for inspectors to conduct any meaningful trend analyses and prioritize their resources accordingly. Instead, inspectors must perform searches of various FAA databases (e.g., databases for surveillance and enforcement activities) to identify any recurring deficiencies at repair stations.
- **Questionable data quality.** The RSATs we reviewed contained errors and incomplete information, further limiting their effectiveness for trending deficiencies. As shown in exhibit D, an RSAT should contain data such as the number of planned/completed inspections, risk assessment scores for each inspection element, and an overall risk assessment score. However, 112 of 146 RSAT worksheets we reviewed for fiscal years 2010 to 2012

contained discrepancies. For example, 66 RSATs contained a different overall assessment score than had been originally recorded in FAA’s inspection database. An FAA official attributed these discrepancies, in part, to problems with transferring data from FAA’s inspection database to the RSATs. Figure 1 below shows the type of discrepancies we identified in fiscal years 2010 to 2012.

**Figure 1. RSAT Worksheet Data Discrepancies, FYs 2010–2012**

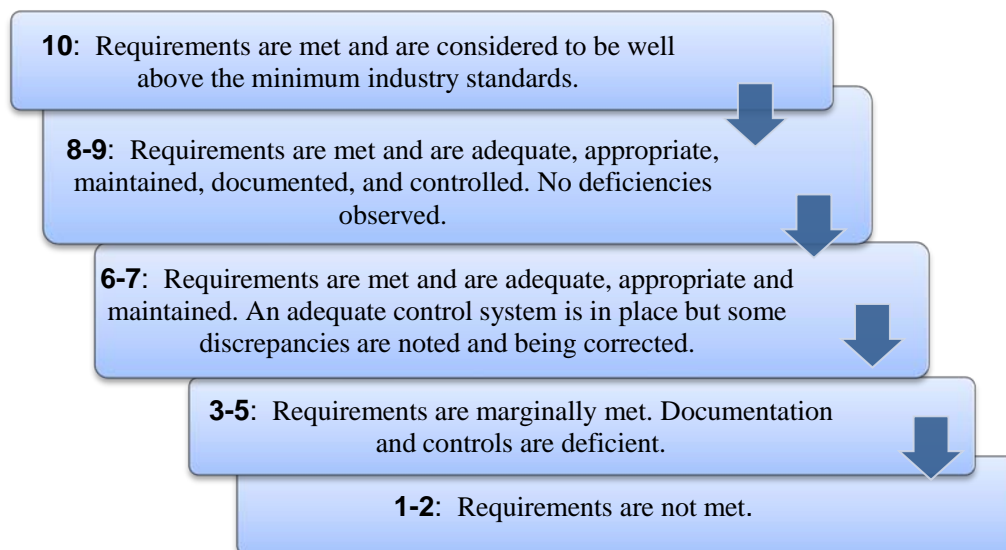


Source: OIG analysis of FAA data

- Subjective risk criteria.** Inspectors must manually assign risk assessment scores that can be subject to misinterpretation. For example, to assign a risk score, inspectors determine the level of risk at a repair station by selecting a generic word description and an associated numerical value—from 1 to 10—as shown in figure 2 below. The numerical value represents the definition that most closely corresponds to the conditions observed during each inspection.



**Figure 2. RSAT Word Description and Risk Assessment Scores**



Source: FAA

- Susceptibility to inconsistent assessments.** Inspectors must understand the tool’s terminology and effectively assign word descriptions to ensure the accuracy of inspection results and to conduct comprehensive trend analyses. More than half of the 31 inspectors we interviewed on this issue stated they did not understand the word descriptions or did not find them to be accurate indicators of problems identified during inspections. This confusion leads to inconsistencies in the way inspectors view the severity of risk and document their repair station risk assessments. For example, two risk assessments by different inspectors<sup>9</sup> of the same repair station in fiscal year 2011 resulted in an overall assessment of 1 (“Requirements are not met”) by one inspector and a 7 (“Requirements are met and are adequate”) by the other. Because of the subjective nature of FAA’s risk assessment process, inspectors may not be consistently or effectively identifying risks at repair stations.

### *Risk Management Process (RMP)*

FAA also provided inspectors with another tool—the RMP—to assist in analyzing and mitigating risk; however, we found that inspectors are not using it. The RMP is a decision tool—similar to a flow process diagram—that inspectors should use to determine the severity and likelihood of recurring deficiencies at repair stations. However, 24 of 34 inspectors we interviewed on this issue stated they do not use the tool primarily because they could not recall the training or did not receive it.

<sup>9</sup> Typically, FAA assigns two inspectors to oversee repair stations—one to review maintenance and another to review avionics processes. Each inspector completes a separate risk assessment.

According to an FAA Aviation Data Systems Branch official, if an inspector used this decision tool, it would be coded on the RSAT inspection worksheet. Yet, our review of 146 RSAT worksheets from fiscal years 2010 to 2012 disclosed that none of the inspectors used the RMP to analyze or mitigate risk.

FAA guidance recommends inspectors use the tool to address any hazard that they decide is significant enough to justify intensive analysis and tracking. However, none of the inspectors included in our review were using the tool. For example, in 2011, an inspector identified deficiencies with a component repair station's training program and improper handling of materials. The inspector rated the repair station with the lowest risk assessment score, indicating it did not comply with Federal aviation regulations. Part of the RMP process requires the inspector to identify the potential consequences<sup>10</sup> that could result if the hazard is not addressed. Through this analysis, inspectors create action items to ensure the repair station has addressed the risk factors. Although FAA guidance suggests that inspectors use the RMP tool in instances where significant or systemic hazards occurred, the inspector did not use it to mitigate the risks he identified with the repair station's training and material handling programs.

### **Ineffective Inspector Training and a Lack of Adequate Data Have Hindered Risk-Based Oversight Efforts**

FAA inspectors we interviewed stated they did not know how to use the risk assessment tools effectively because they were not formally trained. According to FAA headquarters officials, inspectors were trained<sup>11</sup> on how to use the system's two new risk-based tools during a course conducted at FAA's training academy. However, nearly all—33 of 36 inspectors we spoke with on this issue—stated either they were not trained, did not recall the training, or regarded it as poor. The inspectors stated that they only reviewed a PowerPoint presentation provided by FAA or resorted to other means of learning how to conduct and document their risk assessments, such as asking other inspectors for assistance.

Further, FAA has not provided data analysis enhancements to inspectors that would improve their ability to assess repair station risk. When FAA implemented its new oversight system in 2007, it stated it would provide inspectors with a Repair Station Data Package,<sup>12</sup> which would assist them in collecting and analyzing data used to improve their risk assessments. However, inspectors have been using the new risk-based oversight approach for 5 years and FAA has not yet developed the data package. Currently, inspectors do not have a single point of

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<sup>10</sup> FAA defines a potential consequence as an equipment failure, process breakdown, human error, injury/death to persons, damage to equipment, noncompliance with regulations or nonconformance with procedures.

<sup>11</sup> FAA Training Course No. 21058, Certification and Surveillance of Part 145 Repair Stations.

<sup>12</sup> According to FAA guidance, the Repair Station Data Package is intended to be a collection of comprehensive data analyses (e.g., surveillance and enforcement activities) available to inspectors to more easily assist them with identifying risks associated with repair station performance.

reference for details, history, and trends on the repair stations they oversee, so they must rely on their own methods to collect and analyze data.<sup>13</sup> While FAA headquarters officials state the Repair Station Data Package is available, 15 of 25 inspectors we interviewed on this issue either were not familiar with it, felt the guidance was not clear, or they did not know how to access the information.

## **FAA DOES NOT HAVE AN EFFECTIVE OVERSIGHT PROCESS FOR FOREIGN AND DOMESTIC REPAIR STATIONS**

In addition to lacking a fully risk-based oversight approach, FAA's ability to conduct effective and consistent inspections of foreign and domestic repair stations is hindered by a lack of standardized inspection processes. As a result, we found numerous systemic deficiencies at the foreign and domestic repair stations we visited during our review.

### **Lack of Standardized Processes Has Resulted in Inconsistencies in FAA's Surveillance of Repair Stations and Confusion Among Repair Station Officials**

We identified weaknesses in FAA's processes for conducting consistent inspections, performing sufficient reviews of repair station corrective actions, and effectively conveying deficiencies to repair station officials. For example, inspectors do not use formalized checklists, do not fully document areas they reviewed in FAA's inspection database, and do not clearly communicate post-inspection results so repair station officials can develop comprehensive corrective action plans.

#### *Lack of Checklist and Insufficient Documentation of Areas Inspected*

Inspectors do not use standardized checklists to guide their surveillance activities, which results in inspectors using differing inspection methodologies and inconsistently reporting their findings. While FAA guidance suggests areas that repair station inspectors should review, the guidance does not specifically require them to use an inspection checklist. Instead, inspectors rely on their own knowledge of repair stations, or they develop their own checklists to conduct reviews. Over half of the inspectors we interviewed on this issue—19 of 33—did not use a checklist to perform inspections. In addition, inspectors do not clearly identify and document which areas were reviewed in the inspection database. As a result, it is difficult to determine whether inspectors focused their resources on areas in which previous discrepancies were identified.

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<sup>13</sup> Conversely, FAA has provided a data package to its 14 CFR part 121 inspectors to assist them with more consistent and accurate analysis of air carrier operations.

### *Insufficient Verification of Corrective Actions*

Inspectors do not verify whether repair stations have implemented effective corrective actions to address inspection findings. The ability to track the adequacy of corrective actions is important to ensure that repair stations operate in accordance with FAA standards. Once a repair station submits a corrective action plan to FAA, inspectors are responsible for reviewing actions taken and either accepting or rejecting the plans based on the sufficiency of the proposed actions. For example, FAA inspectors for an airframe repair station accepted a corrective action plan with projected completion dates even though repair station officials stated in their response that they needed further clarification from FAA for four of the findings. In addition, a training deficiency (i.e., the repair station failed to maintain a current list of required mechanic training) persisted at one repair station for 3 years, indicating the repair station's corrective actions were not effective each year. Without verification that repair stations have implemented effective corrective actions, inspectors cannot be assured that previous deficiencies will not reoccur.

### *Inadequate Communication of Inspection Results*

FAA inspectors do not have a standardized means of conveying identified discrepancies to repair station officials, which leads to confusion and difficulty in implementing practical corrective actions. Some inspectors provided written notes at the end of the inspection and some merely provided a verbal debrief. Repair station officials at 6 of the 13 foreign repair stations we visited stated that FAA inspectors did not clearly communicate their inspection findings. In some instances, FAA's written repair station reports contained vague descriptions of inspection findings. For example, an inspector provided the following inspection finding to the repair station:

“A repair station may perform maintenance, preventative maintenance or alterations to an air carrier in accordance with their FAR 121 maintenance programme. Personnel need to be trained on the requirements outlined in the FAR 121 air carriers (sic) manual.”

In other instances, inspectors included more findings in the written report than was verbally conveyed at the conclusion of the inspection. As a result, repair station officials are often confused and frustrated as to what actions are needed to address FAA inspectors' concerns. According to repair station personnel, if FAA inspectors had provided a written report at the post-inspection briefing, they could have reached a consensus on the nature of the findings and proposed corrective actions. Officials from one foreign repair station were so frustrated by poor communication with its inspectors that they decided it was easier and more efficient to fly to the United States to meet with FAA for clarification and guidance.

Other examples of inconsistent FAA inspector actions that resulted in repair station confusion include:

- An FAA inspector required a foreign repair station to include a provision in its operating capabilities that authorized it to perform work offsite. While repair station personnel repeatedly insisted that they only conduct maintenance at their main base, they ultimately relented and complied with the inspector's request. However, when a new inspector was assigned to the repair station, he directed them to remove the authorization because it was not needed.
- During an FAA inspection of an airframe repair station, an inspector determined that the repair station had not changed its manual based on the handwritten notes the inspector provided during his previous visit. When the inspector questioned why the repair station official had not made the suggested changes to the manual, he seemed confused. According to the repair station official, he assumed that since the suggested changes were presented on handwritten notes and not presented in a written report of findings, they were not urgent.

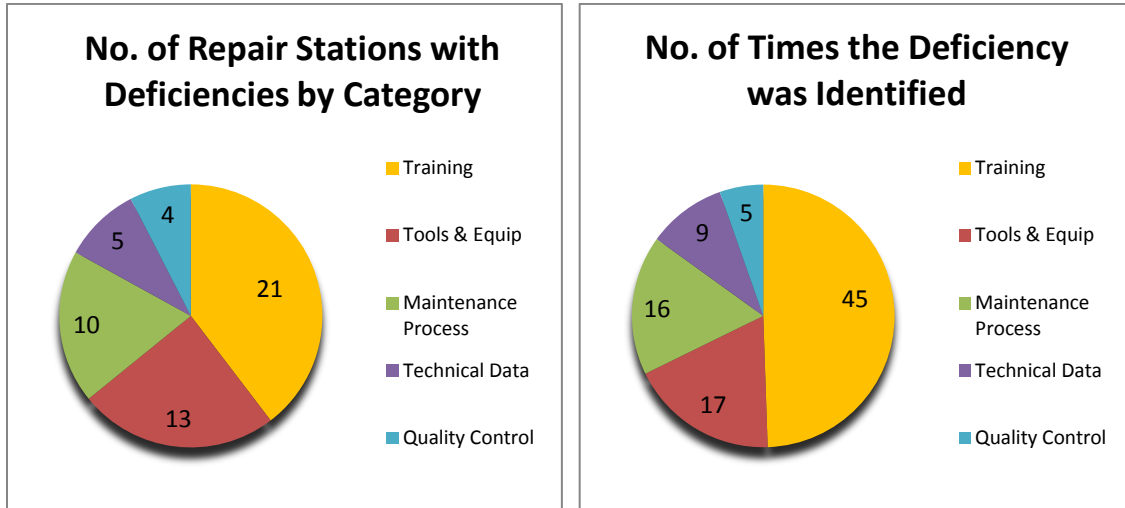
### **Systemic Deficiencies Persist at Repair Stations**

Our review of work order packages at foreign and domestic repair stations disclosed systemic deficiencies, including insufficient mechanic training, outdated tool calibration, and inaccurate work order documentation. These deficiencies are particularly troubling because they occurred in areas that FAA requires inspectors to review annually, including training, maintenance processes, technical data, and quality control. Overall, our review of 119 randomly selected aircraft work orders in these four areas, coupled with our examination of tools and equipment at each facility, disclosed 92 systemic deficiencies. Based on the results of our statistical sample of 27 repair stations, we estimate that 217,641 (37 percent) of the estimated 589,573 work orders from September 2008 to August 2011 from domestic and foreign repair stations (where FAA performs its own inspections) had deficiencies in these five areas.<sup>14</sup> As shown in figure 3 below, training for repair station personnel was the number one category for errors at the repair stations we reviewed.

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<sup>14</sup> Our estimate of 217,641 has a precision of +/-28,919, and our estimate of 589,573 has a precision of +/-254,066 at the 90-percent confidence level.

**Figure 3. Number of Work Order Deficiencies by Category**



Source: OIG analysis of repair station work orders

### *Training Documentation Issues*

Of the 27 repair stations we reviewed, 21 did not maintain accurate training records for mechanics and inspection personnel which are required to demonstrate that they were properly trained and qualified to perform repairs or inspect aviation parts. Repair stations are required to submit their training programs to FAA for approval. The program must ensure that individuals performing maintenance are capable of performing assigned tasks by completing initial and recurrent training. In addition, if a repair station performs work for a commercial air carrier, the employees must also be trained in accordance with the air carriers' requirements. FAA inspectors are required to review training documentation at repair stations annually to determine whether all required training has been completed and appropriately documented at each station. Despite these requirements, repair station officials did not have documentation to show that employees had been trained to perform the assigned tasks required in 45 of 119 work orders in our sample. Examples of the training documentation issues include:

- Employees at an engine repair station did not receive the required maintenance manual course prescribed by the air carrier.
- Employees that serviced aircraft life vests and rafts did not use the proper forms to document training received for hydrostatic testing or charging inflation systems.
- Employees at an aircraft paint facility did not receive the required training to perform work for two U.S. air carriers.

Based on the results of our statistical sample, we can project that 175,552—or 30 percent—of the estimated 589,573 work orders from September 2008 to August 2011 from domestic and foreign repair stations (where FAA performs its own inspections) have discrepancies related to training documentation.<sup>15</sup>

### *Tools and Equipment Issues*

Nearly half of the repair stations (13 of the 27) we visited had weaknesses in their tool and equipment programs. FAA guidance requires inspectors to review repair station manuals describing the tool and equipment calibration process and verify that repair stations are calibrating tools within the required intervals, usually once a year. However, our review revealed that specialized tools and equipment were used to test and repair aircraft parts beyond their required calibration due dates. For example, mechanics at a turbine engine repair station conducted post-maintenance checks on three engines using equipment believed to be properly calibrated. However, we examined calibration due dates for test cell equipment used to validate the engine repairs and determined that at the time of the engine checks, the equipment was overdue for annual calibration. Following manufacturers' specified intervals for calibrating tools and equipment is paramount to ensuring that aircraft operate safely and aviation parts are properly maintained.

Other examples of repair stations that lacked adequate control over their tool and equipment programs include:

- A repair station that services safety equipment, such as life rafts, could not locate some of its tools and had tools that either exceeded required calibration intervals or did not have calibration stickers.
- Officials at an airframe repair station continued to track a wire crimping tool that had been missing for 2 years and was overdue for calibration, but they never accounted for its whereabouts.
- Employees at a landing gear repair station were not following procedures for identifying tools that were owned by individual mechanics, especially those that require calibration. Repair station procedures required that personal tools be inscribed with a serial number and employee initials; however, we found employees using unidentified personal tools.

According to inspection records, FAA inspectors did not find any tool calibration discrepancies at an engine repair facility in the 3 years prior to our visit, yet we found four tools past due for calibration. This was also the case at the repair

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<sup>15</sup> Our estimate of 175,552 has a precision of +/-26,365, and our estimate of 589,573 has a precision of +/-254,066 at the 90-percent confidence level.

station where we found overdue calibration due dates on engine test cell equipment. Ultimately, overdue calibration on specialized tools and equipment and use of unapproved personal tools could result in the use of aircraft parts that do not meet manufacturers' specifications.

### *Maintenance Process Issues*

We found deficiencies in maintenance practices at 10 of 27 repair stations we visited. FAA inspection guidance states that inspectors should identify a repair station process to be inspected, identify the documents associated with that process (i.e., task cards, work orders, maintenance manuals), and follow the documents through the process to determine whether personnel are following repair station procedures. Our review disclosed deficiencies where employees did not complete work orders to document technical data they used during repairs, used incorrect employee stamps to document completion of work steps, or signed off on work steps that they were not authorized to complete. In particular, two inspectors at a repair station signed off on critical inspection tasks<sup>16</sup> without the proper authorization from the air carrier. This work involved repairs to the nose wheel steering cables on a Boeing 717 aircraft. The errors in the work orders indicate the repairs were not performed in accordance with the air carrier maintenance procedures, raising questions about the quality of the work performed at these facilities.

Based on the results of our statistical sample, we project that 43,769—or 7 percent—of the estimated 589,573 work orders from September 2008 to August 2011 from domestic and foreign repair stations (where FAA performs its own inspections) have discrepancies related to maintenance processes.<sup>17</sup>

## **CONCLUSION**

Effective and consistent oversight of aircraft repairs is a key element to maintaining the safety of commercial air carrier operations. With growth in aircraft repair station use projected to reach \$76 billion by 2021, these facilities continue to be an integral part of air carrier maintenance. While FAA has made strides in improving its inspections of repair stations by implementing a new oversight system, this system falls short of being truly risk based, especially for foreign repair stations. FAA must take further steps to improve the effectiveness of its risk-based tools and inspector training so that they can target oversight towards those repair stations most at risk and better detect systemic deficiencies. Until the Agency modifies its inspection system, FAA's ineffective oversight

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<sup>16</sup> Also known as Required Inspection Items, or RII. RII work steps require a repair station inspector to verify the accuracy of the mechanic's repair.

<sup>17</sup> Our estimate of 43,769 has a precision of +/-10,963, and our estimate of 589,573 has a precision of +/-254,066 at the 90-percent confidence level.



could lead to repair stations operating contrary to Federal aviation regulations and decreasing the margin of safety.

## RECOMMENDATIONS

To enhance its oversight of repair stations, we recommend that FAA:

1. Modify its oversight system so that all inspection elements are considered in inspector risk assessments of repair stations.
2. Implement a risk-based system appropriate for oversight of foreign repair stations.
3. Modify the risk assessment tool so that inspectors can document changes to their surveillance plans as soon as they are made.
4. Develop a control that will ensure inspectors prioritize inspections to those repair stations determined to have increased risk.
5. Enhance training for inspectors so they understand the importance of using the available tools for assessing and trending risk.
6. Develop the Repair Station Data Package and provide training to all inspectors on how to use it.
7. Develop a standardized checklist that all inspectors can use to improve the consistency in the way they perform and report their inspection findings.
8. Provide training for inspectors to improve their review and acceptance of repair station corrective plans.
9. Provide training to inspectors on how to conduct comprehensive post-inspection briefings and require them to issue a draft report of tentative findings to repair station officials at the conclusion of inspections.

## AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE

We provided a draft of this report to FAA on January 25, 2013, and received its response on April 4, 2013, which is included in its entirety as an appendix to this report. FAA concurred with all nine of our recommendations, and its response meets the intent of six of them. In its response, FAA cited the development of a new oversight system—the Safety Assurance System (SAS)—to address our recommendations. However, because FAA plans to only *begin* implementing SAS sometime in fiscal year 2015—a 2-year delay from its originally planned rollout in

fiscal year 2013—the Agency has developed strategies and established near-term milestones to improve its current oversight system in the interim. Until SAS is fully implemented, we believe that FAA’s planned interim actions meet the intent of recommendations 2, 5, 6, 7, 8, and 9 and include reasonable timeframes. However, for recommendations 1, 3, and 4, FAA’s interim actions do not address our concerns, and we are requesting that FAA reconsider its responses, as detailed below.

Specifically, for recommendation 1, FAA stated that it will conduct recurrent training to improve the use of the RSAT as it was originally intended until SAS is implemented. However, FAA’s response does not address our overarching concern that inspectors continue to complete mandatory inspections instead of targeting resources where they are needed based on risk. As our report indicates, some inspectors do not use the risk assessment process at all, and those that do are hindered in their ability to assess risk, due in part to the RSAT’s limitations with data availability and quality. While additional training will be helpful, it will not address the fact that FAA guidance requires only seven inspection elements to be assessed for risk while the other nine are inspected annually, regardless of risk. To ensure that the Agency effectively targets its inspection resources by risk, we are asking FAA to reconsider its position and implement an interim action that is responsive to our recommendation.

For recommendation 3, FAA also cited its plans to provide recurrent training to refamiliarize inspectors and their managers with the RSAT’s capabilities so that they may document changes to their surveillance plans as soon as they are made. However, while we recognize that inspectors can adjust their surveillance plans at any time (i.e., by increasing or decreasing the number of inspections as a result of changes in risk), they cannot input these changes in the RSAT after it has been prepared at the beginning of each annual inspection cycle. Providing inspectors with additional training will not address the fact that the RSAT, in its current form, does not allow inspectors to track changes in risk in real time at repair stations. Therefore, we are asking FAA to reconsider its position and provide interim actions that are responsive to our recommendation.

For recommendation 4, FAA indicated that it expects inspectors to prioritize inspections to those repair stations determined to have increased risk, and it plans to conduct recurrent training to emphasize this requirement. While we agree that training can help reinforce requirements, we are concerned that FAA still lacks a method for verifying whether inspectors actually *meet* the requirements. Given our findings that many inspectors do not effectively prioritize their inspections based on risk, we believe an additional control is necessary to ensure compliance with this important requirement. Therefore, we are asking the Agency to reconsider its response and develop a formalized control or another appropriate interim solution.

**ACTIONS REQUIRED**

We consider recommendations 2 and 5 through 9 resolved, but open pending the completion of planned actions. For recommendations 1, 3, and 4, we request that FAA either provide additional information or reconsider its position as described above. In accordance with Department of Transportation Order 8000.1C, we request that FAA provide this additional information within 30 days of this report.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Tina Nysted, Program Director, at (404) 562-3770.

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cc: DOT Audit Liaison, M-1  
FAA Audit Liaison, AAE-100

## **EXHIBIT A. SCOPE AND METHODOLOGY**

We conducted this review between January 2011 and January 2013 in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our audit work was conducted at all of the 10 FAA Flight Standards District Offices, four International Field Offices/Units, and one Certificate Management Office that had oversight responsibility for the repair stations in our review. We used a 2-stage statistical sampling methodology to select these 27 aircraft repair stations. For Stage 1 we stratified our universe of 68 repair stations that perform work for U.S. Part 121 airlines, and are not covered under BASA-MIP inspection procedures into two strata. From Stratum 1 we selected 5 states out of 45, and from Stratum 2, we selected 5 foreign countries out of 23 for a total of 10 locations. These 10 locations had 250 repair stations which made up our Stage 2 universe from which we selected 14 domestic aircraft repair stations out of 223 and 13 foreign aircraft repair stations out of 27. Samples for both stages were selected with probability proportional to the number of air carrier customers with replacement. Our sample of repair stations was derived from a list provided by FAA. We included in our universe all 559 repair stations that had at least one customer.

To evaluate the effectiveness of FAA's oversight of repair station maintenance, we interviewed 37 of 44 FAA inspectors responsible for oversight of repair stations in our review to gain an understanding of how they perform risk assessments and carry out their maintenance inspections. We used a questionnaire we developed with 22 questions. However, not all questions were asked of all inspectors. Therefore, the number of inspectors who were asked and responded to certain questions during our interviews may vary. We interviewed repair station officials to gain their perspective on FAA's oversight. We also analyzed inspection data (fiscal years 2009–2012) from FAA's database and RSAT worksheets (fiscal years 2010–2012) for all repair stations in our review.

To conduct our reviews at the 27 repair stations, we randomly selected 119 aircraft work order packages out of 49,859 from September 2008 to August 2011 to perform tests to determine whether mechanics received training to perform repairs, complied with prescribed maintenance and quality control processes, used appropriate technical data, and adhered to tool and equipment calibration standards. We also observed and noted general shop conditions and ongoing repair procedures during our tour of each repair station.

## **EXHIBIT B. ACTIVITIES VISITED OR CONTACTED**

### **FEDERAL AVIATION ADMINISTRATION**

#### **Headquarters:**

Aviation Safety (AVS)	Washington, DC
Flight Standards Service (AFS)	Washington, DC

#### **Flight Standards District Offices (FSDO):**

Atlanta FSDO	Hapeville, GA
Indianapolis FSDO	Plainfield, IN
Long Beach FSDO	Long Beach, CA
Lubbock FSDO	Lubbock, TX
Orlando FSDO	Orlando, FL
San Antonio FSDO	San Antonio, TX
South Bend FSDO	South Bend, IN
South Florida FSDO	Miramar, FL
Teterboro FSDO	Saddle Brook, NJ
Van Nuys FSDO	Van Nuys, CA

#### **International Field Offices or Unit (IFO/IFU):**

Beijing IFU	Beijing, China
Los Angeles IFO	Lawndale, CA
Miami IFO	Miramar, FL
Singapore IFO	Singapore

#### **Certificate Management Office (CMO):**

American Airlines CMO	Fort Worth, TX
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**14 CFR PART 145 REPAIR STATIONS:****Domestic**

Hawker Pacific Aerospace	Sun Valley, CA
HRD Aero Systems, Inc.	Valencia, CA
MAG Aerospace Industries, Inc.	Carson, CA
AAR Aircraft Services, Inc.	Miami, FL
Accel Aviation Accessories, LLC	Fort Myers, FL
HEICO Components Repair Group	Miami, FL
RA Aviation Support Group Inc.	Miami, FL
Bombardier Services Corporation	Macon, GA
FellFab Corporation	Atlanta, GA
BAE Systems Controls, Inc.	Fort Wayne, IN
Rolls-Royce Engine Services, Inc.	Indianapolis, IN
CAG Industries, LLC	Fairfield, NJ
GE Aviation Systems, LLC	Whippany, NJ
Zodiac Services Americas, LLC	Wall Township, NJ
Chromalloy Component Services, Inc.	San Antonio, TX
Leading Edge Aviation Services, Inc.	Amarillo, TX
Texas Aero Engine Services, LLC	Fort Worth, TX

**Foreign**

GE Celma	Petropolis, Brazil
Rolls-Royce Brasil - Gas Turbine Services	Sao Paulo, Brazil
TAP Maintenance & Engineering Brasil	Rio de Janeiro, Brazil
Aircraft Maintenance and Engineering Corp.	Beijing, China
Boeing Shanghai Aviation Services Co., Ltd.	Shanghai, China
MTU Maintenance Zhuhai Company, Ltd.	Zhuhai, China
Air New Zealand Engineering Services	Auckland, New Zealand
Air New Zealand Engineering Services	Christchurch, New Zealand
Pratt and Whitney Air New Zealand	Christchurch, New Zealand
SEMAN-Peru	Lima, Peru

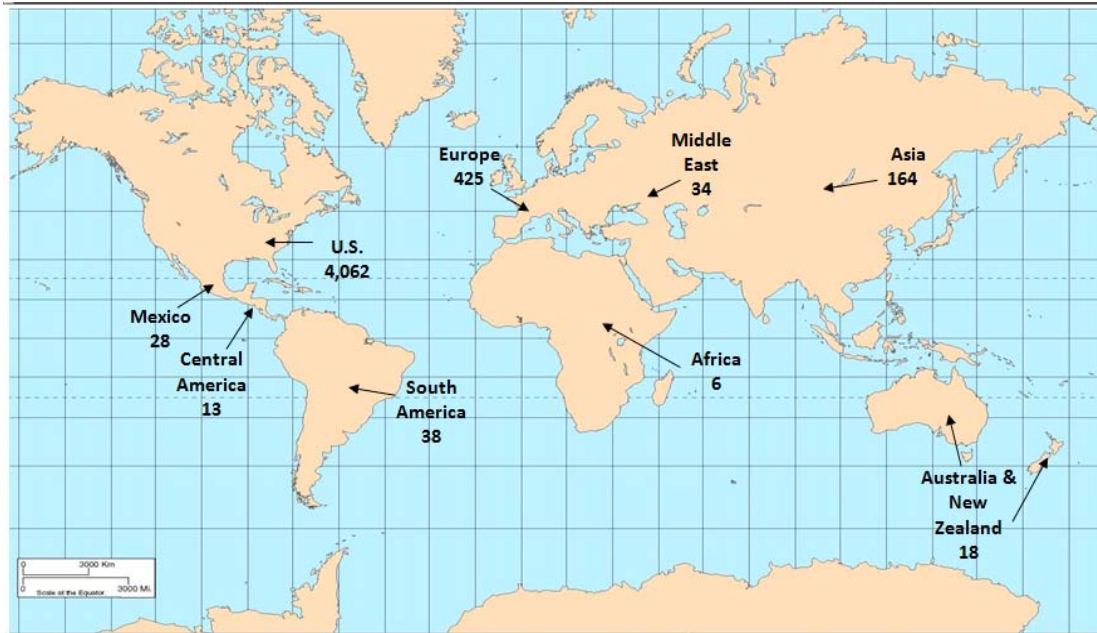
**14 CFR PART 145 REPAIR STATIONS (cont.):**

Eagle Services Asia PTE, Ltd.	Singapore
GE Aviation Service Operation, LLP	Singapore
ST Aerospace Services Co. PTE, Ltd.	Singapore

**OTHER INDUSTRY REPRESENTATIVES OR ORGANIZATIONS:**

Aeronautical Repair Station Association (ARSA)	Alexandria, VA
Professional Aviation Safety Specialists (PASS)	Washington, DC

## EXHIBIT C. FAA-CERTIFICATED REPAIR STATION LOCATIONS



Source: FAA repair station data as of September 17, 2012  
U.S. domestic repair station count: 4,062  
Foreign repair station count: 726



## EXHIBIT D. REPAIR STATION ASSESSMENT TOOL (RSAT)

**Repair Station Assessment Tool (RSAT) - Worksheet Listing**

Overall Risk Assessment Score

Specialty A

FY 2012  
5650 → 8 Overall RSAT

FY 2013  
Overall RSAT 8

FY 2012

FY 2013

Absence of a number in the RMP column means no Risk Management Process was performed

Act	Element Description	Insp	SSA	Plan	Comp	1-2	3-5	6-7	8-9	10	RMP	NPG-R	SSA	R	P	Total	RMP
				No. of inspections planned/completed													
5601	Parts and Materials	8	1	1		0	0	0	1	0	0	0	8	0	1	1	N
5604	Certificate Requirements	8	1	1		0	0	0	1	0	0	0	8	0	1	1	N
5605	Records Systems	8	1	1		0	0	0	1	0	0	0	8	0	1	1	N
5606	Work away from station	N/A	1	1		0	0	0	1	0	0	1	N/A	0	0	1	N
5607	Contract Maintenance - Non-certificated Repair Facility	N/A	1	1		0	0	0	1	0	0	1	N/A	0	0	1	N
5608	Quality control	8	1	1		0	0	0	1	0	0	1	8	0	0	1	N
5618	Air Carrier requirements	N/A	1	1		0	0	0	1	0	0	1	N/A	0	0	1	N
5654	Maintenance Process	8	1	1		0	0	0	1	0	0	1	8	0	0	1	N
5656	Technical data	8	1	1		0	0	0	1	0	0	1	8	0	0	1	N
5657	Housing and Facilities	8	1	1		0	0	0	1	0	0	0	8	0	1	1	N
5658	Tools and equipment	8	1	1		0	0	0	1	0	0	0	8	0	1	1	N
5659	Personnel record	7	1	1		0	0	0	1	0	0	0	7	0	1	1	N
5660	Manuals	7	1	1		0	0	0	1	0	0	0	7	0	1	1	N
5661	Training	7	1	1		0	0	0	1	0	0	1	7	0	0	1	N
5663	Contract Maintenance - Certificated Repair Facility	N/A	1	1		0	0	0	1	0	0	1	N/A	0	0	1	N
5669	Domestic EASA Oversight Audit	N/A	1	1		0	0	0	0	0	0	1	N/A	0	0	1	N



Inspection element risk scores: 1 - 10  
The number in each scoring range indicates that 1 inspection was completed

~~For Official Use Only / Public availability to be determined under 5 U.S.C. 552~~

**EXHIBIT E. MAJOR CONTRIBUTORS TO THIS REPORT**

<b>Name</b>	<b>Title</b>
Tina Nysted	Program Director
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## Federal Aviation Administration

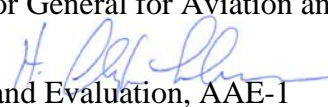
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# Memorandum

Date: April 4, 2013

To: Jeffrey B. Guzzetti, Director, Assistant Inspector General for Aviation and Special Program Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1 

Subject: Federal Aviation Administration (FAA) Response to Department of Transportation Office of Inspector General (DOT OIG) Draft Report: Repair Station Oversight

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The FAA has a rigorous, risk-based system of oversight for repair stations and is taking action to rectify performance gaps that contributed to the issues identified in the OIG draft report. Specifically, the agency is increasing its management focus upon ensuring that Aviation Safety Inspectors (ASIs) make full and correct use of current guidance and oversight tools. In the near term, the agency will improve inspector training and policy guidance in order to provide more comprehensive and standardized procedures for conducting inspections and reporting inspection findings. Over the longer term, FAA is also working to improve the capabilities and performance of the risk-based analytical tools available to inspectors. These enhancements will result in more consistent inspection practices that will improve the detection of systemic deficiencies and increase the effectiveness of repair station safety oversight.

### RECOMMENDATIONS AND RESPONSES

**Recommendation 1:** Modify its oversight system so that all inspection elements are considered in inspector risk assessments of repair stations.

#### FAA Response:

Concur. Since 2007, the FAA has used the Repair Station Assessment Tool (RSAT) as part of its enhanced repair station oversight program. RSAT is comprised of policies and procedures and a supporting automation tool, which enable the FAA to employ system safety methodology and to review past findings to plan and aid risk-based oversight. The current RSAT allows the inspector to review annually the elements contained in a “main base” inspection. The elements are as follows:

1. Parts and Materials;
2. Certificate Requirements;
3. Records Systems;
4. Housing and Facilities;

5. Tools and Equipment;
6. Personnel Records;
7. Manuals;
8. Quality Control;
9. Maintenance Process;
10. Technical Data;
11. Training;
12. Work Away from Station;
13. Contract Maintenance Noncertificated;
14. Contract Maintenance Certificated;
15. Air Carrier and Air Operator Requirements; and
16. European Aviation Safety Agency (EASA) Oversight Audit.

The first seven elements of the inspection above are basic to the repair station and include standard quality control elements. For these reasons, the FAA has made the decision to automatically generate required inspection of the first seven elements if they have not received an inspection in the previous 2 years. Elements 8 through 11 are required inspection items and are not based upon the repair stations' capabilities. Elements 12 through 16 are based upon the repair stations capabilities.

As evidenced by the OIG's findings, some inspectors would benefit from additional training on the RSAT. Accordingly, the FAA will conduct recurrent training/workshops to improve the use of the RSAT as it was intended. This will be completed by December 31, 2013.

Based upon our past field experience with RSAT and the recommendations from OIG, the FAA will also modify its oversight system. The FAA is developing the next generation of surveillance and analytical tools called the Safety Assurance System (SAS). SAS applies to both air carriers and repair station certificate holders. SAS information sharing features, which include automated data collection tools, will give ASIs a more comprehensive picture of the certificate holder's risk environment. As a result, SAS will improve the ASI's ability to prioritize and develop a risk-based oversight work program. SAS will further enhance the FAA's ability to assess the health of repair station systems and ensure that risk is identified, documented, tracked, and effectively managed.

In July 2012, the FAA provided a briefing on the development and implementation of SAS to the OIG and demonstrated how the new system will address the recommendations in the draft audit report SAS deployment is scheduled to begin in Fiscal Year (FY) 2015.

## **Appendix. Agency Comments**

**Recommendation 2:** Implement a risk-based system suitable for oversight of foreign repair stations.

**FAA Response:** Concur. RSAT is the FAA's current repair station risk-based oversight program for all repair stations, both within the U.S. and outside the U.S. In the near term, FAA is developing a training/workshop for all airworthiness inspectors and managers and to more completely convey the expectation that all International Field Offices are required to utilize the RSAT protocols. This will be accomplished by December 31, 2013. Once the briefings are complete, the FAA will amend current inspector guidance to reinforce the use of the RSAT tool and will publish updated guidance by March 28, 2014.

Over the longer term, FAA is developing SAS tools that will provide enhanced risk assessment capabilities for both U.S. and foreign repair stations when they come online.

**Recommendation 3:** Modify the risk assessment tool so that inspectors can document changes to their surveillance plans as soon as they are made.

**FAA Response:** Concur. Using RSAT now, an inspector is able to modify the surveillance plan. The results of the RSAT assessment may be used to add further required inspections and to include follow-up inspections in the annual program. The inspector is also able to cancel or terminate these inspections later in the year, if warranted.

The RSAT tool organizes and synthesizes information and provides it to an inspector in a manner that enables the inspector to plan surveillance. It is also a tool for the inspector to evaluate risk and incorporate the findings into an annual plan. Other factors, such as the National Work Program Guidelines, influence the surveillance plan. The program guidelines enumerate the minimum inspection requirements for each operator. A third factor may be changes in the repair station business, management or personnel. The minimum requirements, plus the risk indicators, allow an inspector to develop a surveillance plan. Currently, it can be modified by adding specific inspections to address risk indications or eliminate them if conditions no longer apply. Inspections can also be terminated if the repair station goes out of business or surrenders its certificate. The modifications are done at the local office level. The regional office monitors the minimum requirements for repair stations to ensure that each certificate holder receives one inspection per year in accordance with the NPG requirements.

During the recurrent training/workshop that is being developed for all airworthiness inspectors and their managers, the FAA will re-familiarize the inspectors and their managers with the RSAT's capabilities so that they may document changes to their surveillance plans as soon as they are made. The FAA plans on accomplishing the training/workshop by December 31, 2013, and once the briefings are complete the FAA will amend the guidance to reinforce the use of the RSAT by March 28, 2014.

Additionally, the FAA is developing SAS to allow inspectors the ability to change, and document changes to their surveillance plans at any time. SAS policy allows inspectors to change planned due dates of all assessments and provides guidance on how and when to do so. All plan changes and justifications for those changes are documented in the SAS program.

## **Appendix. Agency Comments**

**Recommendation 4:** Develop a control that will ensure inspectors prioritize inspections to those repair stations determined to have increased risk.

**FAA Response:** Concur. The FAA expects that the inspector workforce and local office managers will prioritize inspections of repair stations that show increased risk. Inspectors, supervisors and local office managers are expected to identify and respond to risk indicators and mitigate them through increased or targeted surveillance. If the risk indication is validated and the inspections show a regulatory violation, then the inspector will pursue enforcement action.

FAA's recurrent training/workshop will emphasize the responsibility to prioritize inspections to those repair stations determined to have increased risk. This will be accomplished by December 31, 2013.

In the long-term, FAA policy, supported by automation, will require automated triggers or parameters in SAS to ensure inspectors prioritize inspections for all repair stations showing increased risk. Management controls will exist within SAS to ensure that inspections and other resources are assigned to the highest risk areas first. Policy requires a second level review and final concurrence by a frontline manager of the overall inspection plan proposed by the inspector. In addition, policy requires inspectors to complete a risk assessment of the repair station using a list of risk indicators at least once per year. Results of that assessment must be documented in SAS automation and used by the inspector to prioritize repair station inspections. SAS will require adjustments to the oversight plan if the risk evaluation changes over time. If risk increases, surveillance will increase and if risk diminishes, surveillance may be reduced.

**Recommendation 5:** Enhance training to inspectors so that they understand the importance of using the available tools for assessing and trending risk.

**FAA Response:** Concur. During meetings with the OIG, the FAA provided records showing that inspectors had received training in the use of the RSAT and other tools for assessing and trending risk. However, the audit findings suggest, that inspectors either did not retain the information, or that the training did not provide adequate instructions in the use the tools. Therefore, the FAA is developing a recurrent training/workshop to be provided to the inspector workforce. The FAA, by December 31, 2013, will brief the Flight Standards Regional Division managers and maintain completion records to ensure that each inspector, assigned to 14 CFR, part 145 oversight, has received the recurrent training/workshop on the use of the RSAT and other available tools for assessing and trending risk.

As the FAA moves towards a Safety Management Systems (SMS) and begins its implementation, the FAA will again provide courses pertaining specifically to an inspector's job responsibilities. This includes the use of current assessment tools and instructions. These courses will be reviewed and may change with the implementation of SAS. They are:

- SMS Training; and
- SMS Theory and Application.

In addition to the courses listed above, the FAA is developing training to teach inspectors the new concepts and tools that will be found in SAS. The following courses will include

## **Appendix. Agency Comments**

instruction on available tools used for identifying and assessing risk:

- Introduction to SAS – Provides fundamental knowledge of SAS concepts and tools;
- SAS for Inspectors and Field Office Management – Will include specific lessons and exercises in the use of SAS tools used to assess and analyze risk;
- SAS for Repair Stations Located Outside of the United States – Instruction on the unique oversight and data collection requirements for repair stations located outside the United States such as the use of custom data collection tools to enable inspectors to identify and assess risk;
- SAS Analysis, Assessment and Action – Will provide specific instruction in the SAS tools used to analyze and assess inspection results and how to use those results to identify and assess risk, track corrective actions, and use the data to prioritize future inspections; and
- SAS for Managers – Provides managers with an overview of all available risk assessment tools within SAS and management’s roles and responsibilities in SAS.

Once these courses are available, they will assist inspectors in understanding the overall purpose of SAS and how to use the available tools most effectively. The FAA plans to have these training courses completed prior to SAS deployment, scheduled to being in FY 2015.

**Recommendation 6:** Develop the Repair Station Data Package and provide training to all inspectors on how to use it.

**FAA Response:** Concur. At present, FAA inspectors have the capacity to produce a data package through the Safety Performance Analysis System (SPAS). SPAS is an automation system that provides inspectors with information to organize and support their inspection activities and planning. However, to accomplish this, inspectors must go to more than one location within the SPAS to obtain requisite information. Therefore, during the recurrent training/workshop that is being developed for all airworthiness inspectors and their managers, the FAA, by December 31, 2013, will include a section that shows how to obtain a data package to plan surveillance.

After this training/workshop, the FAA will revise guidance to include a clearer, step-by-step guide so that inspectors can obtain a data package. Additionally, the FAA will amend the training course to show how to develop a data package using the information currently available in SPAS and will revise FAA Order 8900.1 Volume 6, Chapter 13, *Repair Station Oversight Process* to define and use of data packages by March 28, 2014.

Also, when SAS is deployed in FY 2015, it will provide a repair station data package that directly supports the SAS oversight process. In addition, standard data reports will be available from the inspector’s homepage in SAS. Training will be provided on how to analyze and assess available data in courses such as “SAS Analysis, Assessment and Action” and “SAS for Inspectors and Field Office Management.”

**Recommendation 7:** Develop a standardized checklist that all inspectors can use to improve the consistency in the way they perform and report their inspection findings.

**FAA Response:** Concur. A standardized checklist is presently available in FAA Order 8900.1, Volume 6, Chapter 9, Section 2: *Team Focused In-depth Inspection of a Part 145 Repair Station*. The FAA will emphasize the importance of the checklist through the recurrent training/workshop being developed for all airworthiness inspectors and their managers by including the standardized checklist from the guidance mentioned above and will require that airworthiness inspectors use the checklist and ensure this occurs through oversight of the local offices. However, based on the recommendation, the FAA will work on a refinement of this checklist for the individual inspector and plan on completing this action by March 28, 2014.

The FAA is also actively developing a standard checklist (through data collection tools) that will allow individual inspectors to improve consistency in future assessments of repair stations. This standardized checklist is part of SAS deployment scheduled to begin in FY 2015.

**Recommendation 8:** Provide training for inspectors to improve their review and acceptance of repair station corrective plans.

**FAA Response:** Concur. During the recurrent training/workshop that is being developed for all airworthiness inspectors and their managers, the FAA will include a section on how to improve the review and acceptance of repair station corrective plans. This briefing will be accomplished by December 31, 2013.

Although the FAA has current training on this subject, the draft report results reveal that a revision is necessary. This revision will be added to the current FAA Course 21058: Certification and Surveillance of Repair Stations. To improve the inspectors' review and acceptance of repair station corrective plans, training in this subject area will be added to Lesson 11, Certificate Management and Surveillance. The FAA plans to complete the revision of this course by February 28, 2014.

Additionally, with the future deployment of SAS, SAS training will instruct inspectors to use SAS tools to verify whether corrective actions taken by a certificate holder properly address the issues found during design or performance assessments.

**Recommendation 9:** Develop guidance and training to inspectors on how to conduct comprehensive briefings to repair station officials on inspection findings.

**FAA Response:** Concur. During the recurrent training/workshop being developed for all airworthiness inspectors and their managers, a section on how to conduct comprehensive briefings to repair station officials on inspection findings will be included in the briefing. The FAA plans on accomplishing this by December 31, 2013.

Although the FAA has courses currently that provide information on conducting comprehensive briefings to repair station officials on inspection findings, the FAA will evaluate the courses to determine their efficacy by December 31, 2013. Additionally, the FAA will determine whether or not they should be made mandatory for all airworthiness inspectors. The following courses will be evaluated for these enhancements:

## **Appendix. Agency Comments**



- FAA Course 21058 - Certification and Surveillance of Part 145 Repair Stations; and
- FAA Course 28463 - Basic Compliance Auditing for AVS Personnel, Phase 3. This course encompasses training on how to conduct comprehensive in-and out-briefings. This course is available to inspectors involved in the auditing process; however, FAA will evaluate and determine if it provides sufficient knowledge on conducting comprehensive briefings to repair station officials.