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Safe Use of Cranes and Hoists

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Equipment used for lifting and moving, such as cranes, hoists, and forklifts, have made it safer and easier to move large, heavy loads. Many ranger stations and work centers have commercially produced cranes and hoists or use equipment designed by local personnel.

Safe practices must be followed to operate cranes and hoists. Operators may place themselves and others at risk if they use equipment that cannot safely handle heavy loads, or use the equipment improperly.

Common Causes of Accidents

According to the U.S. Department of Labor, Bureau of Labor Statistics, human error is the most common cause of fatalities and injuries involving cranes and hoists. Other common causes include:

- Equipment is not being used in accordance with the manufacturer's recommendations.
- Manufactured equipment has undergone modifications that do not follow guidelines set by the American National Standards Institute (ANSI) and

the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA).

- Equipment or parts that were modified have not been subjected to testing standards that ensure they will not fail during use.
- Lack of maintenance, negligence in inspection, or unauthorized repairs.
- Equipment has been used to lift items that were heavier than the manufacturer's weight ratings.
- Equipment is produced without the benefit of safety ratings or standards.
- Personnel are not trained or certified to operate equipment.

Accidents can be reduced by following safe crane and hoist practices established by manufacturers. In addition, OSHA, ANSI, and the Forest Service have guidelines to help ensure operator safety and a safe working environment. Specific safety standards regarding regulations for the design and use of cranes and hoists can be found under:

- Occupational Safety and Health Administration—OSHA 29 CFR 1910. 179, 1926. 250-1926. 252, 1926. 552-1926. 554, Code of Federal Regulations.

- Forest Service—chapter 7120, Forest Service Manual 7100, and section 42, Forest Service Handbook 6709.11.
- American National Standards Institute—ANSI B30.2, B30.16, B30.18, B30.21, and Z224.1

Appropriate and Inappropriate Use of Equipment by Crane and Hoist Operators

Safety starts with understanding the job and selecting the proper crane or hoist. Although a crane or hoist may be able to move a load that is heavier than its weight rating, it may not be able to do so safely. Each crane or hoist has a specific weight rating (figure 1). Adhering to the manufacturer's guidelines is critical. This is also important when selecting equipment, such as hooks and chains. Guidelines and regulations set by ANSI and OSHA are designed to prevent unintentional overloading—and accidents.

Safe operation of cranes and hoists not only involves the equipment and the operator, but the entire work area and all persons working there.



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Figure 1—Cranes and hoists should be properly marked with pertinent safety information and load limits.

Some guidelines include:

- Inspect equipment before use. Ensure that it is in good working order and rated for the particular hoist or crane.
- Ensure that the lifting environment is free of obstructions.
- Keep people out of the area.
- Lift loads away from people.
- Use a crane or hoist only to lift objects—never people.

Loads are another important aspect of hoist and crane operations. Safety standards set by ANSI, OSHA, and the Forest Service should be

followed closely. When moving heavy objects:

- Move loads slowly at first to make sure that everything is stable and operating properly.
- Lift loads vertically, to avoid stressing equipment and causing uncontrolled load swings.
- Balance loads properly.
- Be aware of the items being lifted. Never leave a suspended load unattended.
- Know the weights of the items to be lifted. Supervisors need to train operators to accurately estimate weights. Improperly estimating the weight of

working loads (the weight of the item being lifted) is a violation of OSHA regulations.

- Ensure that load slings and other attachments are the proper size, are rated for the load, and are properly attached to the saddle of the hook. Do not exceed the specified ratings when operating cranes, hoists, and attachments.

Working loads with wire rope should be no more than one-fifth of the rope's tested breaking strength (OSHA). Regardless of the equipment being used, be aware of the differences between tested failure ratings and safe working loads.

Required Job Hazard Analysis

A job hazard analysis (JHA) must be prepared for crane and hoist operations. The written document reminds the operator of hazards associated with equipment use and also serves as a teaching tool during job training. The basic components of a JHA for crane or hoist operation include:

- Selecting the job to be analyzed
- Breaking the job down into a sequence of steps
- Identifying potential hazards
- Determining preventive measures to overcome these hazards

Workers involved in crane and hoist operations should understand and apply the OSHA and ANSI regulations and standards, as well as those in Forest Service policy. These regulations and standards

are a good starting point for any JHA. However, standards set forth by private and government agencies alone may not provide a complete JHA. Only after examining all of the manufacturer's literature and the instructions that accompany a particular hoist or crane can individual tasks be identified for warnings and preventive measures. Cranes and hoists should be used only for their intended and designed purposes. The Missoula Technology and Development Center has developed job hazard analysis software to help you prepare a JHA for any type of work activity (figure 2). Forest Service employees can download the software over the

Forest Service's internal computer network at:

<http://fsweb.mtdc.wo.fs.fed.us/programs/safety/oneclick/jha.htm>

Operator Qualifications

Only designated, qualified personnel are allowed to operate cranes and hoists. Qualified operators can operate the equipment safely, and they can extend the equipment's service life and reduce costs by avoiding potentially hazardous

operations. The operator's physical and mental condition is also important:

- Operators must have good hearing, vision, and depth perception.
- Operators should not operate a crane or hoist if they have a known physical condition that would prevent them from acting quickly in case of an emergency.
- Operators who are taking prescribed medication should make sure that the medication will not impair the ability to operate cranes and hoists safely.

Use of alcohol or drugs is strictly prohibited in the workplace. If you suspect an operator's ability to be impaired for this or any other reason, notify a supervisor immediately.

Inspections and Maintenance

Proper inspection and maintenance are required by OSHA to prevent injury, and they can prolong the life of equipment. According to OSHA and Forest Service regulations, only qualified personnel shall perform inspections. ANSI defines qualified "as a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work." A schedule of inspections and maintenance should be established and meticulously followed for all crane and hoist equipment.



Figure 2—Forest Service employees can download the job hazard analysis software from the Missoula Technology and Development Center's FSWeb site: (<http://fsweb.mtdc.wo.fs.fed.us/programs/safety/oneclick/jha.htm>).

Federal regulations governing the use of overhead and gantry cranes (29 CFR 1910.179) require several types of inspections for cranes and hoists, including:

- Initial startup—Operation test/test load.
- Preventive maintenance programs—Maintenance programs must be based on the crane or hoist manufacturer's recommendations. Signed documentation is required.
- Periodic inspection—Overhead cranes must be inspected every 12 months and every month as required, depending on the crane's service class. Signed documentation is required.

OSHA also requires frequent inspections of cranes, hoists, and associated equipment. Some inspections require that documentation be posted at the work site.

- Frequent inspections—The operator of hoists and cranes shall keep a close eye on hoist and crane equipment and listen closely for sounds indicating problems. Records of these inspections are not required.

If the operator determines that hazardous conditions are occurring while the equipment is in use, a more detailed inspection must be performed:

- Inspect hydraulic systems, tanks, valves, pumps, and lines.
- Inspect hooks and hook latches for damage.
- Check rope spools and rope for damage.

- Frequent hoist inspection—Inspect hooks monthly. Signed documentation is required. Remove hooks from service if routine checks reveal any of the following:

- Cracks
- Bends or twists in the hook that deform it in any way
- An increase in the throat opening that prevents the latch from closing

- Frequent hoist chain inspection—Check the chains for wear. Inspect chains monthly. Post a record of the inspection.

- Frequent wire rope inspection—Examine wire rope for wear, breaks, and kinks (figure 3). Inspect all fittings, attachments, and wraps. Inspect wire rope monthly, and post a record of the inspection.

The operator is responsible for alerting coworkers of problems. If a crane or hoist does not pass inspection, tag it *Out of Service* and remove it from use. Continued use of equipment that does not pass inspection endangers operators and other workers. Use Forest Service form FS-6400-17 to "red tag" defective equipment (figure 4).



Figure 3—Inspect wire rope for crushed areas or broken wires.



Figure 4—Mark unsafe or damaged equipment with a “red tag” (FS-6400-17) and remove it from use until it has been repaired.

Training

Training programs to operate cranes and hoists are available on various forests, through self-study programs, or through training offered by the crane and hoist industry. Textbooks, existing JHAs, or information from the Internet can provide a starting point for training.

District or forest employees may benefit from crane and hoist training. If cranes and hoists are operated on your forest, contact your forest or regional safety officer to find out whether someone is available to conduct training in your area.

Conclusions

This Tech Tip is not a complete guide to the use of cranes and hoists. Review OSHA and ANSI regulations to start learning about the uses of lifting equipment. Forest Service employees should not use homemade, modified, unrated, or uncertified equipment.

About the Authors

Susan Jenkins began working for the Forest Service in 1994 and has spent most of her career working on fires and trails. She has been instrumental in the development of trail and watershed restoration projects that use dry stone masonry techniques and rigging applications to develop sustainable trail systems. Her organizational strengths have helped her conduct effective training sessions and build strong partnerships with contractors, tribal organizations, and volunteers, and to work across disciplines within agencies.

Ian Barlow began working for horse outfitters in the Canadian national parks in 1973. He began working in trails and horse packing for the Forest Service in 1979. Traveling on foot and horseback and working on more than 17,000 trail miles has allowed Ian to develop a strong sense of what works in trail construction techniques. He hopes to continue developing trail construction to help the Forest Service meet the increasing demands on its trail system.

Bob Beckley received a bachelor's degree in political science from the University of Montana in 1982. He began his Forest Service career as a timber technician on the Nez Perce National Forest. Bob was a smokejumper when he came to the Missoula Technology and Development Center in 1990 to work as a videographer, photographer, and project leader.

Library Card

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Describes the practices approved by the Occupational Safety and Health Administration, the American National Standards Institute, and the Forest Service for using cranes and hoists safely.

Keywords: machinery, lifting, regulations, safety at work

Additional single copies of this document may be ordered from:

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Electronic copies of MTDC's documents are available on the Internet at:

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