

Ergonomic Safety Ladders Promise to Reduce Workplace Accidents and Financial Losses

By

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*Ergonomics: The applied science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort. Also called biotechnology, human engineering, human factors engineering.*¹

According to the U.S. Consumer Product Safety Commission, in 2014 more than 500,000 ladder-related injuries required medical treatment.² Some were minor such as cuts, bruises and fractured bones, while more serious injuries included broken backs, concussions and even death. The Centers for Disease Control report that each year nearly 300 people die from ladder-related injuries, and that “the estimated annual cost of ladder injuries in the U.S. is \$11 billion, including work loss, medical, legal, liability, and pain and suffering expenses”.³ Among workers who missed work due to occupational ladder accidents, the average case involved lost time of 11 days. Almost one-third of those cases involved missing 31 or more days of work.

Many experts agree that most accidents and injuries in MRO facilities are related to human conditions such as fatigue, complacency and stress.⁴ These conditions impact both the safety of the maintenance personal and the lives of airline passengers and crew should a mishap occur during flight. Financial costs can be considerable, from aircraft damage to personnel injuries to loss of life. Thus, it is imperative that Aviation Maintenance Technicians not only receive proper safety training, but that equipment used on the job has been designed to minimize risks. And, one of the easiest and most cost effective items to change is the ladder.

The Occupational Safety and Health Administration (OSHA) and the American National Standards Institute (ANSI) have promulgated specific guidelines regarding ladder design and load capacity, which have been readily accepted by the Federal Aviation Administration (FAA). Ladders which meet these standards are allowed in the MRO workplace. Ladders are used by MRO technicians every day to access maintenance and repair points on the exterior and interior of the aircraft as well as in the engine shop. Efficient flight line and hanger maintenance decreases down time and returns the aircraft to service quicker. Selecting right ladder promotes safety and facilitates this paradigm, while struggling with an outdated cumbersome ladder retards progress and makes the work unnecessarily difficult.

OSHA and ANSI Standards for Metal Ladders Used in Aviation Maintenance																				
OSHA Standard 29 CFR ⁵	ANSI Standard A14.2 ⁶																			
<p>1910.26 (a) (1) The design shall be such as to produce a ladder without structural defects or accident hazards such as sharp edges, burrs, etc. The metal selected shall be of sufficient strength to meet the test requirements, and shall be protected against corrosion unless inherently corrosion-resistant.</p> <p>1910.26 (a)(1)(iii) The spacing of rungs or steps shall be on 12-inch centers.</p> <p>1910.26 (a)(1)(v) Rungs and steps shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping.</p>	<p>8.2.11 Duty Rating. Ladders have been designed in four duty classifications:</p> <table border="1"> <thead> <tr> <th>Duty Rating</th> <th>Ladder Type</th> <th>Working Load</th> </tr> </thead> <tbody> <tr> <td>Special duty</td> <td>IAA</td> <td>375 lbs.</td> </tr> <tr> <td>Extra heavy duty</td> <td>IA</td> <td>300 lbs.</td> </tr> <tr> <td>Heavy duty</td> <td>I</td> <td>250 lbs.</td> </tr> <tr> <td>Medium duty</td> <td>II</td> <td>225 lbs.</td> </tr> <tr> <td>Light duty</td> <td>III</td> <td>200 lbs.</td> </tr> </tbody> </table>		Duty Rating	Ladder Type	Working Load	Special duty	IAA	375 lbs.	Extra heavy duty	IA	300 lbs.	Heavy duty	I	250 lbs.	Medium duty	II	225 lbs.	Light duty	III	200 lbs.
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However, not all these approved ladders are equal when considering ancillary features such as ease of movement, comfort when standing, and ability of the technician to work safely. Potential for mistakes due to the human factors of fatigue and stress can be exacerbated by using the wrong type of ladder to accomplish a particular work assignment, such as an A-frame ladder as shown here.



MRO technicians (left) use an A-frame ladder which requires twisting the torso which puts torquing pressure on the spine. LockNClimb's PYLON ladder (right) allows the technician to face his work directly and maintain an ergonomically correct position.

Among human factors responsible for accidents or injuries, stress and fatigue are the most prevalent. These can result from meeting tight deadlines, environmental impediments such as noise, lighting or temperature, and uncomfortable or awkward working positions. Using a ladder which helps minimize these potentially dangerous effects is tantamount to preventing costly accidents and injuries. It is important to select the right ladder manufacturer whose products have been designed and field-tested by the people who use them daily – Aviation Maintenance Technicians.



11LNC PYLON allows close working access under the cowling while rubber padding protects sensitive electronics.

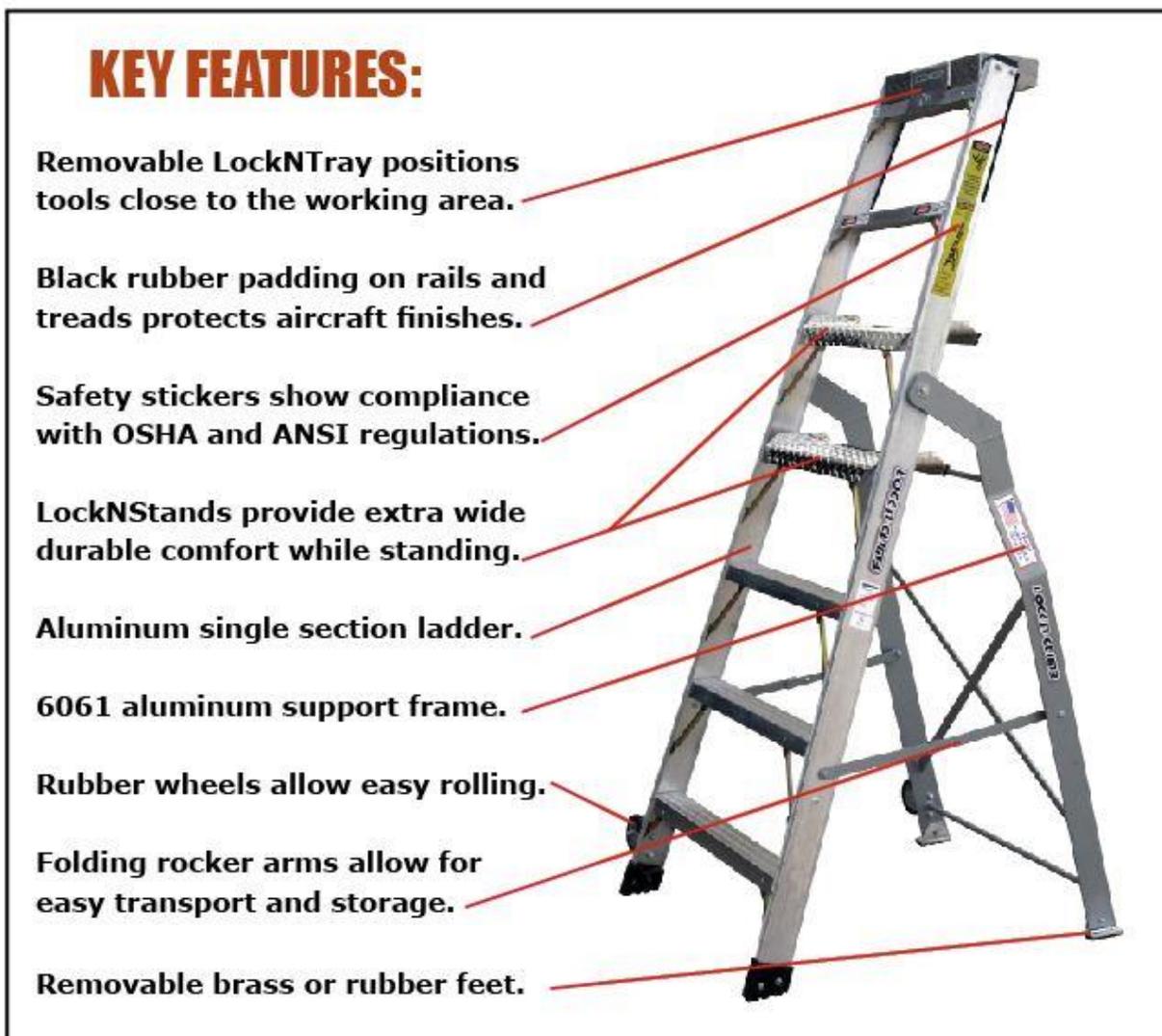


12WW CADET slides under the wheel well door to allow stable service. No other ladder affords such close proximity.

One company stands out in this arena – LockNClimb, LLC, headquartered in Independence, Kansas. LockNClimb® designs and builds ergonomic safety ladders to meet the rigorous demands of MRO technicians in the field. “Our ladders are designed by mechanics for use by mechanics,” says LockNClimb’s President and CEO, Jeffrey A. Green, who spends most of the year flying across America to meet with MRO service personnel and safety directors at major commercial airlines, on U. S. military aviation bases, and corporate jet maintenance facilities. “Airlines will call us when they have a problem, usually after a ladder fall incident or back injury,” says Green. “It is surprising with all the modern technology and safety practices in aviation today that some sites are still using ladder designs that are decades old. Our mission is to incorporate scientific ergonomic designs into

ladders MRO technicians want to use because they enable them to do their work easier, faster, better and safer.”

Three unique features aviation maintenance technicians find most advantageous are the detachable tool trays, the extra wide comfort treads and the wheels which allow the lightweight ergonomic ladders to be easily rolled into position in the hanger or on the flight line.



In a few short years, the small privately held company has grown into an innovative leader in aircraft maintenance safety, with a Who's Who domestic and international client base. Its product line contains USA-built packages to service virtually every aircraft in service today, including: Boeing 717, 737, 757/767/ 777 & 787; Airbus 318, 320 & 330; MD-80, 88 & 90; all Embraer jets; all Gulfstream, Hawker and other corporate jets; all U. S. Army rotorcraft, including the Sikorsky UH-60 Blackhawk, the Boeing CH-

47 Chinook and AH-64 Apache; the Air Force C-130 gunship and KC-135 transport plane; as well as single ladders for use at fixed based operations for private aircraft. LockNClimb's patented ergonomic safety ladders constructed of industrial quality 6061-grade aluminum, have been laboratory tested and engineer certified as ANSI 14.2, 300 lb., 1A extra heavy duty ladders, and meet or exceed OSHA specifications.



MRO technician at Duncan Aviation in Lincoln, Nebraska, uses a sturdy free-standing LockNClimb 13LNCPYLON to service the tail elevators on a corporate jet.

In corporate jet MRO facilities, floor space is limited and lightweight, easy to move ladders with a small footprint are desired over heavy cumbersome ladders and lifts. Chad Doehring of Duncan Aviation in Lincoln, Nebraska, likes the LockNClimb ergonomic safety ladders: "These ladders conform to the aircraft easily, they allow access to areas we couldn't get to with a normal ladder. They roll easily, fold for storage and are incredibly sturdy. Our technicians like them as they don't require wearing a cumbersome harness when climbing. They promote safety, facilitate the quality of work, and improve morale."

Military aviation maintenance technicians in the U. S. Army and Air Force like the way LockNClimb ladders are designed to fit the aircraft

profiles, allowing close working access without damaging sensitive aircraft parts or surfaces. "We have made many trips to test and re-design our ladders to fit military helicopters," says Green. "And, have added special features required by military regulations such as yellow side rails at the top of the ladders."



MRO technician uses LockNClimb's 9HELIPYLON to Service top engine rotor on a UH-72 Lakota used by the U. S. Army. Notice how the wide treads provide comfort while standing, how the ladder has been specifically designed to fit over the skids, allowing the technician to ergonomically face his work "between the rails."

As with every piece of new equipment used in aviation maintenance, ergonomic safety ladders require technicians to refresh their ladder safety skills and employ a simple 10-point checklist.

1. Thoroughly inspect any new ladder that has not been previously used to make sure no damage has occurred during shipping.
2. Select the correct ladder designed to fit properly in the working area to allow closed working access to the aircraft maintenance or repair area.

3. Inspect the ladder for any damage that may have occurred from previous use. If you find damage, do not attempt repairs, tag the ladder and remove it from service.



This ladder has a missing rubber foot and is Potentially dangerous.



Tag damaged ladders and take them out of Service.

4. Once you have determined the ladder integrity is sound, roll your ladder to the working area while maintaining vigilance not to hit any equipment en route. Then tilt the ladder up and walk or slide it into position so it rests securely on the brass or rubber feet at the bottom of the rails. Be careful not to bring the ladder into contact with sensitive aircraft parts or delicate finishes as these are expensive to repair and cause costly down time.
5. Check the ladder again before climbing to make sure the folding brackets are fully deployed. Look for any grease or oil on the floor which may cause the ladder to slip. Also check the bottoms of your shoes. If you find any slippery substance, mark it clearly so others will notice the hazard and report it to a supervisor.
6. Next, double check the safety sticker on the side of the ladder to make sure it is rated to safely handle your body weight and the weight of tools or parts you will be carrying.
7. When ascending the ladder maintain secure "3-point contact" at all times. That is, two hands and one foot should alternate with two feet and one hand at all times when climbing.
8. As you reach your desired working height, make sure not to stand above than the second step from the top marked with the "Do Not Stand" safety sticker.

9. When working, be sure to face your work without twisting your spine, staying “within the rails.” This will help prevent back and spine injuries and keep your weight balanced in the center of the ladder. If you have to reach too far, descend and reposition the ladder. Always lay the ladder down on the surface when not using.



Walk the ladder up to the desired position. Work within the rails to help avoid back and spine injuries. Always lay the ladder flat on the surface when leaving the work area.

10. After you have completed your task, descend the ladder maintaining the same three-point contact and follow the same procedures rolling the ladder away from the working area. Be careful not to drop the ladder as it may cause damage that will render the ladder unusable. After returning the ladder to the staging area, inspect one more time to make certain no damage has occurred during use.

Using the new breed of ergonomic safety ladders, such as those available from LockNClimb, and following proper safety procedures in the workplace, will go a long way towards reducing accidents, injuries and costly claims to both the aviation maintenance technicians and the aircraft company.

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Banning K. Lary, PhD is a widely published freelance writer and documentarian with produced works in science, safety, law, art, psychology, criminal justice, and other fields.