# Assessing Your Fall Protection Needs

Hazards are ever-present in the steel plant environment, and a heightened awareness and emphasis on safety is a necessary priority for our industry. This monthly column, coordinated by members of the AIST Safety & Health Technology Committee, focuses on procedures and practices to promote a safe working environment for everyone.

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Comments are welcome. If you have questions about this topic or other safety issues, please contact safetyfirst@aist.org. Please include your full name, company name, mailing address and email in all correspondence.

Working in the iron and steel industry naturally poses the risk of falls from height. While fall protection is available, it is not always quickly implemented, as plant and facility managers often, and understandably, feel overwhelmed by all the factors to consider. Getting a handle on what exactly fall protection is, how it can help and which system is right for the environment is the first step in creating a safer workplace. The five points discussed in this article can help in assessing the need for fall protection and aid in picking the best fall protection system for virtually any environment.

### 1. The 4-Foot Rule, a.k.a. "Do I Need Fall Protection?"

The 4-foot rule refers to 29 of the Code of Federal Regulations (29 CFR) through which the U.S. Occupational Health & Safety Administration (OSHA) ensures and enforces safe and healthy working conditions for general industry, construction and maritime trades. Employers have the duty of providing their workers with a place of employment free from recognized safety and health hazards. OSHA enforces regulation 1926, Subpart M for construction, and regulation 1910, Subparts D and F for general industry, which require fall protection be provided at: 4 feet in general industry; 5 feet in shipyards; 6 feet in the construction industry; 8 feet in longshoring operations; and any height when working over dangerous equipment and machinery, regardless of the fall distance.

If your operations fall within any of these parameters, you are legally required to implement a suitable fall protection system.

### 2. Elimination or Protection?

Once a fall hazard has been identified, there are essentially two options — eliminate the hazard or protect against it. In some cases, it is possible to eliminate a fall hazard. This is typically known as "engineering out the hazard," and can be done simply by changing the working environment, processes and procedures. If this is not possible, fall prevention should be the next consideration. Common fall prevention methods include installing guardrails, scaffolds, handrails or barriers. When passive fall protection solutions such as elimination or prevention are not practical, personal fall protection equipment, such as harnesses, lanyards and retractable lifelines can be used. Personal fall protection may consist of a restraint system to keep the worker from reaching an area where a fall hazard exists, or a personal fall arrest system that enables a worker to perform his/her duties from the height required while tied to the system.

A restraint system prevents the worker from falling at all by fitting him/her in a harness with a tether attached (Figure 1). A fixed-length lanyard is attached to the D-ring on the harness, and then attached to a code-compliant anchorage system. While avoiding

a fall completely is favorable, very often the work environment does not allow for it. Restraint systems do not tend to be very flexible once in place, rarely handle multiple workers well and are often limited in length. At this point, many companies find success in fall arrest systems that allow the worker to fall only a short, controlled distance. These systems are professionally engineered and, ideally, custom-designed for the specific work environment.

## 3. The ABCs of a Fall Arrest System

An easy way to remember the components of a proper fall arrest system is with the ABCs of fall arrest: Anchorage, Body support and Connectors.

- Anchorage is a secure point to attach a lifeline, lanyard, deceleration device, or any other fall arrest or rescue system — for example, structural steel members, precast concrete beams and wooden trusses. An anchorage connector (or an anchor) is a piece of equipment used as a safe means of attachment for the lanyard or lifeline to the anchorage. Examples of anchors are cable and synthetic slings, roof anchors and beam clamps.
- Proper body support in a fall arrest system is a body harness. A body harness provides a connection point on the worker that distributes forces evenly across the body in the event of a fall. A full-body harness is a body support device that distributes fall arrest forces across the shoulders, thighs and pelvis, and has a center back fall arrest attachment that links to the connecting device.
- Connectors include lanyards, snap hooks, carabiners, deceleration devices such as self-retracting lanyards (SRLs), vertical and horizontal lifelines, ladder climbing systems, and rope grabs. SRLs are deceleration devices containing a drum-wound line that may be slowly extracted from, or retracted onto, the drum under slight tension during normal movement, and after onset of a fall automatically locks the drum and arrests the fall within 3.5 feet (which meets both OSHA and ANSI standards). SRLs work much like a car seat belt. The devices are meant to be anchored directly above the worker and reduce the free fall of the worker as well as swing fall — or the distance a worker swings from side to side as he/she falls.

Figure 1

Tether track swing arm system.

## 4. Wire Rope Versus Rigid Rail

There are two types of fall arrest systems: those that use a wire rope to support a worker and those that use a rigid rail. Rigid rail systems, while more slightly expensive in initial installation, are a superior choice for several reasons:

- Wire rope systems require additional fall clearance due to the initial sag of the wire. The dynamic sag, or the stretch of the rope during a fall, adds to this distance. Rigid rail fall arrest systems stop the fall sooner by eliminating any sag, stopping the fall in a much shorter distance than wire rope. Injuries occurring after the fall, such as swinging into obstacles, are minimized with a rigid rail fall arrest system, which stays firm and minimizes the total fall distance. When a worker falls on a wire rope system, the wire's sag will make the trolley slide to the center of the nearest two supports, creating a risk for the worker to collide with nearby obstacles after a fall.
- A rigid rail fall arrest system allows for longer distances between supports, reducing both material and installation costs. When a worker falls on a wire rope system, any slack on the wire is eliminated. The result could be a sudden pull on the rope that can cause a jarring effect on other workers on the same system. Rigid rail fall arrest systems provide uninterrupted protection for additional workers on the same system.
- Lastly, in the event of one worker's fall, the rigid rail system will not bend or deflect like a wire rope system, allowing additional workers to continue to move freely and safely. The worker can

continue use of a rigid rail fall arrest system after a visual inspection. A wire rope system must be replaced and recertified by a qualified engineer.

## 5. Rigid Flexibility

While the name might imply otherwise, rigid rail systems are the most flexible forms of fall arrest. Ideal for environments where there is limited clearance between the working level and lower level or obstruction, these systems provide a shorter free-fall distance and a reduced risk of secondary injury due to impacts during the free fall or sudden deceleration. Rigid rail fall arrest systems are the perfect solution for permanent applications and can easily be customized to fit every situation.

## Points in Action

Faced with the challenge of ensuring a safe work environment, a track-trenching and surface mining machinery manufacturer in the iron and steel industry recently referenced these five points. With each machine weighing nearly 200 tons and with a grinding surface almost 10 feet tall and treads as tall as a man, the machines presented a less-than-straightforward solution for safety. Assembling one machine takes about eight weeks, and requires moving very large, heavy components using 40-ton-capacity overhead bridge cranes. It doesn't take long before the assembly reaches a point where workers are at an elevated risk. Luckily for the assemblymen, the company building the machines had safety in mind.

Because of the complicated assembly, any form of passive restraint — such as handrails — was impractical. While the company initially sought a permanent overhead fall arrest system, it quickly realized that most permanent solutions to protect the workers from falls would become obstacles for the cranes delivering components to those workers. In order to provide the most fall protection coverage without obstructing the crane movement, the company installed four fold-away fall arrest systems.

## Information in Action

Fall arrest systems are now available in multiple configurations, including various track profiles and support center distances, and fall protection systems can be easily customized to fit every budget and application. If you have determined a fall protection need, add fall protection to the company's overall health and safety plan. A site-specific program should be written, including detailed work procedures to protect your employees. The fall protection portion of your plan should state what fall protection measures are to be used, how they are to be used, a rescue plan, as well as the individual responsible for overall supervision and training.

Remember five points listed above and you'll be on your way to safer workplace. ✦

## Did You Know?

### ArcelorMittal Dofasco Supplying Steel for 2015 Pan Am/Parapan Am Games

ArcelorMittal Dofasco Inc. is supplying steel for the Toronto 2015 Pan Am/Parapan Am Games' most iconic symbol — the cauldron. The cauldron will be made from 10 types of steel, including hot roll, Galvalume®, cold roll enameling and tubular, and will weigh around 14 metric tons. The steel is manufactured by more than 5,000 employees of ArcelorMittal Dofasco Inc. in Hamilton, Ont., Canada. A second cauldron will also be produced as a legacy for the City of Hamilton. ArcelorMittal Dofasco was also named a partner and official supplier of the Games.

"ArcelorMittal Dofasco steel will used be to create this ultimate symbol of the Games, which will showcase athletic excellence and national pride, while creating a lasting legacy for host communities and the province of Ontario," said Sean Donnelly, president and chief executive officer, ArcelorMittal Dofasco. "The cauldron will represent Canada and the many nations and communities coming together to transform tomorrow through sport."

Hundreds of millions of households across the Americas are expected to watch as the cauldron is lit for the first time on 10 July 2015 to officially open the Pan Am Games. It will be lit a second time on 7 August 2015 to welcome the best Parapan athletes in the region to the Games. The lit cauldron will also open and close daily television broadcasts.

"A cauldron is one of the most visible symbols at an international Games. It expresses the unique nature and pride of the host city and host country, while providing an arresting image that captures the spirit of the athletes competing," explained Saäd Rafi, chief executive officer of the TORONTO 2015 Pan Am/Parapan Am Games organizing committee (TO2015).

"We're pleased to welcome ArcelorMittal Dofasco to the TORONTO 2015 Games family. Their long-standing history in Hamilton, innovative work and strong sense of community make them an ideal partner for our Games," Rafi added.

The 2015 Pan Am/Parapan Am Games are the first major international Games to be hosted in Ontario since the British Empire Games hosted in Hamilton in 1930.