Two construction crew members who worked on the recent renovation of historic Lambeau Field in Green Bay, Wisc., know the value of quality equipment and training first hand. The first fell from a steel beam six stories above ground. Less than two months later, another worker slipped from a beam and fell. Both escaped injury and possible death because of their fall protection equipment. Fortunately, these workers not only walked away from these accidents, but also were able to go back to work the same day.

Product testing and certification organizations in the United States and around the world have been re-examining how lifelines in fall protection systems perform and are used when subjected to sharp edge and leading edge applications, concluding that these two applications present unique risks to workers at height due to the potential for fall protection lifelines to be cut, severed, frayed or otherwise compromised. Like football players, construction workers need the best protective equipment and training to address the latest issues in construction. I will address leading and sharp edge applications, the unique risks involved and how these risks call for different equipment and specialized training.

Professional football players need the best protective equipment and training available to stay safe on the playing field. Construction workers face even greater hazards and need special protection as well.

By Craig Firl
What You Need to Know

Many personal fall arrest systems rely on lifeline materials to perform under less-than-ideal conditions. But there are some applications where use of the wrong product — for example, where a lifeline contacts with a sharp edge — can have disastrous results.

Product testing and certification organizations in the United States and around the world — including the American National Standards Institute (ANSI), the Canadian Standards Association (CSA) and CE in Europe — have been reexamining how lifelines in fall protection systems perform when subjected to these sharp edge applications. They’ve also placed a new focus on leading edge applications. Through this analysis, they concluded that these two environments present unique risks for workers at height.

**Sharp edge:** A sharp edge is one that, for practical purposes, is not rounded and has the potential to cut and even completely sever most types of lifelines. The ANSI standard for sharp edges, for example, involves testing the fall arrest device’s lifeline over a piece of steel bar with a radius of no more than .005 inches. If the lifeline is cut or severely damaged, the device fails the test and does not comply with ANSI.

**Leading edge** — To visualize a leading edge, imagine a worker installing a steel deck on a new building. Now imagine the worker’s fall protection system is anchored at foot level behind him. As the worker moves out and away from the anchor point while installing the decking, the worker is exposed to a potential fall over the edge of the building or the edge of an elevated platform.

**Unique Risks of Leading and Sharp Edge Applications**

In sharp edge applications, the primary risk is that the lifeline can be frayed, cut or severed. However, a fall over a leading edge can pose several other risks in addition to the risks associated with a sharp edge (a leading edge also can be a sharp edge).

**Increased fall distance:** When workers are attached at foot level, as they often are in leading edge applications, they will fall farther than they would if they were anchored at shoulder height or directly overhead. For this application, the need for additional fall clearance must be taken into account. The image (below) demonstrates the sequence of events that happen when a worker falls off a leading edge, and why a worker needs additional fall clearance. The required clearance when anchored at foot level varies by product, so make sure to reference the product instructions.

**Lock-up speed:** Self-retracting lifelines react to a fall when the lifeline accelerates out of the housing at a certain velocity, generally 4.5 feet per second on average. When self-retracting lifelines are anchored at foot level, the lifeline may not achieve the required acceleration during the fall until after the user’s D-ring passes over the leading edge and the user falls below the level of the anchor. This means the user may already have fallen about 5 feet before the self-retracting lifeline device will engage to arrest the fall.

**Increased fall arrest forces:** Falling farther means the impact on the body through the fall protection system potentially will be higher when the fall is arrested. This is why many leading edge and sharp edge rated products contain additional energy-absorbing devices.

**Increased potential for swing fall hazards:** If a worker falls, and is off to one side, he may swing like a pendulum. While this in and of itself is dangerous, the danger is compounded if the worker’s lifeline is extended over a sharp edge and the lifeline saws back and forth across the edge.

**New Risks Call for Different Equipment**

Previously, the industry made attempts to prevent hazards in sharp and leading edge applications. These solutions included attaching an energy absorber to standard self-retracting lifelines, protecting edges and elevating anchor points. While these efforts have been helpful, many organizations have now incorpo-
sharp and leading edges. The bottom line? Keep your workers safe. Be aware of the risks associated with your jobsite, provide the appropriate equipment and train workers on the proper use of equipment. These are the basic steps required to save lives in the event of a fall.

Craig Firl has worked at Capital Safety for more than 30 years, most recently as the North American technical manager. His accomplishments include numerous presentations and research on fall protection, including presentations to the International Society for Fall Protection, National Safety Congress and the Voluntary Protection Programs Participants’ Association. Firl has an associate’s degree in industrial engineering technology from Southeast Technical College in Red Wing, Minnesota.

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