

Steel Toecaps Are a Foundation of Worker Safety

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ASSOCIATION

The World Steel Association (worldsteel), headquartered in Brussels, Belgium, is one of the largest industry associations in the world, with members in every major steel-producing country. Its members represent around 85% of global steel production.

This monthly column features steelStories from worldsteel, covering automotive, construction and building, infrastructure, and innovation.

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In the realm of workplace safety, steel toecaps are a fundamental element of protective footwear that have been a cornerstone of occupational health for roughly 100 years.

Originally invented in Germany in the early 20th century to protect workers' feet, steel toecaps slowly reached wider adoption until a rapid increase across the 1970s and 1980s as regulations came into force around personal protection equipment (PPE) for construction and heavy industries.

The first designs incorporated a reinforced steel cap over the toes that shielded workers from heavy objects and machinery. Initially, these were rigid and uncomfortable, focusing solely on safety.

Over time, advancements in materials and design has led to ergonomic designs for more wearable steel toe cap boots that maintain safety while ensuring comfort in often physically demanding workspace environments.

Impact on Workers

There are still 340 million occupational accidents across the world each year, but countries with stricter regulations around the use of PPE in the workplace have seen reductions in the incidence of occupational injury.

In Germany, measures such as the Occupational Health and Safety Act, which obliges employers to provide PPE such as steel toecaps, have seen the annual number of workplace accidents halved since the 1980s.

Today, toecaps are a cornerstone of occupational safety, evolving with various industries and offering versatile protection against impact and compression hazards, promoting a safer work environment for countless professionals.

The Anatomy of Safety

Steel toecaps, also known as safety toe caps or steel caps, are an essential feature integrated into protective footwear such as work boots. These caps are constructed using sturdy materials such as reinforced steel.

The toecap, which is usually combined with a steel mid-sole plate to protect against punctures from below, is designed to cover and safeguard the front part of the foot from various occupational hazards such as falling objects, heavy machinery, or accidental impacts.

Work boots must meet the standard established and issued by the International Organization for Standardization (ISO). EN 345 is the safety standard that specifies basic and additional requirements for safety footwear used for general purposes.

This includes, for example, mechanical risks, slip resistance, thermal risks and ergonomic behavior.

Meeting this standard guarantees that the reinforced steel toecap can withstand a pressure force of 200 joules. This means that a 20 kg object falling from a height of 1 m will not injure the foot wearing the EN 345 shoe. The shoe can also withstand a crush weight of 1,500 kg.

Durable footwear that meets these high standards provides a crucial layer of defense for workers in hazardous environments, helping prevent potential injuries that can result from heavy objects, impact or compression.

Steel toecaps find utility across a spectrum of work environments,



from construction sites and warehouses to manufacturing facilities and heavy machinery operations. Their versatility ensures that workers have a reliable means of foot protection.

With their durability, versatility and compliance with safety regulations, steel toecaps have become an integral component of protective footwear, allowing workers to carry out their tasks with confidence in the face of occupational hazards.

This and other stories are available at worldsteel.org/stories. ◆

Did You Know?

worldsteel Safety and Health Excellence Recognition 2023

The recognized companies this year are:

For Safety Culture and Leadership:

- **BlueScope Steel Ltd.** — Integrating HOP (Human and Organisational Performance) into foundational HSE processes. In 2019, BlueScope started its global HOP journey by proactively piloting HOP-based leadership workshops as top management was curious about evolved safety thinking. BlueScope is at the stage of systems and processes being simplified and updated to embed the HOP philosophy into everything it does, so that the practice is sustained.
- **Liberty Steel** — Transforming safety culture and performance through human performance principles. In 2019, a decision was made to initiate a transformative journey to reshape the safety culture across the organization. To drive this transformation, a comprehensive road map was developed, known as “The WRIB [We are InfraBuild] Safe Way.” Underpinning this are four strategic pillars, with the overarching goal of creating a world-class safety culture and safety performance.

For Occupational Safety Management:

- **Acerinox S.A.** — Innovative roll cover solution enhances safety and operational efficiency in hot mill operations. In February 2022, a critical challenge arose at Columbus Stainless hot strip mill when a finishing mill backup roll suffered a catastrophic failure, posing a risk to personnel and equipment. To address this, a cross-functional team embarked on a mission to create a preventive solution that prioritized safety without compromising operational efficiency.
- **JFE Steel Corp.** — Safe work support using safety monitoring system. At JFE Steel, the latest information and communications technology, artificial intelligence and data science technologies are being used to develop and commercialize more new technologies to ensure the safety of workers at manufacturing sites.

For Occupational Health Management:

- **Tenaris** — Ergonomics program. Confab, Tenaris’ production center in Brazil, started evaluating the ergonomic conditions in its pipe manufacturing mills back in 2016. Before implementing its ergonomics program, the production center reported an average of 42 employees per year with work restrictions due to injuries associated with poor ergonomics. Following this assessment, a three-year ergonomics program was introduced, including an annual review and evaluations by a cross-functional team to establish investment priorities.

For Process Safety Management:

- **Tata Steel** — Real-time visualization of risk movement. All high-potential safety risk scenarios were identified at Tata Steel by implementing a process safety management framework. To prevent and mitigate high-potential scenarios, a number of safety barriers were identified. However, in some instances, there was a fair probability of some early failure indications going unnoticed, which could cause the failure of barriers, leading to high potential incidents. Consequently, Tata Steel felt that tracking the health of the barriers on a real-time basis was needed. The company’s innovative approach to real-time visualization of risk movement aims to provide real-time insights and alerts on the level of risk.