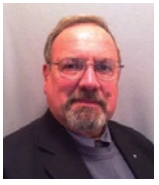
A Discussion of Workplace Injury and Illness Trends in the U.S. Steel Industry (SIC 33), 2021–2025



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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Introduction and History

Those who work in or with the steel industry know that fantastic strides have been made in worker safety and health. The public outcry after the 1907–1908 Pittsburgh survey played a big role in starting the focus on reducing injuries and illnesses. The steelmakers were among the first to hire full-time safety professionals in the early years of the 20th century, largely due to the new workers' compensation laws being enacted in the industrial states. While there was certainly a humanitarian aspect of the safety first movement in steel, the realization that injuries and illnesses are a controllable expense was arguably the leading factor.

The industry, through the Association of Iron and Steel Electrical Engineers (now AIST) founded the National Safety Council in 1913. Heavy manufacturing, including steelmaking, continued to lead the progress in safety through the 20th century, but that progress was excruciatingly slow. The safety leadership mindset didn't always trickle down to the first level of supervision and to the hourly workforce.

Field Examples

Two incidents come to mind to illustrate that point. I began my career as an hourly worker at a fabrication shop in the early 1970s. I became the union safety representative on the afternoon turn. On this particular night, we had all stopped work and gathered around to watch in horror as the EMS crew rescued one of our coworkers who had sustained a compound femur fracture when an unsafe pile of short beams — a pile which he had created, by the way — fell on him. As he was being carted away on the stretcher the turn foreman bellowed at the crew, "Get back to work! One monkey don't stop no show!" (Would you be surprised if I told you we had constant union grievance activity, poor morale, and the company went out of business a few years later after a long strike?)

In 1975, I had graduated to the big time — I was working on top of a brand-new coke battery at one of the large companies. The safety inspector came by one day and engaged the crew, asking if we had any questions or comments about safety. I asked why we never had safety meetings. He looked surprised and went downstairs. A short time later the sub-foreman met me at the elevator. He grabbed my shirt, got in my face, and screamed "Wear your hard hat. Wear your glasses. Wear your respirator. Wear your wooden shoes. Eat salt if you get hot. There's your safety meeting!"

Moving on to the 1990s, changing societal expectations, changes in technology and a better-educated workforce — including better-educated supervisors and managers — brought systemic changes to the

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Table 1

Common Fatal Incident Types in the Steel Industry (2021–2025)

Incident type	Brief description	Typical contributing factors
Falls from height	Workers fell from platforms, cranes, ladders or structures	Missing guardrails, inadequate tie-off, poor access design
Struck by moving equipment	Employees hit by forklifts, loaders, railcars or cranes	Blind spots, poor traffic control, contractor exposure
Caught in/crushed	Fatal crushing during roll changes, conveyors or maintenance	Lockout/tagout failures, stored energy
Molten metal events	Fatal burns or explosions during pouring or charging	Moisture contact, process deviations, personal protective equipment (PPE) failure
Contractor fatalities	Fatal injuries involving maintenance or construction contractors	Limited site familiarity, supervision gaps

industry. It was evolution, not revolution – things improved gradually as we tried many different approaches. The focus shifted from personal protective equipment (PPE), warning signs and barrier guarding to changing the worker. Inspections gave way to behavioral audits. Safety meetings became focused training sessions. Cardinal Rules were published, the violation of which resulted in mandatory harsh discipline. Various programs were put into place to increase worker engagement. Materials were sent home to spouses to engage them in encouraging safe workplace behavior. All these things worked to a point. Total injury rates were slowly driven to all-time lows.

However, the rate of serious incidents plateaued. Steel manufacturing remains one of the most hazardous segments of U.S. manufacturing. Over the past five years (2021–2025), total injury and illness rates in the steel industry have generally declined, but serious injuries and fatalities have not followed the trend.

Overall Injury and Illness Trends (2021–2025)

- Total Recordable Incident Rate (TRIR) in steel remains above the private industry average but has decreased modestly since 2021.
- Days Away, Restricted or Transferred (DART) cases declined only slightly.
- Occupational illness cases dropped sharply after 2022, largely due to the decline in COVID-19 respiratory cases reported to Occupational Safety and Health Administration (OSHA) and the Bureau of Labor Statistics (BLS).

Leading Causes of Injuries by Frequency

According to OSHA data, National Safety Council (NSC) manufacturing data and insurance claim analyses, the most frequent injuries in steel manufacturing over the past five years include:

- Overexertion and Manual Material Handling
  - Strains from lifting, pushing, pulling and handling steel products remain the most common injury type.
- Slips, Trips and Falls (Same Level)
  - Common causes include scale buildup, oil, water, uneven walking surfaces and poor housekeeping.
- Struck by Objects
  - Injuries from moving coils, billets, scrap, tools and mobile equipment are frequent, especially in meltshops and rolling mills.
- Caught in/Caught Between Incidents
  - These occur during maintenance, roll changes, conveyors and unguarded equipment operations.
- Burns and Heat-Related Injuries
  - Contact with hot surfaces, molten metal splashes and steam exposures remain common, though improved PPE has reduced frequency.

Leading Causes of Injuries by Severity

While some injuries occur often, others account for disproportionate severity and cost:

- Falls from height (platforms, ladders, cranes and structures) are the leading cause of fatal injuries in steel facilities worldwide.

- Struck by mobile equipment or loads results in high rates of traumatic fatalities and permanent disabilities.
- Crushing and caught between events frequently cause amputations and multiple fatality events during maintenance outages.
- Burns from molten metal or explosions are less frequent but often catastrophic when they occur.

Insurance data confirm that overexertion and falls together account for nearly 40% of severe injury costs in manufacturing, including steel.

Fatal Incidents in the Steel Industry (2021–2025)

Public OSHA accident investigations, BLS Census of Fatal Occupational Injuries (CFOI), and worldsteel fatality analyses show consistent fatal hazard patterns rather than isolated events.

Key Takeaways

- Injury frequency is improving, but serious injury and fatality (SIF) risk remains high in steel operations.
- Overexertion and same level falls dominate recordable injuries, while falls from height and struck by hazards dominate fatalities.
- Contractors continue to face disproportionate risk.
- Leading organizations are shifting focus from lagging indicators (TRIR) to high potential incident prevention, process safety and human factors controls.

Conclusion

Over the past half decade, the steel industry has made slow but continual progress in reducing overall injury rates, but the low-hanging fruit has been picked. Eliminating the most severe incidents requires a shift in mindset. While behavioral and process controls remain important (lockout, training, traffic management, equipment inspection, etc.), SIF prevention will require separating the people from the hazards. Some may be simple, such as providing no-touch tools to keep workers away from crane loads, for instance, or replacing fixed ladders with stairs, but the most dramatic improvements will come with changing the workplace. Some examples include: using machines instead of muscle (e.g., shaking out rebar before the shear); using remote cameras instead of eyeballs (thus keeping people off the meltshop floor); using robots for hard, dangerous and repetitious jobs (coke oven door cleaning, lancing the EAF, hand-piling structures); or installing safe access and working platforms on mills where maintenance workers have to regularly go.

Just as the job of the quality control department has changed from inspection to process control, the job of the safety professional is no longer inspector. It's now a combination of engineer and psychologist — helping to find practical solutions to workplace risks and then persuading management to invest in the changes.

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