National Safety Council

Small Business
Case Study

WORKtoZERO
an nsc program

USE OF ARTIFICIAL INTELLIGENCE FOR ERGONOMIC RISK ASSESSMENTS

What's the Risk?

In manufacturing settings, workplace injuries, particularly musculoskeletal disorders, pose significant risks to employee health, safety and wellbeing. At Superior Tube Products (STP) for example, employees lift steel tubing and other components weighing up to 50 pounds individually, while anything over 50 pounds requires a two-person lift. They may also endure prolonged static postures while operating heavy machinery and perform repetitive motions when loading parts, conducting fit checks, or using hand tools and other equipment. These risks may be even greater for new hires unaccustomed to these physical demands, which can lead to early signs of strain, particularly in the wrists, elbows and shoulders.

Traditional manual evaluations, such as the Revised National Institute of Occupational Safety and Health Lifting Equation and Rapid Entire Body Assessment, are widely used ergonomic assessment tools that can help employers identify potential MSD risks by analyzing lifting tasks and overall physical strain in the workplace. However, these tools require detailed assessments, calculations and observational data, making accurate evaluations dependent on proper training, experience, and sufficient time and resources. These factors can be particularly challenging for small businesses with limited resources and staffing.

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Through a pilot grant provided by the National Safety Council's MSD Solutions Lab, Superior Tube Products trialed an artificial intelligence (AI)-driven ergonomic assessment solution designed to analyze worker movements and quantify MSD risks. Short videos were taken of employees performing high-risk tasks (e.g., loading and unloading steel tubing, conducting quality inspections and packaging parts for delivery). The system then analyzed these movements, assigned risk scores for different areas of the body (e.g., upper and lower trunk) and pinpointed the motions most likely to contribute to MSD-related injuries.

Impacts

The AI-driven assessment tool enabled STP to identify and prioritize the tasks and movements most likely to contribute to MSDs, empowering it to implement targeted interventions and training to safeguard employees on the production floor. The technology offered several benefits, including:

- **Proactive Risk Mitigation:** By identifying and categorizing high-risk motions, STP was able to make adjustments to the workplace to reduce the strain associated with those tasks. For example, replacing long spray wands with shorter, ergonomically designed versions resulted in an immediate decrease in shoulder and wrist strain complaints. These small but significant changes meant employees could work comfortably for longer periods without compromising their health and safety.

- **Injury Reduction:** The use of the system for ergonomic assessments contributed to a significant decrease in work-related injuries and associated costs. Through the early identification of MSD risks and proactive interventions, the company achieved a 98% reduction in its workers' compensation costs and a substantial drop in its total recordable injury rates, from 13.60% in 2023 to 5.51% in 2024.

- **Improved Efficiency in Ergonomic Assessments:** The implementation of the AI-driven assessment tool significantly reduced the time and resources needed to conduct ergonomic evaluations. Instead of relying on manual assessments, such as RNLE or REBA, the system can quickly analyze videos and produce real-time, actionable insights. The ability to conduct ongoing and accurate assessments with minimal effort led to a more proactive approach to ergonomics, ultimately reducing injuries and improving overall workplace safety.

- **Enhanced Employee Engagement:** The introduction of the system not only improved ergonomic practices but also helped increase employee engagement in safety initiatives. Workers were encouraged to participate in the pilot, including providing suggestions for potential applications of the technology in other areas of production. This sense of ownership and involvement in safety initiatives fostered a stronger safety culture and helped ease any reluctance initially felt toward the use of a new system.

Lessons Learned

As STP continues trialing the AI-based ergonomic assessment platform for its ergonomic assessments, it provided several lessons learned, especially for those in small to medium-sized businesses. Most notably:

- **Engage Employees Early and Often:** STP prioritized live demonstrations and transparent communication to explain the technology's purpose and direct benefits for employees. This approach aligns with the concept of *participatory ergonomics*, which encourages workers to help identify ergonomic risks and shape solutions. Engaging employees early not only helped address potential concerns but also fostered a sense of ownership in the pilot. As a result, conversations expanded beyond the initial use case to explore broader applications across other areas of the production floor.

- **Flexibility and Adaptability Are Key:** When implementing new technology, especially AI, organizations should set realistic expectations and plan for a period of adjustment. Flexibility is key during the pilot and rollout phases, as integration may require system updates, workarounds for incompatibilities or changes to how the technology is used. Ongoing communication with the vendor is equally important. Clear discussions about needs, limitations and customization options can help tailor the solution to fit operational goals.

- **Technology Is an Addition, Not a Replacement:** AI is a powerful tool for identifying risks, but it should complement, not replace, traditional safety programs or interventions. STP, for example, still relies on proactive injury reporting and intervention efforts to prevent workplace injuries. By enhancing these existing practices with AI-driven insights, the organization is able to take a more proactive and predictive approach to worker safety.

- **Take Advantage of Grants and Other Funding:** To fund the initial pilot, STP received a grant from the MSD Solutions Lab. Funding opportunities are often available from government agencies, insurance companies, industry associations, research institutions and nonprofits to support employers, particularly small to -medium-sized organizations, in piloting innovative technologies. By leveraging these resources, companies can mitigate financial challenges and invest in tools that enhance safety and productivity without shouldering the full upfront costs.

Superior Tube Products

Superior Tube Products (STP) is a leading fabricator of high-quality tube products. They specialize in precision-bent and laser-cut tubes for original equipment manufacturers across diverse industries. An all-American manufacturer since 1991, STP is 100% employee-owned and based in Davenport, IA, with a team of over 50 employees.