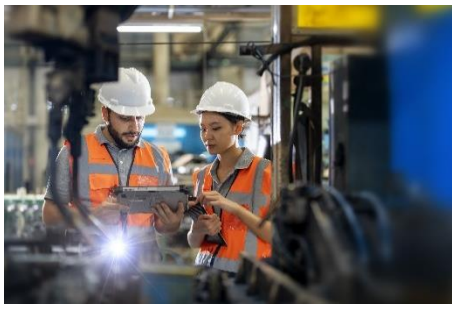
WORKtoZERO
an nsc program

Technology Spotlight
LOCATION GEOFENCING

TECHNOLOGY SUMMARY

Geofencing uses location data to create virtual boundaries around hazardous or restricted areas, such as active work zones, triggering automatic alerts or actions (e.g., logging events or disabling machinery) when workers or equipment cross them. This helps prevent unauthorized access, reduce the risk of collisions and struck-by incidents, and enhance situational awareness in dynamic environments. Adoption may be limited by connectivity challenges, accuracy limitations, and privacy concerns related to location tracking. Starting with small-scale pilots, involving stakeholders early and often, and clearly communicating the safety benefits and intended use of the technology can help foster trust and support implementation.

Geofencing can help protect workers near roadways or rail lines by alerting them when they enter active traffic zones.



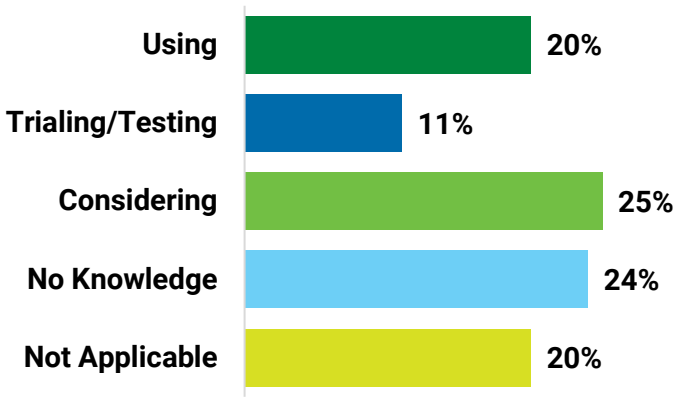
In manufacturing environments, indoor geofences can monitor and control access to hazardous areas, such as active machinery zones.

Geofencing can prevent equipment strikes and collisions by alerting operators when someone enters an active work zone.

SAFETY TECHNOLOGY 2024 SURVEY RESULTS

According to an **NSC survey** of 500 employers and 1,000 employees in safety-sensitive industries, 20% of employers reported currently using location geofencing in the workplace, while 36% said they are either testing or considering its use. The highest reported use of the technology came from employees in construction, manufacturing, and utilities.

Use of Geofencing in the Workplace:



Top Industries Testing or Using:

Construction **(45%)**

Manufacturing **(37%)**

Utilities **(35%)**

Voices from the Workplace:

"Location geofencing warns employees when they enter an area which may be hazardous or restricted, giving them a chance to escape the area before something bad happens or even prevent it from happening."—*Employer (Manufacturing)*

"Invasion of privacy. As geofencing collects and processes location data, it can lead to pushback from employees who might percieve this montioring as intrusive."—*Employer (Manufacturing)*

"[Location geofencing] helps employees at my location to be reminded of dangerous work areas that may cause fatal injury."—*Employee (Construction)*

"Frequent triggering of alarms may result in employees becoming numb to alarms or lead to alarm fatigue."—*Employee (Manufacturing)*

Benefits of Location Geofencing

- Location geofencing enables real-time monitoring and alerts for workers, helping prevent entry into high-risk or restricted areas.
- Some geofencing-enabled solutions can automatically de-energize or disable machinery to reduce the risk of contact injuries.
- Geofencing streamlines worksite planning and management through improved monitoring of personnel and equipment.
- Real-time location tracking can support faster emergency response if an incident occurs.

Considerations for Adoption

- Geofencing does not eliminate exposure to occupational hazards and should be used in combination with other controls.
- Technological limitations, such as connectivity requirements and accuracy limitations, require a balanced and realistic approach to adoption.
- Without transparent communication, use of real-time location tracking may lead to fear or resistance from workers.
- Costs and resource investments may be a barrier for small and medium-sized organizations.

BEST PRACTICES

- **Adopt a balanced, realistic approach to implementation**, considering the potential limitations including connectivity requirements, accuracy limitations, and compatibility with existing systems.
- **Establish transparent data policies and clearly communicate** how any location data will be collected, used, and protected to build trust with employees and address privacy concerns early.
- To ensure smooth integration with your IT infrastructure and systems, **engage early and often with the vendor and relevant stakeholders** throughout the process.
- **Begin with small-scale pilots** to identify technical or operational challenges, gather worker feedback, and adjust before scaling up to reduce initial monetary and resource investments.

For more information, see our report *Advancing Workplace Safety with Location Geofencing* Whitepaper. For additional resources and guidance on adopting safety technologies, explore the Work to Zero *Safety Innovation Journey*.

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Learn More:
nsc.org/WorktoZero

National Safety Council