



Can new technologies **prevent struck-by injuries?**

For workers on foot, navigating a busy jobsite where heavy equipment is constantly moving can be risky business. Even though equipment operators must use a signaller and many vehicles have back-up alarms, there are still too many injuries and fatalities.

The main problem is blind spots around heavy equipment, especially directly behind the equipment. From 1997 to 2011, 28 construction workers died in Ontario after being struck by moving equipment—17 of those deaths were caused by vehicles backing up.*

Several coroner's inquests were convened to look into fatalities due to reversing vehicles. One of their recommendations was to research technologies such as proximity detectors. IHSA's Civil Engineering Labour-

Management Health and Safety Committee took on that challenge. They asked IHSA to research proximity detectors and find out how effective they are in reducing injuries and fatalities from reversing vehicles.

Scan-Link system

IHSA researchers put a safety technology called Scan-Link Armour System to the test. This system is being used by several Canadian municipalities, companies in the oil and gas industry, and road building and demolition firms in construction.

Scan-Link has three components:

1. **A sensor unit** mounted on the back of the vehicle
2. **A display unit** in the cab of the vehicle
3. **Safety vests and hard hats** worn by workers



The system was better at detecting workers who were directly behind the vehicle than at the side of the vehicle.



Sensor unit



Display unit



Safety vest and hard hat

How it works

Scan-Link uses a radio frequency broadcast from the sensor unit mounted on the back of the vehicle to detect any worker who is in the path of the reversing vehicle. Workers wear safety vests and hard hats equipped with radio frequency identification (RFID) tags. If the system detects an RFID tag within the reversing zone, the display unit in the cab alerts the operator with an alarm and a visual warning.

How it performed

Our research department replicated some jobsite conditions and situations to see how the technology would perform. Overall, it worked quite well. Here are some of the positive findings of the research study.

- When there was a worker in the detection zone, a warning was given before the operator could start reversing the vehicle.
- The alarm was loud enough to be heard outside of the vehicle, even when the doors and windows were closed. That would help alert not only the operator but also the worker who is in the reversing zone.
- Other systems that use radar or ultrasonic sensors often sound the alarm for large objects as well as workers. The Scan-Link system only detected workers, not objects or equipment commonly found on busy jobsites.

- The Scan-Link system even detected workers lying on the ground as long as they were wearing their RFID-tagged equipment. Other radar and ultrasonic systems must be tilted up and away from the ground to prevent false positives.

In spite of those positive results, the findings suggest that in certain situations the technology may not be as effective.

- There was a slight delay from the time of detection to the time when the alarm sounded. So, depending on an operator's reaction time and a vehicle's braking distance, an operator might not be able to stop in time if a vehicle was moving fast.
- Our researchers tested detection ranges when workers were standing at three different angles to the back of the vehicle: 0° (directly behind), 45°, and 80°. The system was better at detecting workers who were directly behind the vehicle than at the side of the vehicle. The sensor sends out a conical signal, so as the angle of the worker to the vehicle increases, the detection range decreases.
- The system performed best when the workers were wearing an RFID-tagged vest and hard hat at the same time. It performed almost as well when just the vest was worn, but the detection range decreased significantly when the hard hat was worn alone.

Although this technology cannot replace a signaller, who is legally required to be on site (O. Reg. 213/91, s. 104), it can provide additional protection for workers, including the signaller. With reliance on any technology, however, there is always the possibility that workers will become complacent and not take their normal safety precautions.

For more info about this issue and the results of our study, contact IHSA. To learn more about the technology, visit the Scan-Link website: scan-link.com[†]

^{*} Statistics were provided by the Ontario Ministry of Labour and the Workplace Safety and Insurance Board.

[†] Since the time of the study, improvements have been made to the sensor units. The detection range has increased and there is a data recording option to download info such as time and date of detection, the direction a worker was facing, and the equipment detected (hard hat or vest).