

Preventing Injuries When Working With Ride-On Roller/Compactors

Summary

Workers who operate or work around roller/compactors are at risk of injury from a machine rollover or being struck by the machine or its components. NIOSH recommends that injuries and deaths be prevented through wider use of rollover protective structures (ROPS) and seat belts on roller/compactors, training, establishing and adhering to safety plans and safe work practices, and using appropriate personal protective equipment.

Description of Exposure

A National Institute for Occupational Safety and Health (NIOSH) review of the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) data* identified 282 deaths associated with road grading and surfacing machinery during 1992–2001 [NIOSH 2004]. At least 70 of these deaths involved roller/

compactors. Review of these data narratives and of NIOSH Fatality Assessment and Control Evaluation (FACE) case studies suggests two common causes of injury: (1) machine rollovers and (2) being struck by the moving machine. Two cases are described below.

FACE Case Study 1

A female highway construction worker died after the roller she

was operating slipped off the edge of the road surface, tipped on its side, and pinned her underneath. She had been working for a company that was subcontracted to construct a highway exit ramp. The worker's job was to compact the dirt ramp in preparation for hard surfacing. The roller she used was new and equipped with a rollover protective structure (ROPS), but no seatbelt. The worker was operating the roller, with the



Ride-on roller/compactor with ROPS and seat belt

*CFOI data provided to NIOSH exclude New York City.

enclosed cab door open, back and forth over a built-up road bed. She backed up near the edge, and the earth under the rear tires gave way. When the roller tipped over the embankment, the unrestrained worker was partially thrown from the open door of the cab and pinned under the ROPS. Emergency rescue personnel were immediately called and arrived at the site within 15 minutes. The worker was pronounced dead at the site [NIOSH 1999].

FACE Case Study 2

A male construction laborer died after being run over by a ride-on roller/compactor during a highway paving operation. A seven-person crew was paving two lanes of a four-lane highway. A worker was walking back and forth along the highway, checking the traffic cones positioned along the dotted lines at the center of the highway to ensure that they were standing upright and that the construction-zone warning signs remained standing. As the foreman of the crew operated the paving machine, the ride-on roller/compactor followed behind to compact the newly laid asphalt. The roller operator made a forward pass with the roller, stopped, and then reversed the machine. The machine had traveled approximately 10 feet when the operator sensed that something was wrong; at the same time, a passenger on the roller alerted the operator to stop the roller. The worker was discovered lying face down with his arms at his sides, his head crushed by the roller. Emergency rescue personnel were immediately called and arrived at the site within 15 minutes. The worker was pronounced dead at the site [NIOSH 1998].

Controls

Employers, manufacturers, and rental establishments should take the following steps to protect workers from injury while working with ride-on roller/compactors.

Site Set-Up

- Develop site-specific safety plans for all aspects and stages of the job. Have plans analyzed by a qualified person to determine the safest possible methods to perform the work.

- Minimize the presence of workers on foot near machinery.
- Provide all workers on-site with training in site-specific safety procedures and in hazards they may encounter at the site.
- Use barriers to separate workers, pedestrians, and vehicles from moving equipment.
- Continually evaluate safety plans to address changing conditions at the worksite.
- Provide appropriate personal protective equipment (PPE) such as high-visibility reflective vests and hard hats, and ensure that workers use and maintain them.
- Use machinery equipped with ROPS and seatbelts, and ensure their use. Replace seatbelts if they are damaged, worn, or too small.
- Contact equipment manufacturers or equipment dealers to determine whether approved retrofit ROPS and seatbelts are available for machinery without these safety features.
- Ensure that machines are not operated on grades steeper than those specified by the manufacturer.
- Establish a documented maintenance program for all machinery.
- Replace worn or damaged warning labels on machinery.
- Ensure that operators' manuals are present on all machinery or available to the operator.
- Make sure that all the manufacturers' safety features are operational.
- Ensure that all site workers comply with all applicable requirements of machine warning labels and operator manuals.

Equipment Operator

- Take training in safety procedures at the site and in the proper use of the equipment. Follow manufacturers' specifications and recommendations.
- Check work areas for workers on foot in the machine's path before moving the machine or changing the direction of travel. Use spotters

or barriers where necessary. Be aware of equipment blind spots.

- Be aware of the hazards associated with operating machinery on non-level surfaces. A competent person should continuously evaluate grades on which machinery is being operated to prevent rollover.
- Do not operate machinery without the ROPS and seat belts supplied by the manufacturer. Do not remove the ROPS or seatbelts.
- Wear the seat belt and do not jump from the equipment in the event of a rollover. Keep knees and elbows close to the body, hold on firmly, and lean away from the impact to avoid being crushed by the ROPS.
- Conduct daily or pre-shift visual and operational checks on all equipment systems and operating controls before working the machine.
- Make sure that all the manufacturers' safety features are operational.
- Comply with all warning labels.

Other Site Workers

- Take training to recognize and avoid unsafe conditions and follow required safe work practices that apply to the work environment.
- Be aware of the hazards and blind spots associated with working near moving equipment.
- Before each work shift begins, review and confirm communications signals to be used between equipment operators and workers on foot.
- Do not approach machinery without first signaling the operator to shut down the equipment and receiving acknowledgment from the operator.
- Do not ride as a passenger on rollers or similar mobile equipment.
- Wear PPE that is provided, such as high visibility reflective vests and hard hats, to increase visibility.

Equipment Manufacturers

- Ensure that ROPS and seatbelts installed on a ride-on roller/compactor meet specific Society

of Automotive Engineers (SAE) minimum levels of performance [SAE 1994, SAE 1997].

- Consider equipping machinery such as rollers that must change direction frequently with sensors to detect the presence of persons in the machine's path. This would provide site workers with an additional safety control.
- Clearly identify and label all machine controls.
- Consider providing multilingual warning labels and operator manuals.

Equipment Rental Establishments

- Include only ROPS- and seatbelt-equipped machines in your fleet selection.
- Establish a documented preventive maintenance program for machinery.
- Provide training for customers upon delivery.
- Provide customers with machine-specific safety brochures.
- Ensure that operators' manuals are located on machines or are available to operators.

Acknowledgments

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References

NIOSH [1998]. Construction laborer dies after being run over by asphalt roller at highway construction site—Virginia. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. FACE 98-06.

NIOSH [1999]. Female construction worker dies in a compactor tipover at a highway construction site—South Carolina. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. FACE 99-03.

NIOSH [2004]. Unpublished analysis of the Census of Fatal Occupational Injuries: special research file provided to NIOSH by the Bureau of Labor Statistics. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health.

SAE [1994]. ISO6683—Earth moving machinery—seatbelt and seatbelt anchorages. Troy, MI: Society of Automotive Engineers.

SAE [1997]. J386—Operator restraint system for off-road work machines. Troy, MI: Society of Automotive Engineers.

For More Information

The information in this document is based on data, FACE reports, and expert review. More information about the NIOSH FACE program is available at www.cdc.gov/niosh/face/faceweb.html

Additional safety information and recommendations for protecting roadway construction workers can be obtained from

NIOSH [2001]. Building safer highway work zones: measures to prevent worker injuries from vehicles and equipment. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2001-128.

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