

# MICHIGAN HAZARD ALERT



MICHIGAN STATE UNIVERSITY: Prevention of work-related injuries & illnesses through research & investigation

## RIDING MOWER SAFETY

Riding mowers have caused the death of thirteen (13) workers in Michigan since 2001. Eleven deaths have occurred while the mower was used to cut grass; six deaths involved cutting the grass on a slope. One death each has occurred during blade replacement and using the lawnmower as a tow vehicle. Four deaths have occurred in Agriculture and three deaths in Administrative and Support and Waste Management and Remediation Services (Landscaping). Six other industry sectors had one death each.

## EXAMPLES OF MICHIGAN WORK-RELATED FATALITIES RELATED TO RIDING MOWERS

- A general laborer in his 70s was killed while mowing grass on an approximate 27-degree slope along a narrow seven-foot strip of grass between a tree and the edge of a 27-inch retaining wall using a Grasshopper 725D diesel Zero Turn commercial lawn mower. The mower had a rollover protection system (ROPS). The decedent was not wearing the seatbelt. The decedent was thrown from the seat, and the metal bar from the ROPS struck his head and neck, pinning him to the ground. (See Photo 1)
- A groundskeeper in his 50s died when he was pinned under the ROPS of a Cub Cadet Pro Z 900 Zero Turn riding lawnmower. The east side of the outer lane of a school track used for track and field events was lined by a 3-tier rectangular stone retaining wall. The decedent, who was not wearing a seatbelt, was cutting the grass on the steep embankment. The lawnmower traveled perpendicular to the retaining wall, fell off the wall, rotated forward, and came to rest with the front of the mower on the track near the retaining wall and the rollover protection bar on the rear of the mower resting on the track, facing the track infield. The decedent's head was pinned under the rollover bar. (See Photo 2)
- A parks commission member in his 70s was cutting the grass in a township park when his lawnmower struck a slide. The collision caused a leg injury in addition to him falling from the lawnmower seat. His resting position caused him to have trouble breathing and he died due to positional asphyxia.
- A golf course worker in his teens died after being pinned under an overturned tee box mower. The oval tee box was on a plateau with three gently sloping sides except for the east-side bank, which had a longer grass collar and then dropped off 19 feet with a 49-degree slope into trees. After his third cut, the back wheel of the mower went over the edge of the steep east bank collar, and the mower began to slide down the slope. The mower hit a small tree and the mower overturned, coming to rest at the base of the slope against some trees and on top of the decedent. The mower was not equipped with seat belts.

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Photo 1. Grasshopper 725 D diesel Zero Turn mower resting position. Photo courtesy of MIOSHA News – Spring 2024 Edition

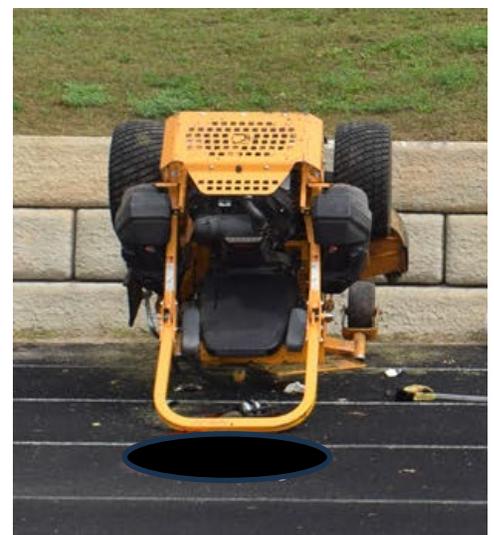


Photo 2. Cub Cadet Pro Z 900 Zero Turn mower resting position on track. Photo courtesy of responding police

## PREVENTING INJURIES AND FATALITIES RELATED RIDING LAWNMOWERS

Workers operating riding mowers face serious safety issues. MIFACE recommends that their employers perform a site assessment at each mowing site to determine which equipment is appropriate for use, evaluate mowers for potential safety modifications, and train operators in safe work practices, especially reviewing stability and roll-over hazards associated with operating riding mowers on areas that could pose a risk.

- **Site Assessment – Identify areas where the use of riding mowers is prohibited**
  - **Determine terrain** that present an overturn or roll-over hazard (e.g., water bodies, unprotected edges of retaining walls, embankments, levees, ditches, culverts, excavations, or similar locations) and **any immovable objects** (e.g., pipes or partially buried rocks, man-made hazards such as signs and trash receptacles, trees/tree stumps, soft or wet spots).
  - Establish at least a [5-foot safety zone](#) to ensure that the mower operates at a safe distance from such hazards.
  - Consult the manufacturer’s operator’s manual to identify and implement the manufacturer maximum slope use limits when using the machine.
    - Use a clinometer or inclinometer to determine terrain slope. Although made for marine use, this inexpensive inclinometer provides direct reading of angles of incline in degrees and can be mounted to the equipment. See Figure 1 for an example.
- **Mower Evaluation.**
  - Non-ROPS-equipped mowers
    - Look for unused bolt holes or brackets near the seat or frame to see if the mower should be equipped with a ROPS.
    - Contact the manufacturer to inquire if a ROPS retrofit kit is available.
  - All Mowers: Ensure/equip mowers with functioning:
    - Operator presence control system that shuts off the blades when the operator dismounts the machine or rises out of the seat.
    - Interlocks that ensure that the engine cannot start while the mower is in gear or if the blade is engaged.
- **Operator Training (at a minimum)**
  - Read, understand, and follow the instructions in the manufacturer's manual for maintenance and safe operation.
  - Prior to mowing a site, require operator to:
    - Consult site assessment’s identified hazards so correct equipment is selected and used.
    - Perform a pre-operational general inspection of the equipment. Clear the work area of debris, sticks, stones, toys, etc.
  - Requirement to wear a seat belt when operating a ROPS-equipped mower. Always ensure the ROPS bar is in the fully raised position while operating unless folding the ROPS is required to perform the work.
  - Required personal protective equipment
  - Do not allow portable music players when operating the mower. These devices cause distraction from noticing potential safety hazards.
  - Operate within MIOSHA slope limits or MIOSHA-approved manufacturer permitted slope operation.
    - Ensure reduced speeds on slopes, sharp curves (when they cannot be avoided), and when on wet, slippery, loose, or muddy surfaces. **Slow speeds are safer speeds.**



Figure 1. [Marine Clinometer Level Inclinometer Angle Finder Instrument](#) (not an endorsement)

*NOTE on MIOSHA Slope Limits–MIOSHA General Industry Safety Standard, Part 54: Rule 5443(4): Riding groundskeeping equipment shall not be operated up or down a slope of more than 26 degrees or move across the face of a slope of more than 17 degrees. Rule 5443(5): A deviation from the requirements of subrule (4) may be obtained from the department of consumer and industry services by presenting special design or modification criteria which shows an ability to perform safely on a specific slope of a greater degree without slipping or tipping.*

## REFERENCES AND RESOURCES

- MSU OEM MIFACE Investigation Report #[08MI128](#): Farmer Died When Portable Elevator Fell Onto Him
- MIOSHA Standards: [LEO - MIOSHA Standards](#).
  - General Industry Safety Standard Part [54](#): Powered Groundskeeping Equipment
- [MIOSHA News](#) – Spring 2024 Edition Volume 32, Issue 2, Spring 2024
- OSHA: [Dangers of Roll-Overs of Riding Mowers](#)
- Canadian Centre for Occupational Health and Safety (CCOHS): [Landscaping – Riding Lawn Mowers](#)
- (ANSI/OPEI B71.1-2017): [Standard Specifications for Pedestrian-Controlled Mowers and Ride-On Mowers](#) Specifications are not intended to apply to commercial products customarily used by hired operators or to products designed primarily for agricultural purpose.
- ANSI/OPEI B71.4-2017 – [Commercial Turf Care Equipment Safety Specifications: Changes](#)
- Test procedures for ROPS for powered ride on turf care machinery weighing 3000 kg (6,613.9 lbs.) or less see ISO 21299:2009: [Powered ride-on turf care equipment - Roll-over protective structures \(ROPS\) - Test procedures and acceptance criteria](#).