

MICHIGAN



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

WHY BOTHER WITH A ROPS RETROFIT

Hazard Alert: ROPS Retrofit 3/24/20

In Michigan, since 2001, there have been 21 tractor overturns to the side or rear that have resulted in the death of the tractor operator. **None of the tractors involved in the overturns were equipped with a Rollover Protection Structure (ROPS) and a seat belt.**

The use of ROPS and a seat belt keeps the operator in the protective zone and is 99.9% effective in preventing death or serious injury when a tractor overturns.

Common ROP designs have manufacturer-designed and tested mounting plates and mounting points for structural integrity:

- Two-post ROPS, with two upright posts (may be vertical or slightly tilted and may fold) mounted to the rear axle (vineyard or orchard tractors may have two-post ROPS mounted to a frame on each side of the tractor engine ahead of the operator).
- Four-post ROPS with mounts both on the axles and on the frame ahead of the operator, or sometimes with all four posts mounted to the tops of design-reinforced flat-top rear fenders.
- ROPS cab, where the cab structure is designed to act as the ROPS.



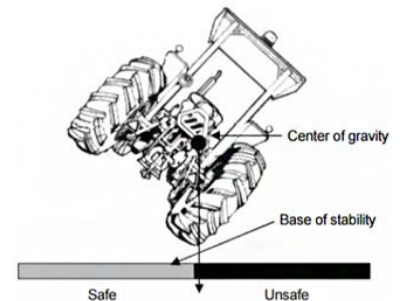
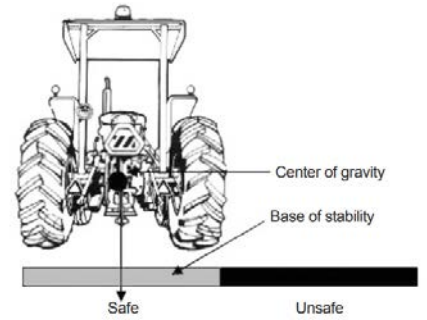
ROPS do not prevent rollovers from occurring! A ROPS alone will not provide full protection to the operator when there is a tractor overturn. A seat belt must be used in combination with the ROPS to provide the highest degree of safety. Don't decide against a retrofit ROPS just because you doubt you will wear the seat belt; a ROPS without the seat belt is better than no ROPS at all. Homemade ROPS are not recommended because they may not be properly designed, built, or installed.

EXAMPLES OF MICHIGAN WORK-RELATED FATALITIES AFTER NON-ROPS-EQUIPPED TRACTOR OVERTURNS

- A male farmer in his 40s was using his tractor to pull a pickup truck stuck in frozen mud in a field behind his house. He hitched the chain above the tractor axle. The tractor overturned to the rear and pinned the victim.
- A male farmer in his 60s was moving dirt on an embankment with his tractor, when the tractor slid down the hill and overturned on him.
- A female farmer in her 50s died when the tractor she was using to free a tractor equipped with both a backhoe and front-end loader driven by a family member flipped rearward pinning her to the ground. The decedent's tractor was connected to the front-end loader bucket by a 20-foot long, 4-inch wide tow strap attached to a 20-foot log chain. The log chain was connected above the drawbar on the decedent's tractor. The decedent's family member suggested that she accelerated too quickly or double-clutched the tractor causing the tractor to accelerate too quickly. The end of the tow strap/log chain was reached, and due to the tractor's acceleration, caused the tractor to overturn to the rear.
- A male farmer in his 70s died when he was pinned under an overturned tractor equipped with a front-end loader with 12-inch bucket tines. He was driving the tractor to a woodlot carrying a salvage flail mower chained to the loader. He traveled along a lane between his cornfields to the back of his property and made a right turn around a 10-foot deep by 15-foot wide drainage ditch. It appears that after he turned the corner he tried to avoid damaging a field of planted corn with the flail chopper. In trying to avoid the corn, he got too close to the drainage ditch and the tractor overturned to the side into the ditch, landing on top of him.

PREVENTING INJURIES AND FATALITIES FROM NON-ROPS-EQUIPPED TRACTORS

A tractor can roll to the rear or to the side when its center of gravity is located outside its base of stability. **Center of gravity** is defined as the point of equal weight distribution. **Base of stability** is defined as the area within the points where the tractor's wheels contact the ground.

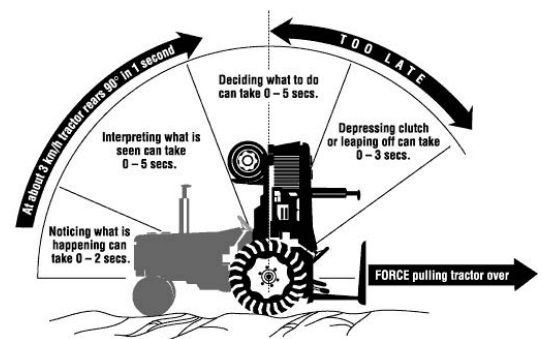


Reduce the Risk of a Side Rollover

- **Inspect tractor daily** and ensure safe operation.
- **Maintain safe speed.** Match speed with terrain conditions. Slow down when pulling rear-mounted equipment.
- **Increase stability.** Set the wheels as far apart as possible. Add wheel weights and use widest practical front and rear wheel spacing. Check manufacturer's recommendations.
- **Lock the brake pedals together** before transport or high-speed road travel.
- **Turn Slowly.** Due to centrifugal force, sudden turns create unstable conditions.
- **Avoid crossing steep slopes.** Watch for depressions on the downhill side and bumps on the uphill side. Turn downhill, not uphill, if stability becomes a problem. Keep side mounted implements on the uphill side
- **Ensure tractor is no closer to the edge than the depth of the embankment.** If the right front tire enters a ditch, turn downward or hold steady and slowly recover. Do not attempt to turn sharply back onto the path of travel.
- **Keep loads, implements or loader buckets as low as possible** during transport or turning.

Reducing the Risk for Rear Overturn

- **Inspect tractor and ensure safe operation**
- **Start Slowly.** Engage the clutch pedal slowly and smoothly. Be ready to disengage power quickly if the front end begins to come up. Do not rev engine or pop clutch. Change speed gradually. **Don't Let Tractor Bounce.**
- **Hitch Low.** Hitch to Drawbar or other manufacturer-recommended hitch points. **Do Not** hitch above axle.
- **Use counterweights to increase tractor stability.** Add front-end weights to increase tractor stability. Follow manufacturer's instructions.
- **Working on slopes**
 - Do Not Coast downhill on a slope. Keep in gear.
 - Keep heavy end of tractor pointed uphill on slope.
 - Keep side-mounted equipment uphill.
 - Back up steep slopes. Avoid backing downhill.
- **Back Out** if stuck in ditch, mud or frozen to ground.



Resources

- MIFACE: www.oem.msu.edu
- MSU Extension: <https://www.canr.msu.edu/outreach/>
- Penn State Extension: <https://extension.psu.edu/>
- National Ag Safety Database: <https://nasdonline.org/>
- **MIOSHA Standards:**
 - [Agriculture Operations Standards](#)
- TRAC-SAFE Facilitator's Manual: www.cdc.gov/niosh/pdfs/tracsafe.pdf
- Clemson Extension: <https://www.clemson.edu/extension/>
- Kentucky ROPS Guide: <https://rops.ca.uky.edu/>
- Ohio State University Extension: [Rollovers and Rollover Protective Structures \(ROPS\) for Trainers and Supervisors](#)

DID YOU KNOW?

- A ROPS normally limits the rollover to 90° which also reduces damage to the tractor.
- A **Guide to Available Retrofit ROPS for Agricultural Tractors Nationwide (Kentucky ROPS Guide)** can be found [here](#)
- The [National ROPS Rebate Program](#) (NRRP) can help reduce the cost of ROPS purchase and installation