

MICHIGAN



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

FARM-RELATED MACHINERY ENTANGLEMENTS IN MICHIGAN

Power take off (PTO) systems enable a large variety of important farm tasks, powering numerous implements and tractor attachments. Augers (including those in grain silos as well as those used to dig post holes) are similarly essential to the operation of many farms. However, rotating machinery such as PTOs and augers can present some of the most dangerous work-related hazards to farmers, their workers, and their families. Since 2002, 9 people have died in Michigan from work-related farm injuries while working around PTOs or augers. Each year other farmers are hospitalized or treated in the emergency department for serious injuries, including broken or amputated limbs, after becoming entangled in these machines (9 such injuries in Michigan in 2015). The additional number of injuries from the use of PTOs or augers that are treated in urgent care or personal physician's offices, or where the victim "toughs it out" is unknown. These injuries affect a farmer's ability to do their work for weeks, months, or (in the case of amputations) for the rest of their lives. The widespread use of PTOs and augers means that it is important for everyone who works on a farm to be made aware of the hazards and, more importantly, trained in the practices required to safely work with PTOs and augers.

EXAMPLES OF FARM-RELATED DEATHS AND INJURIES IN MICHIGAN CAUSED BY ROTATING MACHINERY:

- A farmer in her 50s was killed when her clothing was caught in the unguarded PTO shaft powering the grain elevator she was using to unload corn from a wagon into a crib.
- A dairy farm employee in his 20s was killed when his shirt became entangled in a rotating unguarded PTO shaft while making feed.
- A teenager was using a tractor with a rotating unshielded PTO shaft extension when his sweatshirt became entangled on the bolt securing the extension, killing him.
- A farmer in his 50s died after becoming entangled in a tractor-powered auger attachment he was using to dig post holes.
- A farm supervisor in his 50s was killed when his jacket became caught in the rotating posthole auger attachment on his tractor.
- A teenager was cleaning out a grain silo when he stepped into the auger, leading to the amputation of his leg below the knee.
- A farmer in his 60s was injured when his shirt was caught in the rotating PTO of his tractor and, despite being able to pull himself away, broke several of his ribs.
- A farmer in his 60s was drilling holes in the ground using an auger when his glove got caught in the rotating machinery, breaking his arm.

A farmworker in his 40s had his hand amputated when his arm was trapped in an auger used in the processing of feed.



PREVENTING INJURIES AND DEATHS ON THE FARM FROM ROTATING MACHINERY:

• Power Take Off (PTO)

- Disengage the PTO, shut off the tractor and apply the parking brake before dismounting to clean, repair, service, or adjust machinery.
- Ensure all parts of the PTO system are shielded and guarded, including: (1) a “master shield” for the tractor PTO stub and connection end of the implement input driveline (IID) shaft, (2) a shield which guards the IID shaft, and (3) an implement input connection (IIC) shield on the implement.
- Ensure all PTO shields and guards are in good condition and in place at time of operation. If shielding has been removed, damaged or lost, repair or replace it immediately. Check with your local implement dealer or the manufacturer to order specific parts, or to inquire about retrofitting older machinery with guarding.
- Regularly test driveline guards by spinning or rotating them to ensure that they have not become stuck to the shaft.
- Never step over, or reach across or under, a rotating PTO shaft. Walk around the equipment instead.
- Follow manufacturer directions regarding appropriate PTO hitching.
- Do not wear dangling jewelry, loose clothing or clothing with strings such as those from hooded sweatshirts or untied shoes, or anything else that could get caught in the PTO.
- Secure long hair under a hat with bands or clips.

An example of clothing wrapped around a PTO. From [MIFACE Summary of MIOSHA Investigation #209](#)



• Augers

- Keep in mind the safety tips related to PTOs above.
- Follow the instructions in the manufacturer’s operating and preventive-maintenance manual. If the manual has been lost, contact the equipment manufacturer and request another one.
- Only the operator should be near the auger when it is in use
- Never modify equipment or disable safety controls
- Start at a slow speed and increase the speed as needed.
- Always turn off an auger before cleaning or clearing it or the work area, such as a silo.
- Ensure that all guards and shielding are in place and working.
- If you are using a post-holing auger attachment on a tractor, operate it from the tractor seat. Turn off the tractor engine before getting off the tractor.

DID YOU KNOW?

- Agriculture has the highest rate of work-related fatalities and one of the highest rates of work-related injuries (including injuries that require days off work) of all industries in Michigan.
- At the speeds a PTO can operate at (540 RRM), the rotating shaft can wrap up 7 feet of fabric in 1 second! Many PTOs can rotate at much higher speeds than this, at 1000 RPM. This speed is much too fast for any sort of reaction on the part of the person becoming entangled.

RESOURCES

NIOSH: [Preventing Scalping and Other Severe Injuries from Farm Machinery](#), [Safe Grain and Silage Handling Section 4: Conveying](#)

National Farmers Union: [Power Take Off](#), [Grain Bins & Augers](#)

Missouri Farm Safety: [Power Take-Off](#)

Minnesota Fruit and Vegetable Grower Association: [Auger Safety](#)

University of Arkansas Research and Extension: [Safe Operation of On-Farm Augers](#)

Canadian Center for Occupational Health and Safety: [Tractor Attachments and PTO](#), [Tractor Implements](#), [Landscaping Equipment \(post hole diggers\)](#)

[Michigan AgrAbility](#)