

In agriculture, a Power-Take-Off (PTO) shaft or driveline is generally recognized as the mechanical unit that transfers power from farm tractors to operate the implement being towed by the tractor. There are two main parts that need to be considered when checking for proper shielding. The first is the tractor's stub shaft which can rotate fully at 540 rpm (9 times per second) or at 1000 rpm (16.6 times per second) when operating at full speed. The PTO stub needs to have a master shield over it to prevent clothing from becoming entangled if the operator is too close. The second part is the driveline which is the part of the implement that connects to the tractor by universal joints. This shaft, if unshielded or poorly shielded with locking pins or bolts exposed, is known as a wrapping point hazard. The speed at which the PTO shaft rotates can result in an entanglement of clothing and a person's body in less than a second.

In a study of PTO entanglement incidents conducted at Purdue University: 78% involved the tractor/machine operator; proper shielding was absent or damaged in 70% of cases; and 70% of cases involved entanglement at the PTO coupling or universal joint (tractor or implement connection). PTO entanglements are the third leading cause of tractor-related fatalities.

It is important, therefore, that all PTO driveline shafts on implements and PTO stubs on tractors be completely shielded per manufacturer's requirements.

Hazards

1. Missing PTO master shield on tractor.
2. Missing PTO driveline shaft shield on implement.
3. PTO shields damaged or incomplete.

Recommendations

There are several levels of recommendations that can be suggested to address these hazards and may depend on the size of the farm.

Minimum Compliance:

- Keep all PTO shaft shields on implements and stationary equipment in place and in good condition. Replace shields when damaged and after repairs on equipment are complete.
- All PTO master shields on tractors and self-propelled equipment are in place and in good condition.
- Regular inspection of PTO shaft shields, including testing (with tractor implement turned off) to ensure they spin freely.
- Conduct informal training with employees which includes procedures for working around PTOs, proper clothing and maintenance. Encourage proper work practices.

Intermediate Compliance:

- Keep all PTO shaft shields on implements/equipment and master shields on tractors in place and in good condition. Replace shields when damaged or after equipment maintenance is completed.
- Designate/train employee to perform routine inspections of PTO drivelines to check for presence and condition of shields.
- All employees should receive formal training in the proper work practices when working around PTOs. This would include proper clothing, drawbar positioning, never stepping over PTOs, disengaging the PTO and shut off tractor prior to dismounting to repair machine.
- Monitor and correct work practices as needed.

Best Practices:

- Develop/implement a written policy addressing PTOs with respect to having all PTO shaft and master shields in place and in good condition at all times.
- Develop/implement a routine inspection schedule and practice for proper maintenance of all PTO driven equipment and tractors.
- Conduct formal training for all employees who work around PTOs which includes safe work practices, proper clothing, and proper drawbar positioning.
- Monitor work practices and enforce safety through a formal disciplinary process.