Power Take Off (PTO) Meeting Kit

What’s At Stake

A power take-off or power takeoff (PTO) is any of several methods for taking power from a power source, such as a running engine, and transmitting it to an application such as an attached implement or separate machine.

What’s the Danger

PTO HAZARDS – POWER TAKE-OFF (PTO) STUB

The tractor’s stub shaft, often called the PTO, transfers power from the tractor to the PTO-driven machine or implement. Power transfer is accomplished by connecting a drive shaft from the machinery to the tractor’s PTO stub shaft.

Most incidents involving PTO stubs result from clothing caught by an engaged but unguarded PTO stub. The reasons a PTO stub may be left engaged include: the operator forgetting or not being aware the PTO clutch is engaged; seeing the PTO stub spinning but not considering it dangerous enough to disengage; or, the operator is involved in a work activity requiring PTO operation. Boot laces, pant legs, overalls and coveralls, and sweatshirts are clothing items that can become caught and wrapped around a spinning PTO stub shaft. In addition to clothing, additional items that can become caught in the PTO include jewelry and long hair.

UNSAFE WORK PRACTICES

Many work practices such as clearing a plugged machine leads to operator exposure to operating PTO shafts. Other unsafe practices include mounting, dismounting, reaching for control levers from the rear of the tractor, and stepping across the shaft instead of walking around the machinery. An extra rider while PTO power machinery is operating is another exposure situation.

WRAP POINT HAZARDS

The wrap point hazard is not the only hazard associated with IID shafts. Serious injury has occurred when shafts have become separated while the tractor’s PTO was engaged. The machine’s IID shaft is a “telescoping shaft”. That is, one part of the shaft will slide into a second part. This shaft feature provides a

sliding sleeve which greatly eases the hitching of PTO powered machines to tractors, and allows telescoping when turning or moving over uneven ground. If an IID shaft is coupled to the tractor's PTO stub but no other hitch is made between the tractor and the machine, then the tractor may pull the IID shaft apart. If the PTO is engaged, the shaft on the tractor end will swing wildly and may strike anyone in range. The swinging force may break a locking pin allowing the shaft to become a flying missile, or it may strike and break something that is attached or mounted on the rear of the tractor. Separation of the driveline shaft is not a commonly occurring event but is most likely to happen when three-point hitched equipment is improperly mounted or aligned, or when the hitch between the tractor and the attached machine breaks or accidentally uncouples.

KNOWING HOW PTO WORKS IS PROTECTION

The rotating power from turning gets turned into what is known as hydraulic power. This has also become known as fluid power, and it gets controlled through a pressurized system. The rotating motion will cause a buildup of pressure in the crankshaft, and the power can be used for a variety of different purposes as it builds up. Some of the uses include:

- Greater engine efficiency
- Controls the hydraulics for raising or lowering dump truck bed
- Used for towing vehicles.
- Runs the water pump to spray through the hose.

ADDITIONAL SAFETY PRECAUTIONS

- Never step over a rotating shaft.
- Do not wear loose fitting clothing around PTO-driven equipment.
- Tie back long hair or secure it under a hat before operating equipment.
- Ensure that safety decals, such as "Rotating Driveline: Contact can cause death," are readily visible. Replace decals that are obscured or incomplete.
- Always disengage the PTO and shut off the tractor before dismounting the tractor.
- Never work on machinery or equipment while the engine is running or is energized.
- Keep universal joints in phase.
- Do not switch drivelines between machines.
- To reduce driveline stress and separation, position the tractor's drawbar appropriately for each piece of machinery.
- Reduce PTO shaft abuse by avoiding tight turns, reducing excessive telescoping, engaging power to the shaft gradually, and avoiding over-tightening the slip clutch on PTO-driven machines.
- Examine the driveline for protruding pins or bolts and debris such as mud that has dried onto the driveline shield. Clothing snags easily on such protrusions, resulting in entanglement incidents.
- As part of the pre-operation inspection, if the driveline shield is equipped with a tether, ensure that the tether is attached and in good condition and that the driveline shield rotates freely on its bearings.

PTO BEST SAFETY REMINDERS

Use Safety Guards or Shields. Ensuring your tractor and other machinery are equipped with proper safety features like guards or shields can help prevent a

PTO entanglement.

Don’t Wear Loose-fitting Clothing. Baggy or loose clothing like shirts, sweatshirts, coats and long pants can get caught and tangled in a rotating PTO shaft.

Take Precautions. Taking shortcuts is never a good idea but when you’re operating potentially hazardous equipment. Slow down and follow proper processes:

- Be sure not to step over the power take-off shaft. Instead, walk around the machinery.
- Always turn the equipment and tractor off when making repairs or adjustments.
- Never try to remove debris close to an in-use PTO shaft.

Properly Train Others. Teaching others to safely operate power take-offs is key for safety.

Educate Children. Talk to kids about staying away from power take-offs and machinery while in operation.

FINAL WORD

The Power Take Off (PTO) shaft is an efficient means of transferring mechanical power between farm tractors and implements. It is also one of the oldest and most persistent hazards associated with farm machinery.