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# Machinery Safety on the Farm

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Machinery represents an ever-present danger on the farm. While machines save valuable time and are essential to productivity, use of farm machinery is hazardous, making them the source of most injuries and deaths on American farms and ranches.

While manufacturers design and build safety features into their machines, hazards cannot be completely eliminated without interfering with function. Timely maintenance, responsible use, and comprehensive safety awareness training are ways farmers can protect themselves and others from injury or death when working with and around agricultural machinery.

The primary responsibility for machinery safety rests with the operator. Operators must be aware of potential hazards with the specific piece of machinery they are operating. Safe operators respect machines for the work they perform and the dangers they present. Use these eight simple steps to be a safe machinery operator.

1. **Be aware.** Recognize where and what the hazards are.
2. **Be prepared.** Replace worn parts promptly and do daily pre-operational checks. Include preseason checks. Take advantage of the off-season to do additional maintenance work. This gives you time to order any shields and other parts you may need. Anticipate problems.
3. **Read the operator's manual.** The simple tips and precautions in this publication are no substitute for the operator's manual for each piece of machinery. If the manual is missing, contact your dealer or check online to get another one.
4. **Shield all moving parts.** Make the machine as safe as possible.
5. **Respect PTO and hydraulics.** Remember that any machine that is powered by a power takeoff driveline (PTO) or has hydraulic systems is inherently dangerous.
6. **Shut it off.** Before servicing any machine, disengage the PTO, turn off the engine, remove the key, and wait for all parts to stop moving.
7. **Watch yourself.** Try to avoid particularly hazardous jobs if you're physically ill or mentally distracted. Fatigue and stress cause many accidents.
8. **Use a machine only for its intended purpose.**

## Common Machinery Hazards

Machines are designed to transfer power to perform work. Energy transfer may be accomplished through PTO drivelines, hydraulic oil pressure, electrical motors, internal combustion engines, or ground traction. Regardless of how implements are powered, the potential hazards to those working around them are always present.

**The most common machinery related hazards are:**

- **Pinch points —** any point where two machine parts move toward each other and at least one of them is rotating. The areas where drive belts contact pulleys or sprockets mesh with chains are prime examples of pinch points (Figure 1).
- **Crush points —** when two objects move toward each other (Figure 2) or one object moves toward a stationary object. Examples of crush-point hazards are the raising and lowering equipment with a three-point hitch, components that are moved by hydraulic cylinders, and the areas between the tractor and machinery when hitching or turning.

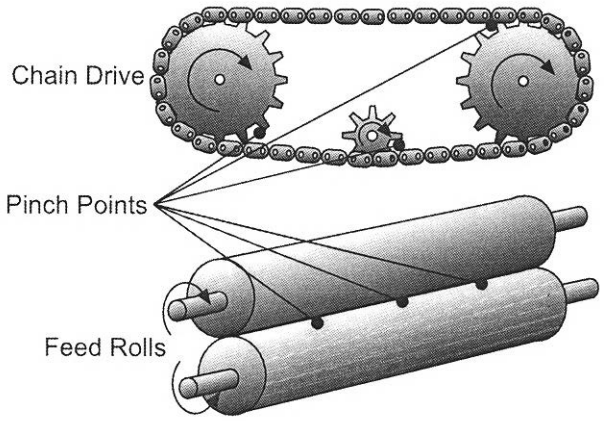


**Figure 1.** Pinch points on rotating parts can catch clothing, hands, arms, and feet.

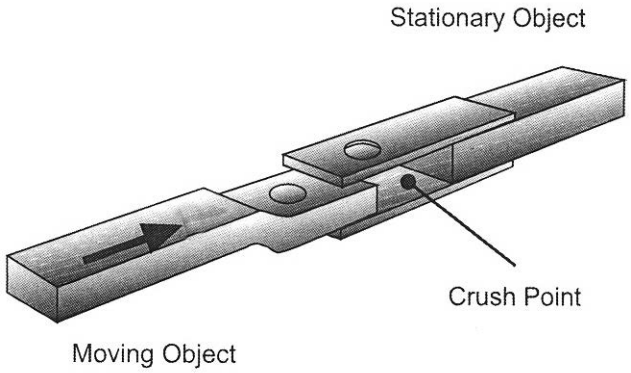


**Figure 2.** Hitches present typical crush points.

- **Wrap (entanglement) points —** any exposed rotating component, including any type of rotating shaft or driveline. PTO drivelines are prime examples of wrapping or entanglement hazards (Figure 3).
- **Pull-in points —** involve mechanisms designed to take in crops or other materials for processing. They include combine headers, windrow pickups, forage chopper headers, and grinders (Figure 4).
- **Shear and cutting points —** where the edges of two parts move across or close to one another or one part moves across a stationary object. Windrower cutter bars and grain augers are examples of cutting and shear points.
- **Thrown objects —** from a machine designed to do so as part of its job. Foreign objects such as metal, glass, wire, sticks, or other materials may be picked up by a machine and propelled with extreme force. Rotary mowers are good examples of machines capable of throwing objects.
- **Burn points —** extreme heating of machinery parts is associated with tractors and self-propelled and pull-type machinery. Hot mufflers, engine blocks, pipes, and fluids are examples of burn points.

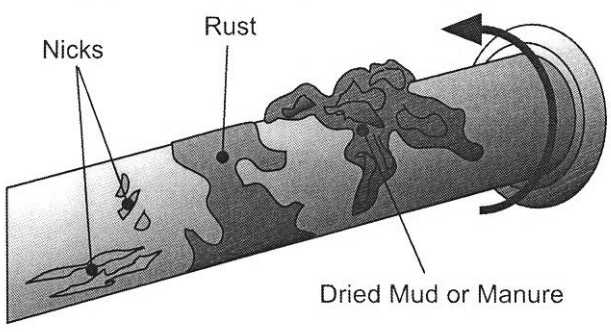


**Figure 3.** These conditions can cause clothing to wrap around a PTO driveline.

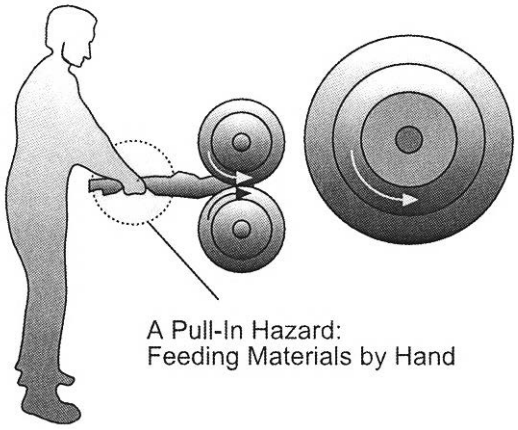


**Figure 4.** Machinery can pull you in faster than you can think to let go.

- **Stored energy —** is present in pressurized systems such as hydraulics, compressed air, and springs. Sudden or unsuspected pressurization or depressurization of these systems can result in crushing and other types of accidents, depending on the use of the system. High-pressure leaks are also forms of stored energy hazards.

## Safety Guards and Warning Signs

New farm machinery comes factory-equipped with a variety of safety features, including guards, shields, and warning signs designed to reduce injuries. Injuries and deaths happen when guards are removed, broken, or torn off during operation and when safety warnings are not followed. Take the time to inspect machinery for missing or damaged safety guards and warning signs. Make necessary repairs or replacements before using the machine. **Never operate a machine with missing or damaged guards.**

## Repairs and Adjustments

Repairs and adjustments are frequently necessary to ensure optimum machinery performance and efficiency. Numerous accidents occur because operators attempt to make repairs or adjustments while a machine was running. People have been injured or killed by being crushed when equipment fell while they were working underneath it.

**Protect yourself.** Before making any repair or adjustment, no matter how minor, be sure to turn off the machine, turn off the tractor, and take out the key. Do not depend on the hydraulic system to keep the implement or attachments in the raised position; prevent them from falling by placing approved blocks

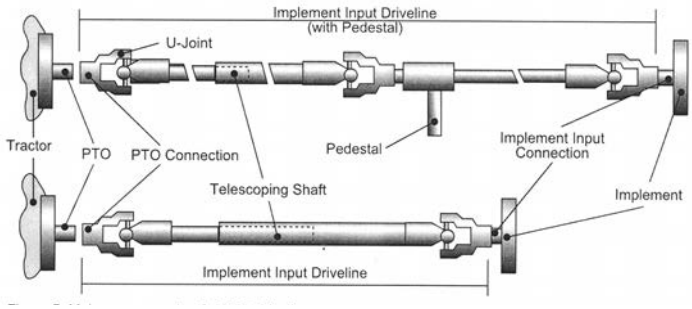


**Figure 5.** Major components of a PTO driveline.

beneath them. Only then can adjustments or repairs be made safely.

## Power Takeoff Drivelines

Power takeoff drivelines (shafts) are among the oldest and most common machinery hazards (Figure 5). Exposed bolts, universal joints, burrs, or other projections on rotating parts can grab clothing, resulting in instant entanglement. Do your part to reduce PTO injuries and deaths:

- Fully shield PTO drivelines (Figure 6).
- Never attempt to step over a rotating PTO driveline, no matter how slowly it may be turning.
- Never attempt to operate tractor controls from the rear of the tractor.
- Never wear loose baggy clothing around PTO drivelines.
- Keep long hair pulled back to avoid entanglement when working near a PTO driveline.
- Keep distance between you and a rotating PTO driveline.

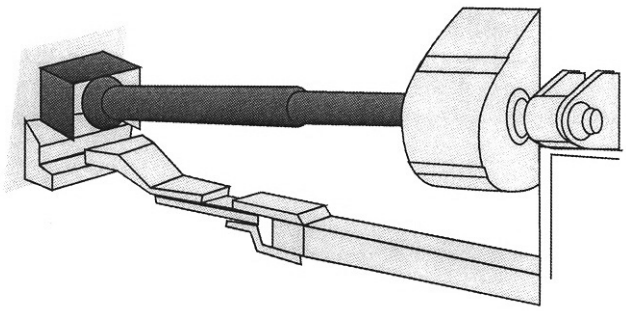

**Figure 6.** Shielded for safety: keep dangerous rotating parts covered on a PTO driveline.

## Plugged Machinery

Combines, hay balers, and other harvesting machines are prone to plug-ups. Normally, these plugs-ups occur at the point where material enters the machine and must be removed before harvesting can continue. Attempting to unplug materials from a running machine can easily result in death or dismemberment by being pulled into the machine. Remember, you cannot win a strength or speed contest with a machine. You can't let go of the material quickly enough to keep from being pulled into the machine. If a machine is plugged, the mechanical components may be under pressure even when the power is turned off. When the plug is removed, components may begin to move. **Always turn off the machine and its power source before attempting to clear any plugged material from the machine.**

## Protecting Others from Danger

Protect employees and family members who live and work on the farm from needless injuries while operating agricultural machinery.

- Train employees and family members to operate machinery in the correct manner.
- Teach employees and family members about the hazards involved with each piece of agricultural machinery.
- Establish safe play areas to keep children away from agricultural machinery whether it is running or idle.

## Reference

*National Ag Safety Database*. *http://www.cdc.gov/nasd*

**Publication adapted from**:

Grisso, Robert "Bobby", Bruce Stone and Glen Hertzel. 2003. *Machinery Safety on the Farm*. 442-092. Virginia Cooperative Extension, Virginia Polytechnic Institute and State University, Blacksburg, VA.

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