



Machinery Safety on the Farm

Raymond L. Huhnke

Professor and Extension
Agricultural Engineer

Introduction

A tour of any modern American farm will reflect a multitude of machines being used in the production of agricultural products. While these machines save valuable time and are beneficial to agricultural productivity, they also represent an ever present danger to the people who operate them. Agricultural machinery presents a host of hazards which makes it the leading cause of injury and death on American farms and ranches.

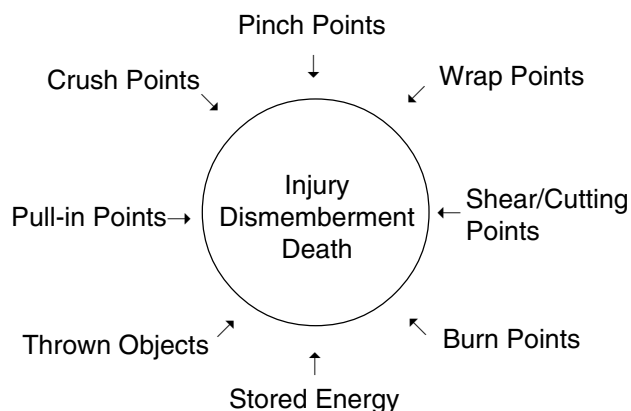
This fact sheet summarizes the hazards associated with the operation of farm machines and presents information about how farmers and farm workers can protect themselves from injury or death when working around agricultural machinery.

Common Machinery Hazards

Machines are designed to use power, motion, and energy to perform work. They may be powered by power takeoff drive lines, hydraulic oil pressure, electrical motors, engines, or ground traction. Regardless of how machines are powered, they present a number of hazards to those working around them.

Based on the action or motion of machine components, there are several dangerous areas which can cause injury, dismemberment, and/or death of the operator. The diagram below lists machinery related hazard areas.

- **Pinch points** are areas where two or more parts move together with at least one part moving in a circle. The



Oklahoma Cooperative Extension Fact Sheets
are also available on our website at:
<http://www.osuextra.com>

areas where drive belts contact pulleys or sprockets mesh with chains are prime examples of pinch points.

- **Crush points** are hazards involving two components moving toward each other. Examples of crush-point hazards are raising and lowering equipment with a three-point hitch or hydraulic cylinders and areas between the tractor and machinery when hitching.
- **Wrap (entanglement) point** hazards pertain to any exposed rotating component. Wrap point hazards include any type of rotating shaft or drive line. PTO drive lines are prime examples of wrapping or entanglement hazards.
- **Pull-in point** hazards involve mechanisms designed to take in crops or other materials for processing. They include combine headers, windrow pickups, forage chopper headers, and other machines.
- **Shear and cutting point** hazards are areas where two parts move across one another or one moves across a stationary object. Windrower cutter bars and grain augers are examples of cutting points and shear points.
- **Thrown objects** present another type of machine hazard. Metal, glass, wire, sticks, or other materials may be picked up by a machine and propelled with extreme force. Rotary mowers are a good example of machines capable of throwing objects.
- **Burn point** hazards are associated with tractors and self-propelled and pulled type machinery. Hot mufflers, engine blocks, pipes, and hot fluids are examples of burn points.
- **Stored energy** hazards are present in pressurized systems such as hydraulics, compressed air, and springs. The sudden or unsuspected pressurization or de-pressurization 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.

Shielding Self From Danger

Safe machinery operation primarily depends on how one interacts with the machines he or she operates. Machines are inanimate objects; they cannot think, reason, or adapt to meet the needs of people. The responsibility for machinery safety rests with the operator.

Become a Safe Machinery Operator

Safe machinery operators are people who have developed a safe working relationship with the machines they operate. They respect machinery for the work it performs and for the dangers it presents. In order to become a safe machinery operator:

- Learn to properly operate machinery. Use the operator's manual as a guide.
- Learn the hazards involved with machinery operation.
- **Be alert** at all times when operating machinery. Take breaks and get sufficient rest to stay alert.
- Always follow recommended machinery safety practices.

Safety Guards and Warning Signs

Modern farm machinery is factory equipped with a variety of safety features, including guards, enclosures, and warning signs designed to reduce injuries. Needless injuries and deaths occur because safety guards are removed, broken, or torn off during operation. Take time to inspect machinery for missing or damaged safety guards and signs. If guards or signs are missing or damaged, repair or replace them before using the machine. **Never operate a machine with missing guards.**

Repairs and Adjustments

Repairs and adjustments are frequently necessary to ensure optimum machinery performance and efficiency. Numerous accidents occur because operators attempted to make repairs or adjustments while a machine was running. Others have been injured or killed from being crushed by combine headers, loaders, or other equipment falling on people working underneath them. **Protect self.** Before making any repair or adjustment, no matter how minor, be sure to shut off the machine, shut off the tractor, and take the key. Only then can needed adjustments or repairs be made safely and the machine restarted.

Power Takeoff (PTO) Drive Lines

Power takeoff drive lines (shafts) are among the oldest and most common machinery hazards. Exposed bolts, universal joints, burrs, or other projections can instantly

grab clothing, resulting in instant entanglement. To reduce PTO injuries and deaths:

- Ensure PTO drive lines are fully shielded.
- Never attempt to step over rotating PTO drive lines, no matter how slow they may be turning.
- Never attempt to operate tractor controls from the rear of the tractor.
- Never wear loose, baggy clothing around PTO drive lines.
- Keep long hair pulled back to avoid entanglement.
- Stay well clear of rotating PTO drive lines

Plugged Machinery

Combines, hay balers, and other harvesting machines are prone to plug-ups. Normally, these plug-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 from being pulled into the machine. Remember, one cannot win a strength or speed contest with these machines. He or she can't let go of the material quickly enough to keep from being pulled inside the machine. **Make it a rule to shut off the machine and its power source before attempting to clear any plugged machine.**

Protecting Others from Danger

One can be instrumental in protecting others from danger. Protect others from needless injuries while operating agricultural machinery by:

- Training employees and family members to operate machinery in the correct manner.
- Teaching family members and employees about the hazards involved with agricultural machinery.
- Keeping children away from agricultural machinery, whether it is running or idle.

For more information, refer to:

Fundamentals of Machine Operation, Deere and Company, Moline, IL.

Safety and Health for Production Agriculture, ASAE Textbook Number 5, American Society of Agricultural Engineers, St. Joseph, MO.