DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Agriculture and Natural Resources

FSA1079

Safe Operation of On-Farm Augers

Sammy Sadaka, Ph.D., P.E., P. Eng.
Assistant Professor - Extension Engineer

Wilmer T. McGraw, M.S.
Former Director, Center of Excellence, Renewable Energy Technology Education, Phillips Community College, University of Arkansas

Introduction

Augers are very useful tools for handling and moving products on the farm (Figure 1). They save a great deal of time and physical labor. Unfortunately, injuries such as broken bones, cuts, amputations, electrocutions and even loss of life can occur from contact with parts of augers in operation or during transport. Becoming entangled in the auger, being trapped under a collapsed or overturned portable auger or being struck by a spinning elevation crank are just a few of the potential dangers of operating augers.

Figure 1. Grain auger.

Auger-related injuries are preventable, although augers remain a serious health concern for farmers and ranchers if not handled properly. Accordingly, operators should make sure all safety systems are operational, should make sure all guards and shields are in place and should practice constant situational and positional awareness.

The objectives of this fact sheet are to provide information related to the dangers associated with auger operations and to provide instructions to reduce the risks involved.

It should be mentioned that not all possible situations are covered in this fact sheet. Auger operators should exercise extreme caution and use personal safety and situational awareness at all times in their operational practice.

What Is an Auger?

An auger consists of a metal blade in a continuous spiral configuration attached around a metal shaft. The metal spiral is called the "flight." The shaft and flight together make up what is called a screw conveyor. The screw conveyor is normally enclosed in a tube slightly larger than the metal spiral. The base end of the screw conveyor is powered by a motor that rotates the shaft causing the spiral to turn. The metal tube contains the agricultural products and allows them to move from the intake at one end of the auger to the discharge at the other end. The metal tube also protects the operator from contact with the rotating blade everywhere except for entry and exit of materials at the tube ends. Augers vary in size, generally ranging from 4 to 15 inches in diameter and from several feet to 100 feet or more in length.

How Are Augers Powered?

An auger can be independent, moveable or integrated with another piece of machinery or grain storage system (e.g., as a fixed component of a combine, grain dryer, grain wagon, storage bin system or silo unloader).

Arkansas Is Our Campus

Visit our web site at:
https://www.uaex.uada.edu

Augers can also be self-powered (electric motor or gasoline/diesel-fueled engine) or driven by power transferred from a second piece of equipment through a power take-off (PTO) shaft or series of gears, chains, belts and/or pulleys.

What Purpose Does an Auger Serve in Agriculture?

Augers of various sizes, lengths and rotational speeds are used with a variety of farm implements. Several augers may be used to move harvested, threshed grain from the grain pans of the combine up and into the grain-holding tank. When the tank is full, an unloading auger with a spout may be used to move the grain from the tank into a grain cart for transport to a truck. The grain cart also has an unloading auger for unloading grain from the cart into the truck or, in some cases, the grain may be directly unloaded from the combine into a truck.

An auger may be used to move seed grain into a grain drill, feed into a feed trough and many other applications on the farm. When the auger is placed on a frame that allows the tube to be elevated at an angle and the base end to remain on or close to the ground and wheels are added to make the whole apparatus mobile, it becomes a portable farm grain auger (Figure 1). Augers also move grain from trucks and grain carts into grain storage bins or move grain out of the grain bin (Figure 2).

Figure 2. Auger unloading a grain bin.

The screw conveyor may also turn within a covered trough in a grain bin or other system to move grain laterally. In some grain bins, a specialized device known as a "sweep auger" may be used to empty the bin (Figure 3). The top and back of the sweep auger are covered, but the front is open to access the grain. The entire auger will "sweep" around a central point in the grain bin in the direction of the open front of the auger. The auger will move grain toward a central grating covering a grain auger or belt conveyor underneath that will remove the grain from the bin.

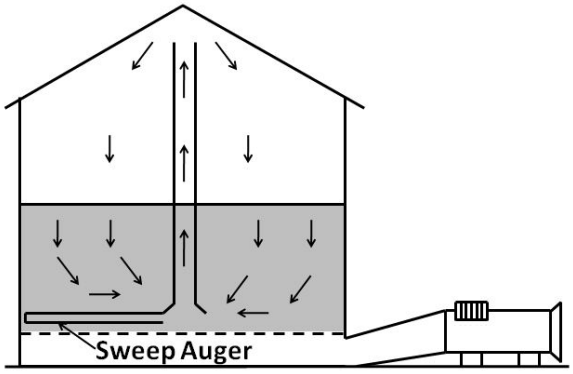

Figure 3. Sweep auger.

Another type of auger is known as an earth auger and is used for digging post holes. This type is vertically oriented and can be manually turned or be driven by an internal combustion engine. Some earth augers are powered by an electric motor or tractor engine's power take-off.

How Many Accidents Are Related to Augers?

Augers are among the most dangerous machines on the farmstead. Accidents resulting in injury can occur if augers are not used properly. According to a U.S. study by Schwab et al. (2000), an average of six to eight injuries related to augers occurred in Iowa each month. The Canadian Agricultural Injury Surveillance Program reported in 2003 that auger injuries rank second after tractor injuries. Between 1990 and 2000, 602 cases of auger injury accidents (more than one case per week) with 24 deaths were reported. Entanglement in the auger was cited as a major cause in almost 80 percent of the injuries requiring hospital treatment. A report by The University of Iowa stated that a farmer died after being caught in the auger of a combine header. Many accidents occurred from contact with the auger flight, with the most common injuries to fingers, feet, arms and hands.

What Are the Causes of Auger Accidents?

The majority of auger accidents are operator-caused. Auger-related injuries primarily result from one or more of the following types of incidents:

- Contact with or entanglement in the exposed screw at the intake.
- Entanglement in a drive belt.
- Being struck by an uncontrolled spinning crank used to raise or lower the auger.
- Entanglement in a PTO drive shaft.
- Electrocution while moving a raised grain auger around the farmstead and contact with an overhead electrical wire.

- Maintenance neglected or overlooked.
- Carelessness in auger handling.
- Operator's unfamiliarity with auger safety and operation.
- Inexperienced youth labor.

Some auger-related accidents cause lacerations, fractures, amputations, electrocutions or even death. Fatal injuries result in large part from two types of accidents – electrocution and entanglement.

How Are Augers Inspected and Safely Transported and Shut Down?

How to Inspect Agricultural Augers

Farmers and ranchers need to inspect the auger for each of the following:

- Guards in place, properly secured and functional.
- Presence and legibility of safety signs warning of improper clothing and situations.
- Winch and cable (or other lifting system) for condition, security and operation.
- Cable anchor on the winch drum for tightness.
- Fasteners for tightness.
- Belts and chains for their condition and tightness.
- Proper oil levels in gearbox and drive box to maintain proper functioning.
- Lubrication as specified in the owner's manual.
- At least three complete wraps of cable around the winch drum in the "full down" position.

How to Safely Transport Agricultural Augers

Farmers and ranchers should follow these instructions while transporting augers:

- Empty auger only when in the "full down" position.
- Lift arm must set against the down position stop.
- When being towed, the hitch pin is securely attached and a safety chain from auger to the towing vehicle is in place.
- Clearly display slow-moving vehicle sign.
- When towing, maintain vehicle speed less than 17 miles per hour, with slow turning to prevent overturn.
- Prevent contact with overhead obstructions, electrical wires.
- Never allow anyone to stand underneath or ride on an auger.
- Never attempt to move an auger manually.
- Do not push the undercarriage of the auger.
- Place the auger on a level surface, attached to a vehicle.
- Keep travel distance to a minimum when moving a raised auger.
- Never attempt to increase auger height by positioning wheels on lumber or blocks.

How to Safely Shut Down Agricultural Augers

During normal shutdown:

- Make certain the hopper and auger are empty before stopping the equipment.
- The power source should be "locked out" before the operator leaves the work area.

During emergency shutdown:

- Immediately disconnect and lock out the power source before approaching potentially dangerous parts of the auger.
- With the power locked out, clean as much grain from the hopper and auger as possible without contacting the flight. Wear gloves and ensure guard is in place.
- Never attempt to start a full auger; the equipment could be seriously damaged.

What Are the Recommendations for Operating Augers Safely?

The following precautions will substantially reduce the risks associated with grain auger use.

- Keep children away from operating grain augers.
- Always leave shields in place.
- Start grain augers safely as instructed in the operator's manual.
- Empty the auger before stopping it.
- Follow previously listed precautions when moving augers.
- Adjust grain auger height carefully.
- Do not try to grab the crank if it is rotating.
- Set up augers carefully and block the wheels to prevent rolling in all directions prior to use.
- Never wear loose clothing, jewelry or have long hair untied while working near or operating a grain auger.
- Limit the number of people around the auger when in use.
- Use barriers (e.g., fences) to prevent individuals not involved in the operation of an auger from entering the area.
- Always stop the machinery when debris begins to be a problem.
- Educate all farm workers on safe operating procedures and hazards associated with augers.
- Always perform a pre-operation safety inspection – checking fastener tightness, belts, chains, oil levels, the winch cable, etc.
- Make repairs and adjustments with power locked out prior to starting up the auger.
- Pay attention to the job at hand; do not operate augers while fatigued or distracted.
- Do not ramp-up augers to exceed their maximum height to reach tall storage bins.
- Never allow inexperienced individuals to operate an auger without direct supervision from an experienced operator.

- Before service, repair or any potential contact with moving parts, shut power off then "lock" and "tag" the auger power source. Lockout prevents restoration of power while maintenance is in progress, and tagging out the switch indicates that power is disabled.
- Never step or jump on or over an auger while it is in operation.
- Lower grain augers to a horizontal position before moving from one location to another.
- Always observe the presence and location of power lines before raising an auger into position.
- Place portable augers on dry, level ground or a gravel pad. Remove spilled grain between loads, and be sure the equipment is turned off when not in use.
- Never use your hands or feet to redirect the flow of grain or other material into the auger. There is a high likelihood that the extremity will become caught in the auger.
- Pay attention to all entanglement hazard-warning labels.
- Disengage the header and other moving parts and shut off the engine before cleaning, maintenance or working close to the combine.
- Beware of a rotating auger, and never ever go close to it while running!
- Never overload the auger.
- Remain clear from the potential hazard that arises when a portable auger jams and the handle rotates about the auger shaft.
- Never enter the grain-holding tank of a grain cart or combine in operation. Never attempt to clean or remove an obstruction from the reel, header auger or unloading augers when the combine is operating. Always disconnect and lock out power before approaching flight.
- Never attempt to clean or remove debris from any combine auger with the combine motor running even if the threshing and cutting part of the machine itself is not in operation.
- Turn off the motor, remove the key and put it in your pocket to be certain no one can start the machine. Even if this procedure is followed, be cautious of stored energy hazards because parts of the machine could move even if the motor is off and the threshing part of the combine is not in operation.
- Do not attempt to work on a grain cart auger with the tractor providing power take-off (PTO) power running, even if the PTO is not turning or in gear.
- Never rely on protective safety shields to prevent contact with dangerous parts of the auger for routine use.
- Never place any body part in the hopper intake assuming the safety shield will protect you from contacting the flight. Often the shield cannot be seen beneath the grain in the hopper and may not be present.

Where Can I Get More Information?

Farm Augers – know and manage the safety risks. https://www.youtube.com/watch?feature=player_detailpage&v=PQ-ZB6zDz0g

Grain Auger Safety. Texas Department of Insurance, Division of Workers' Compensation. Workplace and Medical Services, Outreach and Education. http://www.tdi.texas.gov/pubs/videoresource/stpgrnaug.pdf

Grain Auger Safety Reminders, National Ag Safety Database, Farm Safety Association, Inc. http://nasdonline.org/105/d001648/grain-auger-safety-reminders.html

Grogono, B. J. S. Auger Injuries. Department of Surgery (Orthopaedics), Halifax Infirmary and Dalhousie University, Halifax, Nova Scotia. https://www.researchgate.net/publication/18587769_Auger_injuries/preview/55e0e83308ae2fac471d143b/Preview-18587769_Auger_injuries.pdf?inViewer=0&pdfJsDownload=0&origin=publication_detail

Johnson, W., and R. Rautiainen. 1995. Farmer Dies After Getting Caught in Auger of Combine Header -- Iowa. Online report at http://www.public-health.uiowa.edu/FACE/Reports/REPORT-013.html

Oden, Derek. "Perils of Production: Farm Hazards, Family Farming and the Mechanization of the Corn Belt, 1940-1980." *The Annals of Iowa* 73 (2014), 238-268. http://ir.uiowa.edu/annals-of-iowa/vol73/iss3/3

Schwab, C. V., S. A. Freeman and T. Pollard. 2000. Assessment of the condition of Iowa augers, auger-related injuries and farmers' perceptions about auger-related injuries. *Journal of Agricultural Safety and Health*, 6(2), 117.

Printed by University of Arkansas Cooperative Extension Service Printing Services.

SAMMY SADAKA, Ph.D., P.E., P. Eng., is assistant professor - Extension engineer, University of Arkansas System Division of Agriculture, Little Rock. **WILMER T. McGRAW**, M.S., is former director, Center of Excellence, Renewable Energy Technology Education, Phillips Community College of the University of Arkansas.

FSA1079-PD-6-2016N