OKLAHOMA
CareerTech

Introduction to Agriscience

Unit 13
Agricultural Mechanics Safety

Student Edition

CIMC

AG3001

Unit 13
Agricultural Mechanics Safety

The agricultural industry is becoming more technical and sophisticated every year. Many occupations involve the use of modern, highly technical agricultural equipment. Proficiency in this area can help you earn more money, do your own home repairs, and keep your vehicles and machinery maintained. It may even help you develop some fun and artistic hobbies.

While learning a skill is important, it is even more important to practice safety when in the agricultural mechanics shop. Safety is so important that laws have been passed that regulate the use of proper safety measures, such as eye protection. Government agencies such as the Occupational Safety and Health Administration (OSHA) have also been established to prevent work-related injuries, illnesses, and deaths.

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OBJECTIVES

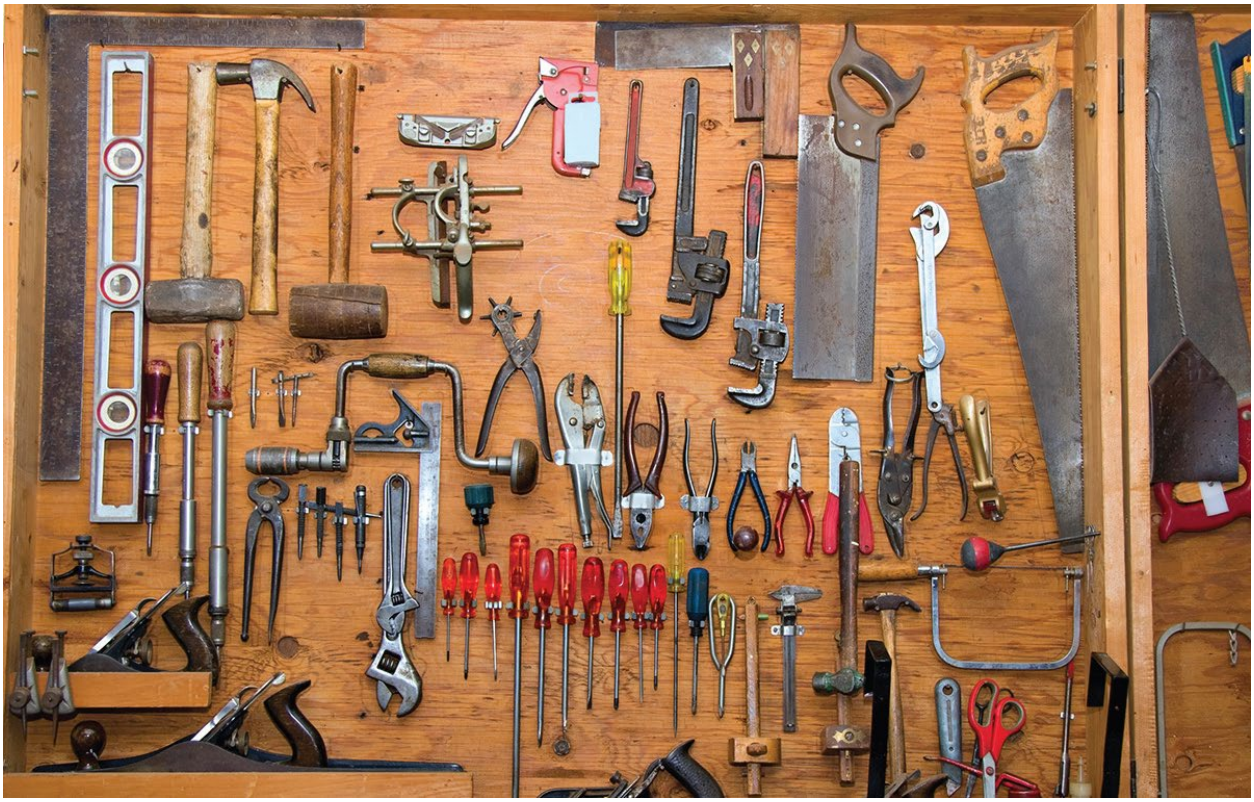
1. Identify common hazards in agricultural mechanics.
2. Determine the importance of maintaining shop safety.
3. Match personal protective equipment with their purposes.
4. Discuss important welding safety practices.
5. Match classes of fire to their correct descriptions and extinguisher type.
6. Identify the colors used for safety coding.

KEY WORDS

accident
combustible
flammable
flash point
hazard
non-synthetic
personal protective equipment
welding arc

Maintaining Shop Safety

General safety precautions apply in any shop situation, regardless of the work being performed. Specific areas of agricultural mechanics, such as welding, have additional safety rules that are taught within that area of instruction. Behaving responsibly, using common sense, and exercising good judgment can help ensure safety in the shop.



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Shop Safety Rules

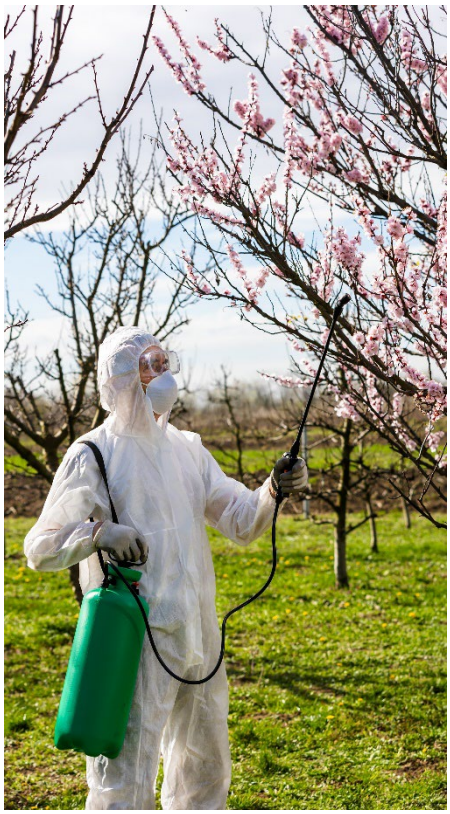
- Wear appropriate clothing that fits properly.
- Use appropriate personal protective equipment, such as eye protection.
- Remove rings and dangling jewelry and tie back long hair.
- Keep the shop and work area clean and well organized.
- Put all items in their proper places after use.
- Properly store work materials at the end of the work period.
- Use tools only for their specific purpose.
- Never work with tools or equipment for which you have not received instruction.
- Keep tools and equipment properly adjusted or repaired.
- Know the location and proper use of fire extinguishers.
- Make sure fire extinguishers are properly charged.
- Place oily or greasy rags in designated covered metal cans.

- Turn off all electrical equipment after use.
- Repair or replace all worn or frayed electrical cords.
- Never touch metal that could be hot.
- Use proper lifting techniques.
- Know and observe shop safety procedures given by your instructor.
- Stay alert to possible hazards.
- Correct or report unsafe conditions.
- Be responsible and conduct yourself in a safe manner.

SAE IDEA:
Entrepreneurship
Create safety videos to sell to local businesses.

Common Hazards

A ***hazard*** is a situation that poses a danger. The agricultural mechanics shop is a workplace that has a variety of potentially hazardous situations. Good safety habits will greatly reduce the severity of these hazards, but one should always be aware that the risk of ***accident***, or unintentional harm, and injury is present when working in the shop. There are many sources of hazard including human error, machinery, and electricity.



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Most injuries that occur in the shop or elsewhere are the result of human error. In other words, accidents occur when someone is being careless, not paying attention, showing off, or indulging in horseplay. Behaving responsibly is the best way to avoid causing an accident that could injure you or an innocent bystander.

Machinery is useful because it is powerful. For the same reason, machinery poses an extreme hazard. If a machine is operated improperly or if it breaks, a person can be injured by moving parts, flying pieces, or falling objects. Machinery should only be operated by someone with the proper knowledge, skill, and ability.

Electrical hazards may result in fire and injury from shock or electrocution. Even a small electric shock is painful, while standard household current can kill. Along with electrical hazards, hazardous materials pose a risk. An agricultural mechanics shop often contains chemicals such as fuel, paints, and solvents. Such material must be stored, handled, and disposed of properly.

Working in an agricultural mechanics shop can involve the use of torches, internal combustion engines, and other sources of heat and explosive energy. If these are not properly handled, serious injury and property damage may result.

CUTTING THE CHATTER MATTERS

Next time you're working on a shop project, take time to notice where your attention is focused. Are you concentrating on what you're doing? Or are you talking with a friend as you work? If you are in the habit of multi-tasking, or doing more than one thing at a time, while working, your attention is not always where it should be, and that's dangerous. For instance, researchers found that talking on a phone while driving is dangerous – not because the driver's hands are busy with the phone, but because his or her attention is divided. Instead of keeping eyes moving and alert for problems, the driver who is talking on the phone or talking to a passenger tends to keep their eyes fixed on one thing, such as the car ahead. Consequently, that driver is in much greater danger of not seeing, and not avoiding, a sudden hazard. The same holds true when you are working in the shop. When you are working with tools or machinery, pay attention to what you are doing and don't distract someone else who is working. Save your conversation for a time when you are not working; you will be much safer in the shop… or in the car!

Personal Protective Equipment

Equipment worn to protect you from injury while working is called ***personal protective equipment*** (PPE). Such equipment may be used to protect your eyes, skin, hearing, body, head, lungs, feet, and hands. The type of PPE you should wear depends on the type of work you are doing, because different kinds of work pose different hazards. For instance, cutting wood poses a hazard to your eyes from flying objects, but it does not pose any hazard of chemical burns to your skin. Welding requires skin protection to prevent burning, as well as extra shielding for the face and eyes.

The agricultural mechanics shop you work in should be equipped with all the necessary personal protective equipment. Always wear the right PPE for the work that you are performing and follow your instructor's guidance. Examples of the types of PPE that are available are listed below.

Types of PPE

- Safety glasses and goggles protect your eyes. Different varieties of glasses or goggles are suited for different purposes. Clear safety glasses with side shields protect your eyes from flying particles when you are cutting, grinding, or sawing. Goggles protect your eyes from splashing liquid as well as flying particles. Goggles can also be worn over prescription glasses.
- Coveralls protect the body, arms, and legs from dust and flying debris.

- Steel-toed boots protect the feet from falling objects.
- Rubber boots protect the feet from water and mild chemicals.
- Clear face shields are sometimes worn in addition to safety glasses. The face shield protects the entire face from flying particles or liquid splashes.
- Helmets and shaded face shields protect the face and eyes from heat, harmful rays, and hot metal when welding.
- Gloves protect the hands from splinters, hot or sharp metal, and chemicals.
- Ear plugs or earmuffs protect the hearing from loud or continuous noise.
- Dust masks protect you from breathing dust.
- Respirators protect you from breathing toxic gases, fumes, and harmful fibers such as asbestos.

The type of PPE worn should be designed for the intended use. For example, dust masks may not offer adequate protection from asbestos fibers. Likewise, tinted safety glasses should not be used when welding. Kitchen gloves do not offer adequate protection from chemicals.

Welding Safety

Welding creates hazards of skin burns, eye damage, electric shock, and fire. *Always follow proper safety precautions when welding*. Careful attention to hazard prevention reduces the chance of an accident.

- Never look at the ***welding arc***, or light, without proper eye protection, which is a shaded lens ranging from No. 9 to No. 12.

  Caution: If you do not have suitable eye protection, you should look away from the arc.

- Use a welding helmet that is in good condition. Notify your instructor immediately if the helmet material or shaded lens is cracked or broken.

- Wear clothing to protect all parts of your body, including your arms and legs. Do not allow your own or a bystander's skin to be exposed near the arc. A long-sleeved shirt of ***non-synthetic***, or natural fiber such as cotton, leather gloves, pants with cuffs turned down, and high-topped leather shoes or boots are best.

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- Before beginning a weld, alert others to the presence of the arc by yelling "Cover!" before striking.

  Caution: Never strike an arc or weld until you are sure that those in the vicinity are wearing protective eye equipment or will look away from the arc.

- Never pick up hot metal or metal you think may be hot with your bare hands or leather gloves; use pliers or tongs.

- Have good ventilation when welding so that gases and fumes can escape.

- Wear safety glasses when chipping a weld and keep the welding area clean and free of objects that may cause tripping.

- To avoid electrical shock:
    - Ensure that welding cables are not frayed or missing insulation and always stand on dry footing when welding.
    - Never leave the electrode holder on the welding table or in direct contact with grounded metal.
    - Never touch an electrode when the machine is on.

SAE IDEA:
<u>Exploratory</u>
Lead a farm safety program for elementary students.

Fires and Extinguishers

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Fires are a serious threat to both life and property. A fire in the shop can start and spread quickly. There is no time to learn about fire and how to deal with it after one has already started! The best way to deal with fire is to prevent it. Keeping the shop clean and following safety rules regarding combustible or flammable material will prevent most fires from starting. ***Combustible*** material is anything that can ignite easily and burn quickly, such as wood or paper. If a material has a ***flash point***, or a temperature at which it will burst into flame, of less than 100°F, it is considered ***flammable***.

Fires are classified according to the type of material feeding the fire. This is important because **not all fires can be put out with water**. Some fires can only be put out by extinguishers that use special chemicals to create a reaction that stops the fire. Fire extinguishers are designed to put out specific classes of fire, and they should not be used with other types of fire.

Fire Classes

Class A – occurs in ordinary combustible materials such as wood, rags, and rubbish. This type of fire can be put out with water or an extinguisher labeled for use on Class A fires.

Class B – fueled by flammable liquids such as gasoline, oil, grease, paints, and thinners. Water should not be used to fight this type of fire because water can help to spread rather than stop the fire. Only an extinguisher labeled for use on Class B fires should be used.

SAE IDEA:
<u>Placement</u>
Work for the local agricultural insurance agent.

Class C – electrical fires that occur in or near electrical equipment such as motors, switchboards, and electrical wiring. Water should not be used to fight this type of fire, because electric shock or electrocution may result. Only an extinguisher labeled for use on Class C fires should be used.

Class D – fueled by flammable metals, such as magnesium. This type of fire must be fought with a chemical extinguishing agent. Only an extinguisher labeled for use on Class D fires should be used.

Many fire extinguishers are designed to fight multiple classes of fire. Make sure you know the locations and types of fire extinguishers available in the shop or home. Learn how to use the fire extinguisher properly. Finally, understand that home fire extinguishers are designed to put out only very small fires. Always follow proper fire safety procedures if a fire does start.

HOW SMOKE DETECTORS WORK

Smoke detectors are an inexpensive and effective safety device. They work by using a sensor that detects the presence of smoke. A common type of sensor used in smoke detectors is called a photo detector. This sensor senses light rather than smoke. Inside the smoke detector a small beam of light shines across the entrance of a chamber where the photo detector sits. The light doesn't shine into the chamber, so the sensor cannot "see" it. But when smoke crosses the path of the light beam, it diffracts the light, which then bounces toward the photo detector. Once the photo detector "sees" the light, a switch is activated that sets off the alarm.

Safety Color Code

Creating a safe work environment in agricultural mechanics is essential to avoiding accidents and injuries. Color coding helps individuals identify specific hazards or dangers. It also helps individuals locate objects and organize the work area. Agencies such as OSHA and ANSI (American National Standards Institute) have standardized colors to provide consistency in work areas. Workers should become familiar with the color code to reduce the number of accidents and injuries.

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RED – used to identify fire protection equipment and apparatus, and to designate "danger" or "stop." Red is used to identify portable containers of flammable liquids. The color is also used to show emergency shut-off switches, stop bars, and stop buttons. Safety signs indicating danger should be painted red.

YELLOW – used to designate caution and mark physical hazards such as stumbling, falling, tripping, striking against, and caught-between. Colors used for designation may be solid yellow, yellow and black strips, or checkers.

ORANGE – used to designate dangerous parts of machinery and parts of equipment that can cause electric shock. This color identifies parts of machinery or equipment that can cause injuries by cutting, crushing, shocking or other means. Orange is used to identify hazards such as exposed edges and openings of pulleys, gears, rollers, cutting devices, and power jaws.

GREEN – used to designate safety and first-aid equipment. Green is used to identify areas where medical treatment may be given, such as safety deluge showers.

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BLUE – used to warn against starting equipment, moving equipment, or using equipment under repair or being worked on.

PURPLE or **BLACK AND YELLOW** – designates radiation hazards.

BLACK AND WHITE – used to designate traffic movement and housekeeping areas.

SAE IDEA:
Research
Research some of the most hazardous jobs in the United States.

UNIT SUMMARY

Safety is the number one priority when working in the agricultural mechanics shop. It is important to be aware of potential hazards to prevent accidents. While working in the shop, all shop safety rules should be followed to ensure that you or someone else are not harmed. Proper PPE should be worn depending on the type of work being done, and eye protection of some kind should always be worn. Welding is often done in the agricultural mechanics shop.

Knowing the rules and procedures for welding safety will help you avoid mistakes that may lead to injury. If a fire does occur in the shop, you should first identify the fuel for the fire. Fire extinguishers have been designed to target the fuel for the fire, and water should be used with caution because it could cause some fires to spread. Shop safety color coding decreases accidents by highlighting areas of caution and safety.

UNIT REVIEW

1. What is the purpose of OSHA?
2. What should be done with rings and jewelry when working in the shop?
3. State five shop safety rules and why they are important to follow.
4. What causes most injuries in the mechanics shop?
5. Explain the potential hazards in a mechanics shop.
6. Give five examples of personal protective equipment.
7. What should never be done without eye protection when welding?
8. What PPE should be worn when welding?
9. What should be done to avoid electrical shock when welding?
10. Name the classes of fires and the fuel for each.
11. Which classes of fire should never be fought with water?
12. What is the purpose of the color safety code?
13. Summarize what each of the safety code colors indicates.