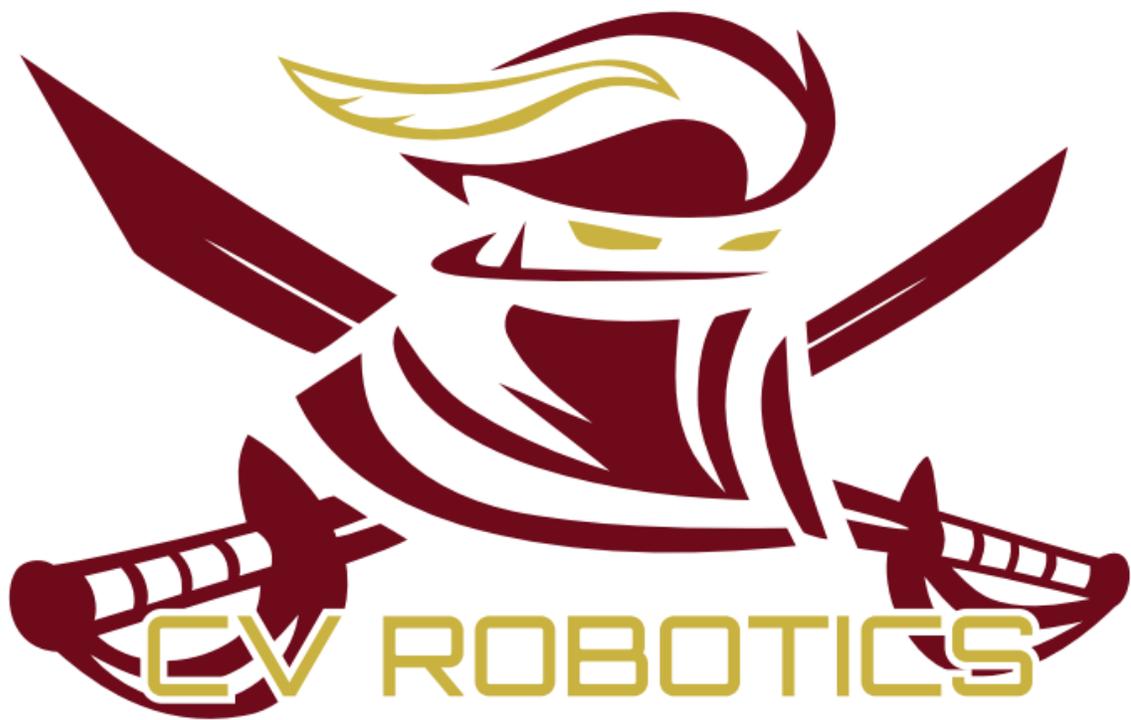


CV Robotics FIRST Team 955

Safety Manual



cv955.com

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Corvallis, Oregon

Table of contents (need to change)

Team Mission Statement and Badge System.....	2
Team 955 Shop/Robot Safety.....	3
General Shop Rules.....	4
Shop Tools.....	5
- Chop Saw.....	7
- Drill Press.....	8
- Pedestal Grinder.....	9
- Metal Lathe.....	10
- Table Saw.....	10
- Upright Mill.....	12
- Hand Drill.....	13
Shop Safety Tests.....	14
Soldering.....	16
Competition/Pit Safety.....	17
First Aid Kits.....	18
Safety Data Sheet.....	20
Safety Outreach.....	21
Archived Safety Sheets.....	22
- Band Saw	
- Horizontal.....	22
- Vertical.....	22
- Belt & Disk Sander.....	23
Archived Safety Tests.....	24

Our Mission Statement

CV Robotics' driving force is to provide a supportive environment where high school students can gain hands-on experience in Science, Technology, Engineering, Art, and Math (STEAM) by competing in FIRST Robotics Competition (FRC). We strive to have an inclusive environment where all students are welcome regardless of background. Our team reaches out to our community to spread the values of FIRST through numerous community events. We are a student-led group supported by mentors who help guide us in achieving our goals.

Badge System (Subject to Change)

Last year the team implemented a badge system. This system includes four levels: blue, green, yellow, and red.

- Blue is achieved by completing orientation, paperwork, and general shop training.
- Green is achieved when a student has shown Walt, our lead shop mentor, and our Fabrication Captain that they are proficient in the wood power tools in the Materials Lab, excluding the table saw, and passes the Green Safety Test with 100% accuracy.
- Yellow is achieved when a student has shown Walt, our lead shop mentor, and our Fabrication Captain that they are proficient in the metal power tools in the Materials Lab and passes the Yellow Safety Test with 100% accuracy.
- Red is achieved by gaining Walt's trust in using all the tools present in the shop. You are seen as a Role Model in the Shop.

When a student has a red badge, they are expected to be a role model in the Materials Lab and help teach other students how to use the tools in the Materials Lab (other than the table saw).

Team 955 Shop/Robot Safety Protocols

The team has the following list of protocols and rules posted outside of the Materials Lab and in the classroom to make sure that everyone is aware of them.

Do YOU comply?

- Safety glasses on
 - Hair tied back
- No loose clothing
- Safety badge on
- Closed-toed shoes
 - No phones

Shop Safety Rules

- Safety Glasses must be worn at **all times** when in the shop, working on electrical, or around the robot.
- Check the robot status whenever you enter the room by checking lights, or by asking those working on it. Make sure you know if the robot is on or not.
- When you do not know the robot status, assume it is on, enabled, and **dangerous**.
- When in the shop or other dangerous areas make sure not to have any loose clothing, drawstrings hanging out, headphones/earbuds, or hair shoulder length and longer hanging out in front of you.
- Please wear your safety badge whenever you are in the shop.
- Make sure that there is at least one mentor in the shop.
- When you enable the robot, say **“ENABLE!”** loud enough for everyone around the robot to hear. Also make sure everyone around knows it is being enabled

and is clear of the robot, and that you are facing the robot.

- Do **NOT** enable the robot by yourself. There should be at least one other person in charge of watching you and the robot and making sure everyone is clear.
- While in the shop do NOT run or engage in horseplay.

Shop Tools

The following is a list of tools Team 955 uses in the school's Shop.

- Jigsaw
- Chop Saw
- Drill Press
- Pedestal Grinder
- Metal Lathe
- Table Saw
- Upright Mill
- Hand Drill

Chop Saw (Motorized Miter Box) Safety Sheet

1. Always clamp stock to be cut firmly against the table and fence. If materials are too small to be clamped on the chop saw, DO NOT USE THE CHOP SAW TO CUT THEM.
2. Materials to be cut on the chop saw must have a flat face resting upon the saw's table. Never cut round stock on the chop saw without consulting with a mentor.
3. Boards shorter than 3 feet should be clamped to the saw before cutting.
4. Boards to be cut that is shorter than six inches require special set-up and generally should not be cut on the chop saw. See a mentor if you have pieces that need to be cut shorter than 6 inches.
5. Keep your hands at least 6 inches away from the saw track at all times.
6. NEVER cross your arms when making a cut.
7. NEVER reach near a coasting blade. Always let the blade come to a stop, and then return the head assembly to its normal home position before handling workpieces that have been cut.
8. Allow the blade to reach full speed before starting a cut. If the blade is engaged with the workpiece when it is started, the workpiece can be thrown.
9. When slide action cutting, pull the saw out beyond the front edge of the workpiece and allow the blade to reach full speed before making your cut. With the blade, all the way extended, push the running blade down into the wood, and then complete the cut by pushing the blade back through the work toward the fence.
10. For warped or bent wood, orient the warped piece so that the piece is in contact with the fence near the blade. If there is a gap between the workpiece and the fence, the workpiece may move as sawing proceeds.
11. Use the chop saw for crosscutting only.
12. Cut only one piece of stock at a time.
13. Keep the safety guard in place and properly adjusted at all times.
14. Return the saw to the rear of the table after each cut.
15. Be sure the power is off, the saw is not rotating, and the saw is unplugged before making any adjustments.
16. Clear the table of scraps and sawdust only when the saw is stopped. Use a brush or stick. DO NOT use your fingers.
17. Check the "saw-line" to see that it is clear before and after each cut.
18. Do not use the saw if it has a tendency to "pinch" in the wood.

19. Cut only wood, plastic, or aluminum on the saw. Never cut ferrous metals on the chop saw. Whenever cutting something other than wood on the chop saw, check with a mentor first. When cutting aluminum, a wax lubricant such as Johnson's Stick Wax No. 140 or equivalent should be placed on the blade. When waxing the blade, the machine should be unplugged.

20. Before leaving the saw, be sure that the blade is stopped and the working area is cleaned up.

Revised: 2/2/2019

Drill Press Safety Sheet

1. Never leave a chuck key in the chuck. If the power is turned on, the key will be thrown out and may injure someone.
2. All workpieces must be secured to the work table. Metals and smaller pieces must always be clamped down.
3. If the workpiece is caught by the drill, turn off the power and lower the drill bit and workpiece to the drill press table. Friction between the table and spinning work will stop all motion. Wait for it to stop spinning. DO NOT TRY TO STOP IT BY HAND.
4. Large drills should turn at slower speeds than smaller drills since larger drills are removing more material with each rotation. Generally speaking, drill speed should not need to be changed. Never change the speed of the drill without consulting a mentor.
5. Some operations (like drilling into cylindrical parts) require special attention and instruction.
6. The drill press table should be locked in place. Keep hands, hair, loose clothing and jewelry away from all moving parts.
7. Always place a board beneath the piece to be drilled. It will protect the drill press table when the drill penetrates the workpiece.
8. Always tighten the chuck!

Revised: 7/31/2013

Pedestal Grinders Safety Sheet

1. Safety shields must be in place before operating the grinder.
2. Always assume the grinding wheel is spinning when you first approach it. Spinning wheels can look stationary. Additionally, spinning wheels take a long time to coast to a stop.
3. Stand to one side of the wheel when first turning the power on. The wheel may be cracked causing it to break up.
4. The tool rest should be adjusted to within 1/8" of the grinding wheel.
5. Use steady, even pressure when grinding. Jamming the workpiece into the wheel could damage it and cause serious injury to the operator or persons nearby.
6. Only one person at a time may operate the grinder even if there is a wheel on both ends.
7. The workpiece should be held against the tool rest for all grinding operations.
8. Grinding should be done on the front of the wheel, NEVER on the side of the wheel.
9. Never hold the workpiece with rags or gloves. Cloth material may become entangled in the moving wheels.
10. Never apply enough pressure with the workpiece to slow the wheel. Excessive pressure could cause the wheel to break.
11. Frequently dip the tool or part (i.e. the piece being ground) into water to cool it. If the workpiece becomes too hot to hold, it should not be ground until once again cool to the touch. Avoid bluing the steel.
12. Ensure that the wheel is periodically dressed using a dressing tool to remove metal particles caught within the grains of the wheel. Ask a mentor if you believe the wheel needs to be dressed.

Revised: 8/1/2013

Metal Lathe Safety Sheet

1. Students must receive training before using the metal lathe.
2. Adjustments to tooling/workpiece must be made when the machine is at a dead stop.
3. Adjustments to speed must be made correctly. Some lathes require the motor to be running, others (variable speed) must be adjusted when the motor is running.
4. The chuck key must be removed from the chuck immediately after using it.
5. Metal chips are sharp and can cause injury, do not touch with bare hands.
6. Remove chips from lathe with a brush.
7. Irregular shapes require special setups, additional training and mentor supervision are required if a student desires to machine an irregular shape on the lathe.
8. Spindle speed is determined by the diameter of the workpiece, type of metal, and type of tool being used. Calculate and adjust speed every time the lathe is used.
9. Work must be secured in the chuck and/or between centers when turning.
10. Tool bits must be properly ground (if applicable) and on-center before turning the lathe on.
11. When measuring and laying out stock, the lathe must be at a dead stop.
12. Tools should never be left on the lathe.
13. Remove jewelry, loose clothing, and tie up long hair before approaching the lathe.
14. If you are uncertain about any aspect of the operation you are attempting, STOP and ask a mentor.

Revised 11/28/2017

Table Saw Safety Sheet

1. Make all adjustments only when the power is off and the blade has stopped.
2. Do not reach over a revolving saw. Remove material only after the blade has come to a complete stop.
3. Never have your hand or fingers in line with the saw blade.
4. Keep the blade guard in place over the saw blade at all times.
5. Adjust the height of the saw blade before starting the saw. It should extend above the stock by 1/4".
6. Use a push stick when ripping stock less than 3" wide.
7. Always check the fence to see that it is locked in place before ripping lumber.

8. Never stand directly behind the blade. Always stand to the left of the blade to avoid kickbacks as well as to better keep the piece being cut against the fence.
9. Always use the cut-off box when crosscutting lumber, or when cutting stock to length. As necessary, get assistance in lifting the cut-off box onto, or when removing it from, the table. Never use the rip fence when crosscutting lumber.
10. Never use the rip fence and miter gauge together. Doing so increases the risk of binding the workpiece into the blade and therefore increases the risk of kickbacks. When both the rip fence and miter gauge are used together, a clearance block must be used.
11. When cutting short pieces, use a clearance block (also known as a spacer block) against the fence to prevent kickback of the cut piece.
12. Keep the saw blade clean.
13. Remove rings, watches and other items that might catch in the saw. Wear garments with short or tight sleeves.
14. Hold stock firmly against the cut-off box when crosscutting and against the ripping fence when ripping.
15. When ripping, look at the "point-of-contact" between the stock and the fence.
16. Avoid cutting through knots. Check for nails and other foreign material in the wood to be cut.
17. Clear all special set-ups with a mentor.
18. Do not lift lumber over the blade while the machine is running.
19. Avoid sawing warped or twisted lumber. Check with a mentor if unsure.
20. Never speak to or try to attract the attention of the operator of the table saw. Distraction for a second can cause a serious accident.
21. Freehand cutting is NEVER permitted.
22. Push the end of the lumber past the saw blade before releasing it. Letting go of the lumber before it is past the blade invites a kickback.
23. When a helper assists the operator of the table saw, the helper should NEVER pull the stock. The helper only supports the stock.
24. Never cut cylindrical stock (dowel rods) on the table saw.
25. Never cut more than one piece of work at a time.
26. The primary causes of kickbacks are:
 - a) improper alignment of the fence to blade;
 - b) improper support of the workpiece;
 - c) a twisted or warped workpiece;
 - d) a dull or damaged blade;
 - e) overly aggressive workpiece feeding.

Revised: 11/5/2017

Upright Mill Safety Sheet

1. On variable speed mills, always change speed with the machine running. Failure to do so can damage the mill.
2. Spindle speed is determined by tool diameter, tool type, and material being machined. Always adjust to an appropriate speed before beginning to machine.
3. Changing cutters and workholding setups must be done with the machine at a dead stop.
4. Remove the drawbar wrench from the drawbar immediately after securing the bit in the collet
5. Always secure your workpiece. This can be accomplished with a vice, v-blocks and clamps, rotary table, or step blocks.

6. Milling machine cutters are sharp and must be handled with care.
7. Remove all jewelry, loose clothing, and tie hair back before approaching the mill.
8. Chips should be removed with a brush when the machine is at a dead stop.
9. Once finished milling, turn off machine power, apply the brake until the spindle has stopped, remove the cutter, and clean up your work area.
10. Keep fingers at least 6 inches away from any running cutting edge.
11. If cutting fluid spills on the floor, obtain a towel and clean any spilled fluids that could create a slipping hazard.
12. If unsure about any operation, stop and ask the instructor for clarification.

Revised 11/28/2017

Hand Drill Safety Sheet

1. Clamp material you plan to drill tightly in a vise. Do NOT hold the material in your hand while drilling.
2. Hold the drill with two hands for better control.
3. Use the proper sized bit for the job. For example, don't drill a ½" hole with a 3/16" bit.
4. Make sure the drill is spinning in the right direction.
5. Remove the drill bit when transporting the drill and when finished drilling.
6. Use the correct speed and clutch for the job at hand.
7. Lay the drill on its side when not in use so it doesn't get knocked over.

Revised: 1/7/2018

Shop Safety Tests

There are two tests to advance to the next badge. The first one is the green badge test and the second one is the yellow badge test.

Green Badge Test

Multiple Choice

When using the Drill Press, in how many places should you tighten the chuck with the chuck key?

- a. 1
- b. 4
- c. 0
- d. 3
- e. 2

Check all that apply when using the chop saw.

- a. The material being cut must have a flat face resting against the saw's table

- b. It is never ok to cross your arms when making a cut
- c. It is ok to cross your arms when making a cut
- d. Keep your hands at least 5" away from the blade
- e. Keep your hands at least 6" away from the blade

What is the minimal length of material that can be safely cut on the chop saw?

- a. 9 inches
- b. 1 foot
- c. 6 inches
- d. 2 feet

If the workpiece is caught by the drill, what should be done?

- a. Lower the bit into the table
- b. Turn the power off and raise the bit
- c. Turn the power off and lower the bit into the table
- d. Raise the bit and try again

Yellow Badge Test

Short Answer

What is the one tool that you can leave running?

When removing metal chips or handling a freshly cut piece of metal you should...

What is the only adjustment that can be made to the Mill while the machine is running?

Allow the blade of the abrasive cutoff saw to reach _____ speed before starting a cut.

If you are uncertain about the set up or any aspect of the operation, you should...

What can you use on the Grinder?

Where is the correct place to put tools?

How do you use the mill?

Lead Soldering Safety Guideline

Health Hazards

This guideline provides safety precautions for lead soldering. Lead (Pb) is a known neurotoxin and can pose other significant health hazards if the soldering material is not safely handled. Potential exposure routes from soldering include the ingestion of lead surface contamination and inhalation of soldering fumes. For assistance or if you have exposure concerns, contact the Environmental Health & Safety (EH&S) Office at x3347.

General Safety Precautions

- Avoid skin burns and never touch the tip/element of a soldering iron, which can be 400°C. Wear appropriate personal protective equipment (PPE), follow the manufacturer's instructions, and read the solder material safety data sheet (MSDS).
- Avoid inhalation of lead soldering fumes. Work in a well-ventilated area or use local exhaust ventilation.
- Avoid ingestion of lead surface contamination by keeping soldering areas clean and properly managing lead soldering waste (see below). Personnel should not eat or drink in soldering areas and should wash hands after completing soldering work.

Personal Protective Equipment (PPE)

- **Protective Clothing** – long sleeve shirts and pants that are made of natural fibers (cotton) and closed-toe shoes should be worn during soldering activities. Heat resistant gloves may also be prudent.
- **Eye Protection** – Safety glasses, goggles, or face shields should be used when soldering.

Waste Management

Lead soldering waste is considered a hazardous waste. If you generate lead soldering waste, EPA and MA/DEP regulations require that you properly collect and manage the waste in a satellite accumulation area (SAA). The EH&S Office will supply all approved SAA collection containers (metal containers that are pre-labeled). The generator must inspect the SAA containers weekly and ensure compliance with the following:

1. **Storage** – Only one lead waste container is allowed at each SAA.
2. **Labeling** - Every container in a SAA must be properly labeled. The approved labels will be supplied by the EH&S Office and include the following information: the words 'Hazardous Waste', full chemical name of the waste (Lead), hazard classification (Toxic), and date the container became full.
3. **Closure** - All containers must be closed at all times except when adding waste.
4. **Removal** - Full containers must be dated and promptly removed from the SAA.

Team 955 Competition Safety

General Safety

- Use the buddy system when traveling at the event
- Do not throw objects from the stands
- Safety First even in the heat of competition

Team 955 Pit Safety

The team also has the following pit safety sheet posted in our pit a competition so that everyone is aware of the team's pit safety standards.

General Safety

- Follow safe work practices, safe use of all tools, and maintain a healthy attitude regarding safety.
- Always walk and work in a controlled and thoughtful manner.
- Wear ANSI-approved, UL-Listed, CE EN166 rated, AS/NZS certified or CSA rated. If glasses are tinted, only lightly tinted yellow, rose, blue, and amber tints are FIRST approved. Your eyes must be visible to other people.
- Wear closed-toe and closed-heel shoes, gloves whenever needed (such as using tools or lifting the robot), and used hearing protection if necessary. Remember to keep those shoes tied!
- Assist other teams with safety issues. Display Gracious Professionalism and act with good, safe behavior at all times.
- Take special care when working at higher-than-normal height.
- Always fully open a ladder and never stand on a non-approved step.

Transferring Your Robot

- When lifting the robot, use your knees **not** your back.
- Make sure to yell 'Robot' loud and clear to inform others that you are coming. (note: When doing this, it is good to be more personal when warning others of your presence. Shouting 'watch out' or 'coming through' is likely going to get more people's attention.)
- Keep full control of the robot at all times with no one in the robot's path at any time.
- Do not run or engage in horseplay in transportation.
- Make sure that the robot is never left unattended.
- Be careful when turning corners with the robot cart.

Inside the Pit

- Control access to your Pit area; visitors are required to comply with Personal Protection Equipment rules.
- Keep your aisle clear for pedestrians and robot transport
- When transporting your robot, politely keep pedestrians alert to your movement.
- Adhere to the specifics in the FRC Administrative Manuals, "At the Events" section.
- Do not build any structure to support people or items for storage above the work area in the team pit station.
- No Team Stations structures, signs, banners, or displays can be higher than ten feet above the floor.
- Securely mount team pit station signs, banners, and displays to the structure.
- Be aware of your neighbors. Alert them if there is a hazard in your station or near theirs.
- Maintain a clean, neat, and orderly Pit Station at all times; make sure the floor is clear as well.
- Make sure that everyone in the pit knows where all the first aid kits are.
- Stacked items must be more than 18 inches away from the sprinklers.
- Heavy/Bulky Items should be stored below the shoulder level.
- Make sure that there is enough light to safely work with.
- Properly work with the power outlets; do not "daisy chain" power strips.

If you have ANY questions, ask your safety captain. They won't hurt you. :)

First Aid Kits

The team has five fully stocked First Aid kits that contain the following materials:

Main First Aid Kit:

The main First Aid Kit is located in our pit at competitions and in the Materials Lab during practices. It is stocked with all of the mentioned items at all times.

- Bandages, Gauze Pads: Injuries
- Antiseptic pads: Wound Sanitization
- Medical Scissors: Cutting Gauze And Tape
- Adhesive Tape and Bandages: Binding Gauze, Closing Small Wounds
- Instant Cold Pack: Reducing Swelling
- Eyewash: Cleaning Chemicals From Eyes
- Safety Glasses
- Hair Ties
- Hard Candy: Throat Soreness
- Flashlight: Pupil Dilation, Looking For Slivers
- Sugar: Control of Blood Sugar Levels
- Tweezers: Slivers and Splinters
- Latex Gloves: Prevention of Bloodborne Contamination (of Multiple Sizes)
- CPR Masks: One Way Valve For Use In Mouth To Mouth Resuscitation
- Hand Sanitizer: To Sanitize Your Hands

- Ear Plugs

Mentor First Aid Kit:

The mentor first aid kit is a fanny pack that travels with our lead mentors who will be located in the stands and pit during competition. It has:

- Hand Sanitizer
- Sugar
- Antiseptic Wipes
- Adhesive Bandages
- CPR Mouth Guard
- Ear Plugs
- Gauze Pads
- Adhesive Tape
- Gloves

Safety Satchel:

The safety satchel travels with our lead mentor, captain, or lieutenant who will be located in the stands and pit during competition. It has:

- Bandages
- Gauze Pads
- Alcohol Pads
- Medical Scissors
- Adhesive Tape
- Instant Cold Pack
- Eyewash
- Safety Glasses
- Hair Ties
- Flashlight
- Sugar
- Tweezers
- Latex Gloves (of multiple sizes)
- CPR Masks
- Hand Sanitizer
- Ear Plugs

Safety Data Sheets

Our team keeps an up-to-date SDS (Safety Data Sheet) of all the chemicals we use. It is kept in an easily accessible location at the school and in the pit at competitions.

The SDS includes information on the following chemicals:

- A-9 Aluminum Cutting Fluid
- Acetone
- Acetylene
- Acrylic Paint White
- Argon
- Baking Soda
- Duster Aerosol Dust Removal System
- Great Stuff Pro Insulating Foam Sealant
- J-B Weld Steel Reinforced Epoxy Resin
- Klean Strip Denatured Alcohol
- Kool Mist 77
- Kool Mist 78
- Krylon Metallic Spray Paint
- Lead Acid Battery
- Lead Solder
- Lithium Grease
- Loctite 242 Threadlocker

- Loctite PL Premium Fast Grab
- Mobil Vactra Oil 2
- Multi-Use Product Aerosol WD-40
- Rapid Tap
- Rust-Oleum Flat Black
- Rust-Oleum Gloss Real Orange
- Rust-Oleum Metallic Silver
- Rust-Oleum Oil Rubbed Bronze
- Scotch-Weld PR100
- Sharpie Fine Point Marker
- Soldering Flux
- Spackling Paste
- Synthetic bicycle lubricant
- Tenacious Oil
- Ultra Black Gasket Maker

Safety Outreach

Outreach to Cheldelin Middle School:

Team 955 has done presentations to the First Tech Challenge teams at Cheldelin Middle School. In the presentations, we have discussed general safety within the workshop and promoted good safety practices outside of robotics as well.

Safety Animation:

Team 955 has done the safety animation; this year we have focused on the theme of sustainability. We have also done the safety animation last year where we discussed general safety practices in the workshop and what to do in the event of batteries becoming a hazard to the health of others.

Archived Safety Sheets

With the new shop, we do not have access to many of the tools that we did before, these are the safety sheets to all the old tools for future reference.

Horizontal (Metal Cutting) Band Saw Safety Sheet

1. Wear safety glasses when operating the horizontal bandsaw.
2. Never wear loose clothing, or jewelry when operating the horizontal bandsaw.
3. Keep the blade cover in place at all times.
4. Disconnect the electrical power when servicing the saw or replacing blades.
5. Never adjust the horizontal band saw while it is in operation.
6. Use support when cutting heavy or long stock.
7. Clamp metal securely before sawing.
8. Keep the floor free of coolant-water and metal.
9. Never leave the saw unattended while in operation.

Horizontal Band Saw Operating Procedures

1. Adjust the arm guide rollers as close as possible to the stock without interfering with other parts of the saw.
2. If the horizontal saw is equipped with a coolant/lubricant system, be sure the coolant is flowing over the stock.
3. Place stock in the vise:
 - a. Clamp firmly
 - b. When cutting several pieces of flat iron, stand the stock on edge and clamp together in a vise.
 - c. When cutting rectangular stock, clamp the widest side towards the blade.
 - d. Clamp angle iron with legs down in a vise.
4. After starting the saw, lower the blade head by hand until the blade makes contact with the stock. This will prevent damaging the blade teeth.
5. Supports for the long stock should be no higher than the vise to prevent pinching the blade.
6. If the saw cuts too slowly or binds, replace the blade; do not apply pressure to the blade head.
7. Remove unused stock from the saw to prevent others from walking into it.
8. Keep proper feed pressure on the hydraulic feed control.

Revised 11/28/2017

Vertical Band Saw Safety Sheet

1. Plan your cuts to avoid backing out of a kerf (kerf: the cut or channel made by the saw blade). Make relief cuts as necessary to avoid backing out of a kerf.
2. If you must back out of a deep cut, turn the saw off and allow it to come to a dead stop before attempting to remove your work.
3. Adjust the blade guard to within 1/4 inch above the top surface of the work.
4. Use a push stick if your fingers will come within three inches of the blade.
5. The workpiece should have one flat side so that it will lay flat on the table.
6. No one should stand on the right side (the right side relative to the operator) of the bandsaw when it is running. If the blade breaks, it may extend out of the blade cover in that direction.
7. Hold your workpiece on either side of the cutting line so that there is no danger of your hands slipping into the blade. Keep fingers three inches from the blade.
8. If the blade breaks, shut off the machine and call a mentor.
9. When you are finished, turn off the machine and allow it to come to a dead stop. Use the foot brake to bring the saw to a stop quickly. Using the foot brake on the yellow saws will turn the power off to the saw automatically. Clean the machine and your work area before you leave.
10. Be careful not to crowd, cramp, twist or bend the saw blade as this may cause the blade to break.
11. Do not feed your work into the saw with too much force. If the blade is flexing, you are forcing it too much. Let the saw do the cutting. If you feel that the saw is not cutting fast enough, stop the saw and consult a mentor. Perhaps the blade needs to be changed, or there is a more appropriate piece of equipment to use for the task at hand.
12. Have a mentor check resawing, round stock, angle cuts and all other special operations.
13. The yellow Powermatic bandsaw fence plates have two positions – one for resawing when vertical, and one for use with small parts when horizontal.
14. Never use the rip fence and the miter gauge at the same time.
15. If the blade begins to wander off the cutting line even when the band saw fence is used, inform a mentor. There are several reasons for such blade drift:
 - The fence is not parallel to the miter slot and blade.
 - Incorrect blade tensioning.
 - A dull blade.
 - The teeth of the blade have excessive "set" on one side of the blade.
 - The feed rate for the workpiece is too fast.

Revised: 11/5/2017

Belt & Disc Sander Safety Sheet

1. Keep your hands away from the moving belt or disc. Small pieces to be sanded should be held with either a clamp or channel lock pliers. **DO NOT SAND SMALL PIECES USING YOUR HANDS!**
2. Whenever possible, keep one face of the workpiece flat on the sanding table.
3. Move the stock to avoid burning either the wood or the abrasive belt or disc.
4. Sand only on the downstroke side of the disc sander.
5. Stop the sander to make any adjustments.
6. Sand with the grain, not across the grain.
7. Complete all cutting operations before sanding. Minimize the time required at the sander by cutting as much material off the workpiece with a saw.
8. Apply just enough pressure to get the job done. The tendency is to press too hard which results in burning and deeper scratching.
9. Keep your attention on the job being performed.

Revised: 7/31/2013

Archived Safety Tests

Green Badge Test

Multiple Choice

When using the band saw, what is the minimum distance should your hands be from the blade?

- a. 6 inches
- b. 3 inches
- c. 2 inches
- d. 4 inches

When using the Drill Press, in how many places should you tighten the chuck with the chuck key?

- f. 1
- g. 4
- h. 0
- i. 3
- j. 2

When using the disk and belt sanders, how far away should your hands be from the disk and belt sanders?

- a. 1 ½ inches
- b. ½ inches
- c. 2 inches
- d. 1 inch

Check all that apply when using the chop saw.

- f. The material being cut must have a flat face resting against the saw's table

- g. It is never ok to cross your arms when making a cut
- h. It is ok to cross your arms when making a cut
- i. Keep your hands at least 5" away from the blade
- j. Keep your hands at least 6" away from the blade

When using the band saw, how far above the surface of the wood should the blade guard be?

- a. ½ inches
- b. 0 inches
- c. 1 inch
- d. ¼ inches

Where should no one stand when someone is using the bandsaw?

- a. Behind the person using the saw
- b. Behind the saw
- c. To the right of the saw
- d. To the left of the saw

What is the minimal length of material that can be safely cut on the chop saw?

- e. 9 inches
- f. 1 foot
- g. 6 inches
- h. 2 feet

If the workpiece is caught by the drill, what should be done?

- e. Lower the bit into the table
- f. Turn the power off and raise the bit
- g. Turn the power off and lower the bit into the table
- h. Raise the bit and try again