MAE Student Design Center

Rules for Facility Use

The MAE Student Design Center (hereafter *SDC*) is for use by MAE and other approved College of Engineering students working on sanctioned design projects. Access to this facility is a privilege and should be treated as such. The following rules apply to all students working in the facility. ***Failure to follow these rules will result in suspension or revocation of facility privileges.*** There will be no exceptions. It is incumbent upon each person using the facility to enforce the rules laid out in this document. If you experience problems using the facility or have suggestions for improvement, please contact Mike Braddock (mjb@ufl.edu).

A lot of effort and money were spent renovating the SDC so you have a pleasant, safe, and efficient environment in which to work. In return, you are expected to maintain the facility in a professional manner. A dirty, disorganized workspace is a sign of disrespect and selfishness, and it also reflects poorly on the department when giving tours. In addition, because the Department will give tours of the SDC, the entire facility must always be kept clean. The SDC is a department workshop and as such, your conduct must be on par with that expected in any other university lab or classroom. With this in mind, **the following guidelines will be enforced at all times.**

General Use:

1. **Only sanctioned MAE projects which have faculty advisors can be worked on in the SDC.** No course or graduate research projects are allowed, as they are supported by the Student Shop. ***Use of shop resources for personal projects is strictly prohibited and personal items such as bikes, scooters, cars, and motorcycles are never to be brought into or worked on at the SDC.***

2. **No unapproved power tools (such as circular saws, grinders, or table saws) will be permitted in the SDC.** These types of tools are extremely dangerous and accidents can be life-changing, so they will not be allowed. Any group desiring to move additional power tools into their work area must obtain permission from Mike Braddock prior to doing so.

Facility Respect:

3. **Respect the facility.** Do not modify or damage cabinets, floors, walls, or worktables without permission; this includes not damaging tables when drilling or cutting over them, and not hanging items on walls without permission (including graphics/vinyl/decals). Since the Department will give visitor tours of the SDC to secure operational funding, the facility must always be kept clean, organized, and professional. Please let your projects and leadership reflect your individuality, and the SDC reflect your professionalism.

4. **Respect the floor.** Respect the painted floor and refrain from dropping items on it, dragging items across it, painting over it, or spilling chemicals on it. ***If something is spilled CLEAN IT IMMEDIATELY.*** NEVER leave spilled fluids or chemicals on the floor while you finish what you're doing. Not only is it a safety hazard, but many fluids destroy the paint by seeping under it and causing delamination. Make sure you use proper cleaning technique. **Never**

clean the floor with solvents like brake clean or acetone; they will do just as much damage to the new paint. If oil spills, use an absorbent pad to soak it up. For anything else, wipe it up with the BLUE paper towels or white rags (not red rags, as they will stain the floor) then spray and wipe up diluted Simple Green on the affected area. If you have questions on how to clean something, ask BEFORE proceeding.

5. **Respectfully manage your waste. Plastic trash cans must be used with liners and emptied when three-quarters full.** New liners (bags) are in the cleaning supplies cabinet. A dumpster is located on the north-end of the building; ***don't wait for someone to ask you to empty the trash; when you see it's three-quarters full, empty it. Don't place fluids (including drinks) or food items into the trash cans,*** as they make a mess and attract ants. If oil or solvent waste is generated, place it in the appropriate bin, as noted under ***Chemical & Solvent Safety.***

6. **The SDC is a workshop, not a lounge.** Don't sit around doing things that distract and demotivate others who are trying to work. If you want to relax, go somewhere else; the shop is a workspace for designing and fabricating sanctioned collegiate projects.

7. **The SDC is a workshop, not a restaurant.** A refrigerator is provided so you can enjoy a cold non-alcoholic beverage while working. Drinks must be labeled with a name or they will be discarded. Use cardboard coasters to prevent condensation from absorbing into the wooden worktable tops. Pour remaining drinks down the sink drain and only place empty drink containers in the trash cans. ***No food is allowed in the facility because EH&S rules for personal hygiene forbid chemicals and food to be handled in the same area.***

8. **If you use common facility tools or materials, note it on the Material & Tool Use List EACH time;** this includes tools from the facility's storage cabinets AND consumables like sandpaper and fasteners. The Department monitors use of these items so we know when and what to reorder. There are two checkout lists in the facility for easy access: one is by the facility storage cabinets and one is by the fastener storage bins. Users needing a large quantity of a particular fastener or material (i.e. > 10 fasteners of the same size or more than a few sheets of the same grit sandpaper) should purchase the items using their team's project budget. ***Note: only safety stewards should retrieve facility use tools out of their storage cabinets.***

9. **Broken / Lost Tooling List.** There is a broken / lost tooling list located with each checkout list noted previously. ***If anything in the SDC is broken or lost (hand tools, measuring tools, machine tooling, saw blades, equipment, etc.), it must be reported on this sheet.*** This list serves two purposes: (1) it allows the facility staff to track what tools need replacement and (2) it allows additional instruction to be provided to users who break tools. You will never be reprimanded for broken tools unless you violate protocols for proper use.

10. **Respect the composites and welding shop.** These areas are easily neglected since the floor and walls are not finished like the rest of the facility. The same rules for use and cleanup apply to the composites and welding shop. If you leave a mess, you will be asked to clean it up and restricted from using the area. ***Students must be trained and approved to use the welding and cutting equipment just like any other facility equipment.***

11. **Respect assigned work bays.** Groups with assigned work bays are responsible for the care and contents of their toolboxes, which will be inventoried each semester. Missing items will be replaced at the groups' expense. Groups are expected to keep their work bays clean and organized as a token of appreciation and respect.

12. **Respect others' possessions and workspace.** Many design teams will be using the SDC. Be respectful of other group's possessions and never use them without permission each time; this includes their workspace, tools, materials, and supplies. If permission is granted to use another team's items, leave a note on an 8-1/2" x 11" sheet listing what was used, who provided permission, and when (if pertinent) the items will be returned.

13. **It's EVERY USER'S job to enforce safety and facility respect.** ***If a student is breaking a rule or not respecting the facility, it is YOUR RESPONSIBILITY as a user to respectfully tell them first and report them if their action continues*** *(e-mail Mike Braddock (mjb@ufl.edu) with subject line: "SDC SAFETY REPORT").* You are each a facility steward when you agree to use the facility, and part of that responsibility is protecting other users and the facility because it only takes one person's negligence to ruin the privilege of use for everyone. ***Likewise, groups will be held responsible for their members' actions; if a member breaks a rule, that group broke a rule.*** Groups that break rules will be in jeopardy of having their access revoked and workspace awarded to another group. For this reason groups should restrict facility use of any member(s) who do not follow all rules.

14. **Profanity will not be used in the workshop.** The SDC is part of the MAE Department, and as with any lab or classroom, abrasive language will not be tolerated. ***Profanity is a sign of immaturity, ignorance, and unprofessionalism, and is not how we represent our university.*** If you deserve a nice place to work on your design projects, prove it with your behavior.

Facility Use and Equipment Operation:

15. **NEVER WORK ALONE.** The SDC will be available for use 24/7. ***Between the hours of midnight and 6:00 AM a minimum of THREE persons must be present in the facility at all times; during other hours a minimum of TWO persons must be present.*** *There shall be no exceptions to this rule since you cannot predict when an accident will occur.*

16. **Safety stewards.** Each group working in the facility will put forward nominees to be trained as safety stewards to ensure the safe and respectful use of the facility. Nominees must be responsible students who have completed EML2322L. ***Unless one of your group's safety stewards is present and on duty, NONE of the facility's powered equipment (drill presses, sanders, saws, sheetmetal equipment, welders, etc.) may be used, or the entire team will lose use privileges.***

    When functioning as a safety steward, the student's focus is NOT working with their design team, but rather the safety of its members. To reduce the chance of accidents and equipment damage, facility users must receive assistance from one of their team's safety stewards every time they use the facility's powered equipment. Each safety steward shall be

given the same respect as any other TA in our Department, regardless of their ranking on their design team. ***STUDENTS USING THE FACILITY WHO DO NOT RESPECT AND OBEY THE SAFETY STEWARDS WILL LOSE USE PRIVILEGES.***

17. **The SDC should remain clean and organized at all times.** Please enforce and obey the ***Cleanup Protocols*** listed in this document each work period and fill out and submit a ***Facility Inspection Checklist*** every week. Place unfinished projects in designated bins stored on shelves. These bins are for parts only; tools should not be stored in these containers.

    Due to the large number of users, each group has a limited amount of storage area, so it must be used wisely. Excess parts, materials, and tools will be stored offsite. Parts from past years should be discarded when no longer needed. Only one row of items will be stacked on top of any cabinets. Storage bins, parts, etc. are to be stored off the floor on the mezzanine shelves or in cabinets. Fire extinguishers must always be accessible and each work area must remain free of trip hazards. Nothing shall be stored outside. ***Random inspections will be performed and messy or unorganized work areas cleaned without regard to what gets discarded.***

18. **Mezzanine.** The upstairs area is for lightweight component storage on the shelving units located under the air conditioning ductwork and for students to have space for administrative / computer / design work (objects over 50 pounds must be approved by Mike Braddock). ***No hands-on project work is to be performed on the mezzanine and its capacity is limited to 25 students.*** Component storage is limited to items which fit *completely* on the provided 3' deep shelving units; other items must be stored offsite at an alternate location determined by each user/group.

19. **Personal security.** ***Since the SDC is separated from the main UF campus and many students will use the facility at night, ALWAYS think about your personal safety and NEVER work in or leave from the facility alone.*** In addition***, the SDC is never to be left unlocked,*** as there is a lot of expensive equipment within. ***When you are among the last to leave (again, NEVER ALONE!) follow the Lock-up Checklist posted by each door to ensure you leave the facility secure. Contact UPD for an escort if you feel unsafe at any time you are using or leaving the facility (this is their job and your responsibility to remain safe).*** Keep the doors closed when using the facility to prevent non-UF students from entering and to prevent over-loading the air conditioning unit.

20. **Parking.** UF is granting parking privileges to students **<u>while working</u>** in the SDC. ***Students are not allowed to park cars at the SDC and ride to campus.*** Such behavior will result in vehicles being ticketed and ultimately, revocation of parking privileges for all SDC users. Use of RTS buses and bicycles is encouraged to alleviate parking congestion (however bikes must be locked outside and not brought into the facility).

Safety Steward Certification:

Individuals nominated to try out for Safety Steward positions must be certified before being allowed to function as acting stewards. The Safety Steward certification process is as follows:

1. **Complete EML2322L,** as this course teaches the rules and culture Safety Stewards must embody for the SDC to be a safe and productive working environment for our students.

2. Read the ***MAE Student Design Center Rules*** document *thoroughly*, and be familiar with all the rules and procedures listed within.

3. Read the ***Safety Steward Responsibilities*** document thoroughly, and understand how serious of a position this is in regard to your responsibility for the personal safety of students you allow to use facility resources under your supervision.

4. Watch all of the equipment training videos for the SDC on the **MAE Student Design Center YouTube Channel.**

5. If you have any questions about the aforementioned documents or safety training videos, e-mail Mike Braddock (mjb@ufl.edu) to schedule a time to stop by his design lab on campus (MAE-C 002) to discuss the information in question. These meetings will typically be scheduled for Mondays and Fridays so they don't interfere with his class schedules.

6. After you are **CONFIDENT** you understand all of the above material, schedule an appointment to take a Safety Steward assessment by e-mailing Mike Braddock (mjb@ufl.edu). Assessments are administered on an individual basis, however if your team has more than one member who would like to tryout, please have them coordinate a time together. Assessments take approximately one hour and consist of two parts: an oral portion regarding safe operation of the equipment, and a written portion reviewing the Safety Steward knowledge and responsibilities.

MAE Student Design Center

General Shop Safety and Respect

Introduction:

This handout is designed to acquaint new students with common workshop hazards. The goal is to prevent injuries to the users of this workspace. Each student is required to be familiar with the safety and operation instructions for each piece of equipment used in the SDC.

CONSULT THESE SAFETY RULES FREQUENTLY.

Ignorance is no excuse for improper or unsafe behavior. Ask the facility safety stewards to train you how to safely operate each tool you need to use. Once you demonstrate proficiency and are added to the approved users list for a piece of equipment, carefully follow safe protocol and always have a safety steward present. Beware that familiarity can breed haste. Think through each operation before performing it and do not do anything that seems unsafe. **WHEN YOU ENCOUNTER A SITUATION YOU ARE UNSURE OF WITH REGARD TO SAFETY, CONSULT A SAFETY STEWARD *BEFORE* PROCEEDING.**

The safety stewards are here to help you safely use the facility. However, they cannot be everywhere at once. Each individual using the SDC must take responsibility for the safe use of the facility. If you are unsure of the proper method to do something, wait and ask for guidance. If you notice an unsafe condition in the shop, fix it or bring it to a steward's attention. If you think someone is using the equipment unsafely, promptly discuss it with the individual and suggest a safer alternative or bring their activities to the attention of the safety steward.

YOUR PERSONAL SAFETY IS OUR NUMBER ONE CONCERN.

RESPECT FOR OUR FACILTY IS OUR NUMBER TWO CARE.

General Safety:

1. **Familiarize yourself with the layout of the facility**. Note the location of the exits, first aid kits, fire extinguishers, eye wash stations, and personal protective equipment (PPE).

2. **Get trained and approved by an SDC safety steward the first time you use each machine or process in the facility.** Do not work on any machine until a steward trains you in its safe operation, and you are able to demonstrate competency in the manner taught by the safety steward (including tools you have learned to operate elsewhere). Always operate the machinery as taught, as all of our operating procedures have been developed with safety in mind. Once you demonstrate said competency you will be added to the list of approved users for that machine.

3. **Wear all necessary protective gear and clothing when in the work shop.**
   - **Always wear safety glasses, regardless of what you are working on, in the SDC.** Eye hazards always exist and you must constantly protect your eyes from them.
   - **Always wear shoes that completely enclose your feet: no sandals, flip-flops, etc.**
   - **Always wear long pants to protect your lower body from workshop hazards**. ***SKIN TIGHT ATHLETIC WEAR (such as workout or yoga pants) ARE NOT ACCEPTABLE, as they do not provide the abrasion protection found with more substantial fabrics.***
   - Over-the-head hearing protection is available throughout the facility, as are foam earplugs to make working in a noisy area comfortable while allowing you to hear others around you; they can be cleaned by running them through the washer with your other clothes.
   - **Work gloves are available in the safety storage cabinet**; please return them after use. ***Gloves are never to be worn around power tools, but should always be worn when working with raw materials which have not been deburred.*** Disposable nitrile gloves should be worn when handling chemicals, cleaning solvents, or adhesives.
   - **Particulate respirators are available to protect against airborne hazards.** Students are expected to research and purchase appropriate respirators for other hazards, such as fume protection, but they must obtain medical approval prior to doing so.

4. **Remove all personal accessories and loose clothing that might get caught in moving machinery**; this includes rings, watches, jewelry, and open jackets. ***Loose garments must not be worn around any powered equipment in the shop.*** Tuck in loose fitting shirts and clothing tie-strings. Roll up or remove loose sleeves (wear short sleeves whenever possible).

5. **Tie up long hair.** All power tools in the shop make use of rotating or reciprocating shafts, tools, or blades. Long, loose hair can get caught on these moving items and thus must be tied up. Rubber bands are available in the main facility safety cabinet for this purpose.

6. **Never work alone or use SDC equipment without a safety steward present.** When working in the shop you must have at least one other person present who is capable of assisting in the event of an accident. That second person must be able to see you while you are working, and get to you if you need help. If the second person moves to a place where they can no longer maintain visual contact with you, you must cease working. Never use any of the SDC's

equipment without a safety steward present and on duty; this includes the bandsaws, drill presses, sanders, grinders, sheetmetal equipment, and welding equipment.

7. **Don't work when you can't concentrate.** This includes times when you are tired or overly stressed, as well as times when you taking medication that might affect your ability to be alert. **DO NOT USE EQUIPMENT WHILE UNDER THE INFLUENCE OF ALCOHOL OR DRUGS.** Do not use the shop when you can't think clearly and carefully. Avoid last minute work in favor of consistent weekly effort. Deadline-driven haste leads to mistakes and injuries.

8. **Be careful using the compressed air guns**. Never operate without eye protection. Never aim one at another person as it can cause retina damage and permanent vision or hearing loss. Never modify an air gun or fit with a non OSHA approved adapter, or regulator.

9. **No horsing around in the workshop.** One distraction or surprise can result in a severe accident. What might be funny somewhere else could startle someone in the workshop and cause them to injure themselves or others, so act maturely when in the workshop.

10. **General rules for safe equipment use and servicing.** Never remove safety guards when working with equipment, as they are provided to protect users from personal injury and must be present when the equipment is being used. Prior to servicing any machine or if a machine is found to be damaged, the power cord should be unplugged and locked out from service until the facility supervisor can rectify the problem. Lockout / tagout procedures are detailed later in this document under ***Electrical Safety.***

Clean Up Protocols:

Systematic cleanup is part of the safe and respectful use of the SDC. If someone cannot find a tool in its regular place or is required to work in someone else's mess, the result will be frustration. Since it is difficult to keep safety in mind when frustrated, it is important to constantly keep the shop clean and return everything to the correct location at the end of each work session. ***Do not begin a job unless you budget time to clean up properly before leaving.***

The golden rule for cleanup is to leave each work area (and in turn, the facility) cleaner than you found it. A little courtesy goes a long way towards accomplishing this and keeping the SDC an enjoyable place to work, so please do your part by obeying the following cleanup protocols.

1. **Put away all items (tools, materials, scraps, parts, papers, etc.) that do not belong permanently with the machines or on the facility worktable(s).** If you don't know the correct location of an item, ask a teammate or facility safety steward; if (s)he does not know, leave the item in the **LOST AND FOUND BOX**, instead of putting it in the wrong place.

2. **Store parts and materials in a clear and organized manner** with a contact phone number (i.e. in containers labeled with tags). Items left out and not labeled will be discarded.

3. **Wipe off the table(s), sweep the floor in the areas you used,** and place collected debris in a trashcan. If sweeping doesn't leave the floor clean, mop the area. If you get anything other than dry debris on the floor, immediately stop working and mop the area before the paint is damaged.

4. **Assist with bi-weekly facility deep-cleanings.** During the first and third weekends of each month the SDC will be thoroughly cleaned as a sign of respect and appreciation. Cleaning session times will be coordinated and posted by the student group leaders using the facility and all users are required to participate equally; students and groups which do not will lose use privileges. **Deep-cleaning sessions include:**

    a. consolidating and emptying trash in the dumpster outside the building and placing new liners (bags) in each plastic trash can; this includes discarding unlabeled drinks in the facility refrigerator
    b. sweeping all floors (including the composites / welding area); an electric blower is provided for this purpose and makes this an easy task
    c. mopping painted floors (at least once a month and more frequently if necessary)
    d. organizing tool boxes, storage cabinets, material storage (including items stored on the mezzanine so it remains neatly organized), etc.
    e. checking first aid supply kits, refilling from the inventory stocked in the master facility safety cabinet, and noting any supplies which are running low

MAE Student Design Center

FACILITY LOCKUP PROTOCOLS

If you are among the last to leave the facility (even if running a quick errand), follow the facility lockup procedures noted below. There is a lot of expensive equipment that can be stolen and it is your responsibility to help protect this equipment. A five minute errand can inadvertently turn into a much longer trip, so **lock up every time you leave the facility.**

1. **Check all powered equipment is turned off;** this includes the facility bandsaws, drill presses, grinder, sander, etc.
2. **Never leave anything on that could overheat and cause a fire** (such as vacuum pumps or heat lamps).
3. **Check all three garage doors are shut and locked.** CAREFULLY lower the doors when closing, as dropping from any distance will cause expensive damage. Lock the doors by sliding their base latches into the locked position.
4. **Check all three walk-in doors are fully closed and latched.**
5. **Turn off all lights** in the main work area and the composites/welding shop.
6. **Exit thru either of the two walk-in doors in the main work area and check that the door locks behind you.**

Additional Protocols for Safety Stewards

1. **Check welders and plasma cutter are turned off.**
2. **Check welding gas tank valves are shut by rotating** the vertical shutoff valve in a CW direction (not the T-handle regulator valve).
3. **Check each machine station is clean.** Any stations left messy are your responsibility to clean since you did not enforce proper cleanup for the last user(s) you are trained to supervise.
4. **Check all other common areas are clean, including the composites/welding shop.** If they are not clean, it is your responsibility to clean them to the appropriate standard before leaving.

REMEMBER: Never leave the facility alone. If there is anyone who does not appear to be a UF student loitering, call UPD, as it's their job to investigate any questionable activity, and it's your responsibility to report anything unusual.

MAE Student Design Center

Emergency Response Procedures

As stated previously, this handout is intended to acquaint new students with common shop hazards. However, **despite our best intentions, the occasional accident is going to happen** since we are working in a prototyping facility. The purpose of this section is to outline common emergency response procedures in the event of an accident.

Accident Response Levels:

1. **PERSONAL ASSISTANCE**: for minor cuts (not requiring stitches), **abrasions, burns**
2. **INFIRMARY or URGENT CARE FACILITY**: for **more serious, yet non-severe injuries** (like cuts requiring stitches)
3. **EMERGENCY ROOM**: for **serious injuries** (like deep lacerations), **call 911.**

SDC Location: UF Building 980
Physical Address: 2610 SW 23rd Terrace

Infirmary Information:

Hours of Operation:	FALL/SPRING: M-F 8-5 pm; Sunday 12-4 pm SUMMER: M-F 8-4:30 pm; Sunday 12-4 pm
Phone Number:	(352) 392-1161

Accident Response Protocols:

1. **In the event of an injury:**
   a. Try to remain calm.
   b. Alert others in the area so they can help after putting on gloves.
   c. If the injury does not prevent you from walking, move to the bathroom with assistance. Never walk alone, as it is possible to become dizzy and faint.
   d. If you can't walk, sit in a chair and let the other students help you.
   e. If the injury is minor to moderate, allow an assistant to stabilize the wound and if necessary escort you to a medical treatment facility (Infirmary / Urgent Care Center).
   f. If the injury is severe, call for emergency medical assistance (i.e. paramedics and an ambulance by dialing 911) or allow a student to drive you to the SHANDS E.R.

2. **First aid kits are located throughout the facility.** Use any items necessary from the kits, but please let the safety steward know if one of the first aid kits runs low on consumables. The first aid kits contain the following items for dealing with accidental injuries:
   a. nitrile gloves
   b. band aids
   c. antiseptic
   d. gauze pads
   e. medical tape
   f. burn gel
   g. tourniquet
   h. scissors

3. **Cuts and Abrasions:**
    a. Always wear gloves when offering medical assistance to another person.
    b. Control the bleeding by firmly covering the area of the wound with a sterile bandage, gauze, or clean paper towels to assist clotting
    c. If possible rinse the wound with soap and water and gently blot the area
    d. Apply antiseptic ointment or spray on a sterile bandage, gauze, or clean paper towel.
    e. Cover small cuts with appropriately sized band-aids or butterfly bandages.
    f. Cover larger cuts with gauze and medical tape. If possible, apply blood clotting spray to the gauze before covering the wound and securing with the medical tape.
    g. Seek professional medical attention if you notice signs of infection, like increased pain, redness, swelling, fever or oozing.

4. **Burns:**
    a. For minor (1st degree) burns (skin is not burned all the way through the outer layer; appears red and sore; covers a small area):
        i. Apply cool water to the area of the burn for 10-15 minutes or cool the burn with cold compresses (never put ice on the burn).
        ii. Gently blot the area to dry it.
        iii. Gently apply burn gel, but don't cover the wound so it can remain cool.

    b. For moderate (2nd degree) burns approximately 3" in size or smaller (first layer of skin is burned through and second layer is also burned; appears blistered and painful):
        i. Apply cool water to the area of the burn for 10-15 minutes or cool the burn with cold compresses (never put ice on the burn).
        ii. Cover the burn with a sterile gauze bandage. Don't use fluffy cotton, or other material that may get lint in the wound. Wrap the gauze loosely to avoid putting pressure on burned skin. Bandaging keeps air off the burn, reduces pain and protects blistered skin.
        iii. Take an over-the-counter pain reliever like aspirin, ibuprofen (Advil, Motrin, others), naproxen (Aleve) or acetaminophen (Tylenol, others).

    c. For major (3rd degree) burns larger than 3" or on hands, feet, face, groin, buttocks or major joints (burns involving all layers of skin; usually no pain and causes skin to be white or charred):
        i. Call 911 for emergency medical help.
        ii. Don't remove burned clothing or immerse large severe burns in cold water.
        iii. Elevate the burned body part(s).
        iv. Cover the area of the burn using a moist sterile bandage or moist cloth towels.

    d. For minor or moderate burns, seek professional medical attention if you notice signs of infection, like increased pain, redness, swelling, fever or oozing.

5. **Foreign Debris in Eye(s):**
    a. Eyewash bottles are located above the sink by the bathrooms and Emergency eyewash stations are located by the entrance doors.
    b. If you need to use a bottle, flush your eyes with the entire contents of the bottle for at least 10 minutes to ensure the foreign substance is removed from your eye.
    c. When rinsing, forcibly hold eye open to ensure effective rinsing behind eyelids. Move eye side-to-side and up-down during rinsing to allow the water to carry the foreign debris out of the eye. Remove contact lenses as well.
    d. When done, blot the area around your eye lightly with a paper towel, but <u>never rub your eye to dry it</u> (in case there's still anything still inside).
    e. If in doubt as to the extent of the injury or if debris is removed, contact the UF Infirmary or Emergency Room.

MAE Student Design Center

BANDSAW SAFETY

(Delta & MSC) Vertical Bandsaws:

1. **Always wear safety glasses** when operating the bandsaw.
2. **Never wear gloves** as they could get caught on the moving teeth and pull your hands into the moving blade, causing severe injury.
3. **The upper blade guide should be set to within ¼ inch of the workpiece**. Adjust guard with machine off.
4. **Use a push block for small work** so if your hand slips it will not collide with the blade. Stated another way: **NEVER place your hand in the plane of the blade.**
5. **Do not push the blade into the workpiece hard enough to cause the machine to chatter;** slow down and/or find a more rigid manner in which to clamp the work in the saw.
6. **Never cut materials that might be hardened, such as stainless steels, mower blades, linear precision ground rails, etc.** Any material than cannot be cut easily with a hand file should never be cut in a bandsaw; use an abrasive cutoff saw instead.
7. **If the blade breaks, shut off the power and stand clear until the machine stops.** Inform the laboratory staff so a replacement blade can be installed.

(Roll-In) Vertical Gravity Feed Bandsaw:

8. **Make sure the workpiece is clamped securely before turning on the saw. Failure to do so will result in the workpiece dislodging from the vise and breaking the saw blade.**
9. **Do not push the blade into the workpiece hard enough to cause the machine to chatter;** slow down and/or find a more rigid manner in which to clamp the work in the saw.
10. **Always bring the blade into contact with the material before engaging the gravity feed**. The proper procedure is as follows: (1) firmly clamp the workpiece in the vise; (2) turn on the saw so the blade is rotating; (3) gently bring the moveable saw blade into *light* contact with the workpiece by rotating the hydraulic feed knob; (4) keep your hand on the feed knob while the cut is being made; (5) retract the blade carriage after the workpiece is cut but before the blade passes the remaining stock in the vise; (6) return the carriage to its original (starting) position; (7) turn off the saw.
11. **Never leave the machine unattended while cutting.**

MAE Student Design Center

CHEMICAL AND SOLVENT SAFETY

1. **Avoid skin contact.** Wear nitrile gloves available in the chemical storage cabinet.
2. **Never use volatile solvents around hot surfaces, sparks or flames**. Likewise, never light flames in areas where solvents are used or stored.
3. **Do not use chemicals or solvents in confined, unventilated areas.**
4. **Always use/dispense chemicals over the provided plastic spill trays** to prevent chemicals from coming into contact with table tops or the floor coating. Oil or chemical soaked rags or towels should be placed in the appropriate container in the Satellite Waste Accumulation Area under the south stairs.
5. **Clean up spills <u>immediately</u> using rags (for small quantities) or absorbent pads (for larger quantities).** Dispose of the solvent soaked rags or absorbent pads in the proper labeled canister in the facility's satellite waste storage area (i.e. oily waste or chemical waste).
6. **Remove personal protective equipment and wash thoroughly with soapy water immediately after contact with solvents.**
7. **Always return chemicals and solvents to the proper location <u>immediately</u> after use**.
8. **Never bring unauthorized chemicals into the Student Design Center**. Each solvent MUST be accompanied by a Safety Date Sheet (SDS) with clear and safe rules for use and storage. Safety Data Sheets are stored in a labeled notebook on top of the chemical storage cabinet in the composites / welding area.

MAE Student Design Center

COMPOSITES SAFETY

1. **Always wear eye protection (safety glasses or goggles)** when working with composites.
2. **Wear nitrile gloves when working with resins and other chemicals like acetone and methyl ethyl ketone (MEK).** Without gloves these chemicals will be absorbed through your skin.
3. **Wear work gloves** when working with cured composites around non-powered equipment. Edges of composites can be very sharp and contain a lot of small slivers.
4. **Wear dust masks to minimize itching or irritation when cutting or sanding cured composites.** Contrary to popular misconception carbon fiber dust is not toxic; however it is a mild irritant to the skin, eyes, and lungs, much like fiberglass, so protect yourself by wearing a dust mask.
5. **Keep the workspace clean and organized,** as this reduces the likelihood of accidents and helps extend the working life of the equipment. **Never use liquid resins or other chemicals without first putting down plastic sheeting to protect the table and floor surfaces.** When performing wet layups check your shoes to make sure you don't track uncured resin through the facility across the painted floor. ***The same level of facility cleanliness is expected when working with composites, so be sure to clean up all dust and debris and put away all tools and chemicals AT THE END OF EACH WORK SESSION.***
6. **Read the SDS for each product you use.** The SDS identifies safety handling guidelines as well as first aid measures to follow if an accident occurs. Always follow the manufacturers' safety recommendations for using their products.
7. **Plan your work well before starting a work session,** as doing so results in fewer mistakes, less waste, and a better product.
8. **All composites work must take place in the composites shop to prevent the fumes from entering the return air supply for the AC system. Make sure your workspace is well ventilated when working with resins and other chemicals.**
9. **Never use a vacuum pump around materials which can catch fire**, as the pump can become extremely hot in use, igniting nearby combustibles.
10. **Never use a vacuum pump without a resin trap** to prevent excess resin from getting sucked into and ruining the expensive pump. ***Like all portable facility equipment, the vacuum pumps must be checked out before and checked back in after each use.***
11. **Clean resin off tools immediately after use with acetone** from the clearly labeled Cleanup / Waste Acetone container. ***Disposable brushes can be discarded but items like composites rollers, scissors, and layup tools must be cleaned BEFORE resins cure or they will be ruined.***
12. **If using a spray gun be sure to clean it properly EACH time or it will be ruined:** empty and clean the product cup, spray clean acetone through the gun five times in 1 sec bursts, remove the nozzle and soak in waste acetone for one hour, clean all product off the outside of the gun and cup, and reassemble for the next use. Pay close attention to use the necessary personal protection equipment (i.e. respirators) needed when spraying chemicals.

MAE Student Design Center

DISC AND BELT SANDER SAFETY

1. **Always wear safety glasses** when operating the sanders.
2. **NEVER wear gloves** when operating power equipment like grinders and sanders (make sure your parts are properly deburred before taking them to a sander). Many fingers have been SEVERELY INJURED from users who willfully broke this rule thinking any hand protection is better than no hand protection, and were wrong.
3. **Pedestal and table must be adjusted to within 1/8" of the disc or belt at all times.**
4. **Never operate sanders without all guards in place**. Be cautious to **keep your fingers away from the motor belt and pulleys**, as these are common pinch points.
5. **On the disc sander <u>always use the downward motion side of the disc to sand</u>. Never use the upward motion portion of the disc, as this can throw the workpiece upwards towards the operator's face with TREMENDOUS force.**
6. **<u>Always place the workpiece against the table on the sander.</u> NEVER BRING A FREELY SUPPORTED WORKPIECE INTO CONTACT WITH THE ROTATING DISC, EVEN FOR A SECOND!**
7. **Gently move the workpiece side-to-side across the full width of the belt or full radius of the disc to evenly distribute heat and wear.**
8. **Do not sand parts that are extremely hot,** as doing so will destroy the sanding disc or belt. Frequently cool the work using a nearby metallic water container (do not dump this down the sink drain due to the metallic debris).
9. **Do not use the sander for bulk (i.e. more than 1/8") material removal, as doing so prematurely wears out the abrasive discs or belts**. Rather, (re)cut the workpiece in the bandsaw or other cutting machine and then sand if necessary.
10. **Do not operate machines with torn discs or belts.**
11. **Never sand materials that produce hazardous dust or fumes.** Materials such as asbestos, beryllium, cadmium, lead, and galvanized coated metals must never be sanded in the SDC.
12. **Control your short term exposure to non-hazardous materials.** When sanding non-hazardous materials like wood, steel aluminum, fiberglass, or carbon fiber for more than a few minutes (or sanding pieces repeatedly), wear a particulate mask.

MAE Student Design Center

DRILL PRESS AND HAND DRILL SAFETY

General:

1. **ALWAYS wear safety glasses and NEVER wear gloves**, as they can catch on the rotating tool and pull your hands into the cutting zone.
2. If using a drill chuck that takes a key, **always remove the chuck key from the spindle immediately after tightening/loosening.**
3. **Never return a drill bit to the wrong location.** Note where each drill bit comes from and return it to the proper location for the next user. If a burr is created during use that prevents the drill bit from being returned to the drill index, carefully file the burr to remove it.
4. **Facility drill bits are only for use cutting non-ferrous materials using the vertical drill presses.** If cutting steel, iron, or other ferrous metals, students must provide their own drill bits. Users must also provide their own drill bits when using hand drills. No exceptions.

Clamping the Workpiece:

5. Always clamp the workpiece in a vise or directly to the drill press table. **Never use your hands to hold the part to be drilled, as the drill bit can snatch a handheld workpiece and cause severe lacerations.**
6. Attach smaller sheetmetal pieces to a larger plate or board which can be clamped in the vise or to the drill press table directly using the provided clamps at the drill press station.
7. **Vises must always be secured to the table using C-clamps or rotated so they contact the rear vertical support column** to prevent the vises from spinning when the drill bits break through.
8. **Always support the workpiece on parallels or a sacrificial backing board when drilling thru material to prevent drilling into the machine table or vise.** If using parallels, be certain not to drill into them, as this will destroy both the drill bit and the parallels.

Drilling:

9. **Never touch the drill bit or chuck when the machine is in motion.** Likewise, never attempt to slow the spindle with your hand after turning off the power. Let the spindle stop on its own to avoid lacerations from sharp burrs on the drill chuck.
10. **Run drills at an appropriate speed for the diameter of drill bit and material used.** Larger drill bits require slower speeds. Consult the speed chart for recommended speeds. A high pitch squealing noise indicates the speed needs to be lowered immediately.
11. **Always use cutting fluid when drilling holes,** as it greatly extends the usable life of the drill bits by providing lubrication and reducing the temperature in the cutting zone.

(DRILL PRESS AND HAND DRILL SAFETY CONTINUED ON NEXT PAGE)

Drilling (con't):

12. **Don't use excessive force when drilling;** let the drill bit do the work. If excessive force is required, the drill bit is either damaged or spinning backwards, or the workpiece material may be harder than the drill bit (in which case a more expensive carbide drill bit would be needed).
13. **When drilling holes, withdraw the drill bit frequently to evacuate chips;** this is called peck drilling and prolongs tool life. Apply oil frequently as you peck drill.
14. **Reduce drilling pressure as the drill bit breaks through the bottom of the material**, as this is when the majority of damage to the drill bit cutting edges occurs.
15. **If the drill bit binds in a hole, stop the machine and turn the spindle backwards by hand to release the bit.** Consult a safety steward before proceeding.
16. **Always use ¼" step-**ups when drilling larger holes. For example, if drilling a 3/8" hole through a workpiece, start with a ¼" drill and finish with a 3/8" drill.
17. **Don't drill holes larger than ½" in metal on the drill presses.** Drill presses in general lack sufficient stiffness to drill holes larger than ½" in metal, resulting in damaged drills and drill chucks. Use a milling machine in the MAE student shop instead for these larger features.
18. **Never remove chips with your hands, as they can cause lacerations (even when the drill press is turned off) and can pull your hand into the rotating drill bit.** Remove chips with a rag after the spindle has ceased rotating.
19. When releasing the drill bit from the chuck, make sure the power is off and **hold the drill bit with a rag** while loosening the chuck to ensure it does not drop on the table. The rag will protect your hands against the elevated temperature resulting from the drilling action.

MAE Student Design Center

ELECTRICAL SAFETY

Extension Cords:

1. Extension cords must **exceed the power rating** of the device being used.
2. Extension cords should **only be used on a temporary basis** and must **not be used to provide permanent power** to a machine or work area.
3. Extension cords should be **inspected regularly** for damaged sockets, loose or bare wires, or pinched insulation, and taken out of service at first notice of deterioration.
4. **Extension cords which feel hot should NEVER be used.**
5. Extension cords should **never be attached to any structure by using staples.**
6. Never risk pinching extension cords in doors, windows, or under heavy objects which could damage the cord's insulation.
7. **Keep extension cords out of high-traffic areas like doorways or walkways where they pose a tripping hazard.** Each year, thousands of injuries involving fractures, lacerations, and sprains caused by people tripping over extension cords are treated in emergency rooms. If temporarily routing an extension cord across an area where others may walk, **tape the cord to the floor** to mitigate the tripping hazard.
8. **Insert plugs fully** so that no part of the prongs are exposed when the extension cord is in use.
9. Ensure all extension cords are **certified by a nationally recognized testing lab** such as UL or CSA and never use cords which have been modified, as they present an electrocution hazard.

Lockout / Tagout Procedures:

Lockout / tagout procedures must be used to ensure any electrically powered machine is isolated from all potentially hazardous energy before performing maintenance activities where the inadvertent activation of the machine could cause injury. Lockout / tagout procedures are also used to disable a damaged machine to prevent injury to other users until the maintenance supervisor can assess and repair the machine.

1. **Turn the machine off in the normal fashion** (depress stop button, activate toggle switch, etc).
2. **Unplug the machine's power cord** from the wall receptacle.
3. **Retrieve the lockout / tagout kit** from the main facility safety cabinet.
4. **Install a lockout cover and padlock over the machine's power plug** to prevent reconnection to wall receptacle or other type of power supply.
5. **Contact the facility manager and report the machine problem** (mjb@ufl.edu). Once the facility manager assesses and repairs the machine, the lockout cover and padlock will be removed and the machine will be placed back in service.
6. ***REMOVING A LOCKOUT COVER YOU DID NOT INSTALL WILL RESULT IN IMMEDIATE AND PERMANENT REVOCATION OF FACILITY PRIVILEGES, SINCE DOING SO COULD CAUSE SEVERE INJURY TO YOU OR ANOTHER EQUIPMENT USER.***

MAE Student Design Center

GRINDER SAFETY

All Grinders:

1. **Always wear safety glasses or goggles AND FACE SHIELDS** when operating grinders. Wire wheel brushes are also extremely hazardous as they throw steel wire strands at high velocity, so always wear face-shields when using powered wire wheels.
2. **Never wear gloves** when operating power equipment like grinders and sanders (make sure your parts are properly deburred before taking them to a grinder). Many fingers have been SEVERELY INJURED from users who willfully broke this rule thinking any hand protection is better than no hand protection, and were wrong.
3. **Never operate a grinder alone or without instruction from a safety steward.**
4. **Never operate abrasive wheel machinery** (i.e. bench grinders, angle grinders, abrasive chop saws, pneumatic cutoff saws, die grinders, etc.) without all guards in place.
5. **Report cracked, broken, dropped** (even if it looks fine, as such wheels may break and fly apart upon startup or use), **or vibrating wheels to the facility staff** so they can be taken out use.
6. **Never grind aluminum or other nonferrous metals on grinding wheels**, as doing so can clog the wheels, causing them to overheat and explode. Sanders are for nonferrous materials.
7. **Always bring the workpiece into contact with the grinder (or vise-versa) GENTLY** to prevent shattering the fragile grinding wheel.
8. **Be EXTREMELY cautious of your fingers and knuckles around grinders and wire brushes.**
9. **Never use excessive force while grinding**, as one slip can result in your hand contacting the wheel and being rapidly abraded.

Pedestal / Bench Grinders:

10. **Tool pedestals on pedestal grinders must be adjusted within 1/8" of the wheels at all times.**
11. **Stand to one side of the wheel(s) when starting grinders** in case of wheel damage.
12. **Only grind on the outer face of the grinding wheel, NEVER on the side.**
13. **Always hold work securely while grinding and press it firmly against the toolrest for support; never bring freely supported workpieces into contact with the grinding wheel**.
14. **Use locking pliers (i.e. *Vise-grips*) to hold small pieces.**
15. **Never touch any part of the grinding wheel.** If the grinder is running, your finger(s) can get pulled between the grinding wheel and the steady rest. It is often impossible to discern if a grinder is running, so even if it appears to be off, NEVER touch any part of the wheel.

(GRINDER SAFETY CONTINUED ON NEXT PAGE)

Portable (Handheld) Grinders:

16. **DO NOT UNDERESTIMATE HOW DANGEROUS HANDHELD GRINDERS CAN BE**; if they catch on the workpiece they can suddenly be thrown towards your body causing SEVERE injury.
17. **Only operate handheld grinders which have the disc guard in place**; otherwise, a broken wheel can cause INCREDIBLE injury to your body or face.
18. **Always place handheld grinders wheel-side up on tables so if the switch is stuck on when you plug it in, it will not spin uncontrollably, causing serious injury.**
19. **Always operate handheld grinders with both hands for maximum control**; doing this safely requires clamping your work securely in a vise or to a table.
20. **Apply EXTREMELY LOW pressure between the grinder and the work**, realizing grinding in general is a slow process and especially so when you are supporting the grinder by hand. If high pressure is applied and the grinder slips off the workpiece, the user will be injured or the surrounding environment will be damaged.
21. **Unplug hand grinders** (and other hand operated power tools) **before changing wheels or adjusting wheel guards to prevent injury due to accidental triggering.**

MAE Student Design Center

PLASMA CUTTER SAFETY

General Safety:

1. **Wear the darkly tinted glasses to protect your eyes.** While less bright than welding, plasma cutting uses an electric arc that is bright and cause damage to unprotected eyes.
2. **Wear gloves** as there are lots of hot sparks created during the plasma cutting process.
3. **Wear proper (rugged) footwear and pants** as the molten sparks from plasma cutting can easily burn through thin fabrics.
4. **Wear ear protection** to protect from the high velocity air leaving the cutting torch nozzle.
5. **NEVER plasma cut painted, galvanized, greasy, oily, or dirty metals,** as the superheated fumes can be toxic.
6. **Always use the *Hot Work Safety Checklist* prior to using the plasma cutter.**
7. **Never cut or weld any container that has held flammable materials**, regardless of how well it's been rinsed; MANY PEOPLE HAVE LOST LIMBS OR LIVES AFTER MISTAKENLY BELIEVING A CONTAINER WAS CLEAN ENOUGH TO CUT. If you must cut this type of container, pay an expert at a local welding shop to risk their life and bodily injury.

Setup:

1. Make sure the air valve is turned to the ON position (in line with the air line) and turn plasma cutter on using the main power switch on the front of the machine.
2. Clamp the workpiece to the table in a manner that ensures the cutting zone is overhanging the table. NEVER RISK CUTTING INTO THE TABLE, AS THAT IS BLATANT DISRESPECT.
3. Clamp the ground cable to the welding table / workpiece.
4. Draw a cut path with a sharpie; ***again, check that the cut path is clear of the welding table so the plasma arc doesn't cut into it***.
5. **If starting in the center of a workpiece (as opposed to an edge), drill a ¼" starter hole to prevent premature damage to the cutting tip and related consumables.**
6. Turn the air and power OFF when done using the plasma cutter.

Use:

1. **Close the welding curtain** when plasma cutting to protect those outside the area.
2. **Call "EYES" before starting your cut**, to ensure those around you are ready and protected.
3. **Keep the plasma torch 1/16" - 1/8" ABOVE the workpiece; never drag the tip across the part (i.e. make contact with the part)**, as doing so will ruin the tip and its ability to cut properly.

MAE Student Design Center

SHEETMETAL EQUIPMENT SAFETY

1. **Always wear safety glasses** when operating sheetmetal equipment because material drops can be ejected at high velocity.
2. **Wear gloves when working with sheetmetal on non-powered machinery**, as the edges are extremely sharp and can result in deep lacerations. Inspect gloves for holes prior to use.
3. **NEVER operate sheetmetal equipment in tandem with a second person**, as the slightest miscommunication can result in severed fingers.
4. **Abide by the maximum material thickness the equipment is designed to cut.** Maximum capacity is noted on each machine; ask a safety steward if unsure.
5. **NEVER cut or bend round material or wire on the sheetmetal shears or brakes,** as this equipment is only for thin sheet metal. This rule also applies to hand shears (large scissors).
6. **Dispose of all material drops or scraps before leaving each machine station.**
7. **Debur sheetmetal IMMEDIATELY after cutting and APPLY RUBBER EDGE TRIM to any sheetmetal edges which may come into contact with someone's hand or body.**

MAE Student Design Center

WELDING SAFETY

General:

1. **Due to the hot work nature of welding, it MUST ONLY be performed in the designated welding shop,** never in the main air conditioned work areas.
2. **Everyone in the welding area must wear welding helmets and natural fiber welding jackets**. Never weld with any part of your body uncovered. Natural fiber clothing is required because it will not melt onto your body in the presence of the extreme heat produced by welding.
3. **Do not wear contact lenses if welding for more than a few minutes**, as the intense light from arc welding can irritate your eyes with prolonged exposure.
4. **Wear proper footwear and pants** to protect your body from sparks and molten metal.
5. **Use the industrial fume extraction hood** to ensure adequate ventilation of shielding gases.
6. **Use the roll-around welding curtain** to protect others from optical injury.
7. **Clearly communicate when you START and STOP welding so no one gets flashed with the arc by calling *"EYES"* before starting and *"RAISE HELMETS"* when finished.**
8. **Always assume EVERY PART on the welding table may be HOT and touch cautiously.**
9. **NEVER weld on painted, galvanized, greasy, oily, or dirty metals,** as the fumes can be toxic and the welds will be contaminated and will fail in use.
10. **Allow for proper ventilation when brazing or soldering, as some fluxes are toxic.**

Explosion / Fire Prevention:

11. **Keep a fire extinguisher nearby** and know how to operate it.
12. **Always use the *Hot Work Safety Checklist* prior to using the welder.**
13. **Never cut or weld any container that has held flammable materials**, regardless of how well it's been rinsed; MANY PEOPLE HAVE LOST LIMBS OR LIVES AFTER MISTAKENLY BELIEVING A CONTAINER WAS CLEAN ENOUGH TO CUT. If you must cut this type of container, pay an expert at a local welding shop to risk their life and bodily injury.

Gas Cylinder Handling:

14. **Always strap gas cylinders to welders**, welding carts or fixed objects (like walls). **Never allow gas cylinders to free stand**. Replace the safety cap on cylinders when not in use.
15. **Avoid handling gas bottles with greasy hands, gloves or rags**. Fatal explosions have resulted because of accidental tank tipping.
16. **When changing regulator ensure your hands are not contaminated with oil** – oxygen and oil can result in explosion with the metal regulator is tightened down.

MAE Student Design Center

WELDING / HOT WORK SAFETY CHECKLIST

WORK AREA

☐ YES ☐ NO **1. Is the work area clear of ALL flammable chemicals and oil deposits?**

☐ YES ☐ NO **2. Is the work area clear of ALL combustible materials, including paper products, dust and trash cans?**

☐ YES ☐ NO **3. Is the entire welding area suitable for hot sparks (i.e. the walls, floor, etc.)?**

☐ YES ☐ NO **4. Is the welding area closed off from view via welding curtains?**

☐ YES ☐ NO **5. Does the welding area provide adequate ventilation for the users?**

☐ YES ☐ NO **6. Is a fire extinguisher within 10 feet of the welding area and do you know how to use it?**

☐ YES ☐ NO **7. Are you prepared to treat EVERY workpiece on the welding table as if it may be EXTREMELY HOT and exercise the respective caution?**

PERSONAL SAFETY EQUIPMENT (PPE)

☐ YES ☐ NO **8. Are all persons performing welding wearing heat resistant footwear?**

☐ YES ☐ NO **9. Are all persons performing welding wearing long natural fiber pants?**

☐ YES ☐ NO **10. Are all persons performing welding wearing natural fiber welding jackets?**

☐ YES ☐ NO **11. Are all persons performing welding wearing welding gloves?**

☐ YES ☐ NO **12. Are all persons performing welding wearing welding helmets and safety glasses?**

WORKPIECES

☐ YES ☐ NO **14. Are all workpieces clean and free of oil, rust, paint, or other coatings? For example, never weld galvanized coated materials because the fumes produced by the intense heat are toxic.**

☐ YES ☐ NO **15. Was alcohol or acetone used to properly clean the parts to be welded? NEVER use cleaners containing chlorine (i.e. aerosols like brake cleaner) to clean parts for welding, because the chlorine gas will be converted into Phosgene, which is LETHAL IN THE SMALLEST DOSES.**

☐ YES ☐ NO **16. Is the workpiece a container that has held combustible materials or flammable solvents like gasoline, acetone, etc.? *If so, STOP and DO NOT WELD ON IT, regardless of how well you think or have been told it's been rinsed.* MANY PEOPLE HAVE LOST LIMBS OR LIVES AFTER MISTAKENLY BELIEVING A CONTAINER WAS CLEAN ENOUGH TO WELD. Containers MUST be welded by a professional, WITHOUT EXCEPTION.**