

## CLASSROOM MAKERSPACE GUIDELINES

This policy is specific to Makerspaces in classrooms and not designated TAA facilities.

### A Makerspace

is a collaborative learning environment where students can come together to share materials and learn new skills. Makerspaces are not necessarily born out of a specific set of materials or spaces, but rather a mindset of community partnership, collaboration, and creation. Makerspaces focus on the development of a wide range of skills including everything from woodworking and sewing to electronics, laser cutting, and 3D printing. Makerspaces vary widely and can consist of everything from a simple cart filled with arts and crafts materials to a high-tech lab with 3D printers, laser cutters and hand tools, but **Makerspaces are not about the tools; they're about enabling making.** At the heart of the Makerspace movement is a culture of participatory learning.

Existing classrooms are not TAA facilities and will not have dust collectors, exhaust fans or likely appropriate electrical capacity or space for the proper placement of power tools. Therefore, **any Makerspace must be age appropriate and suitable to the classroom space they occupy.** The use of small hand held power tools maybe permitted as long as approval for the use of the hand held power tool and set up of the Makerspace has been approved by the Director of Operations or his delegate. The use of large, stationary power tools is not permitted in a classroom Makerspace.

Makerspace users must be trained in the safe use of operating tools before using them independently. Signage must be posted on each machine to explain its ideal application and key safety guidelines.

Extension cords may only be used for temporary power to a tool and must be positioned so that they are not a trip hazard. Approved power bars must be secure prior to use.

Tools need to have enough space to be operated safely and not endanger the operator or other people in the space. People need to concentrate when trying new tools, especially ones that can injure. Make sure there is enough space to use a tool safely. Work areas need to be well lit and clean. Ventilation and/or air filtering is required for many tools that produce fine airborne particles.

The equipment itself needs to be as safe as possible. Tools should be well maintained and not have safety features removed or defeated. When acquiring new tools spend the extra money on models with advanced safety features.

First-aid kits must be visible and easily accessible throughout your space. Post clear and visible warning signs on all equipment or where necessary.

**Prepare**

- Safety is your top priority when using the shop. If you are not sure what you are doing, ask.
- Safety tests done prior to use.
- Know all the locations of all first aid, fire, eye wash stations and safety equipment.
- Never use a tool unless you've been trained to use it safely.
- Never work alone when using power tools. Two persons must be present and be able to see one another.
- Sign in before using any equipment.
- Do not work in the shop if tired, ill or on medication or in a hurry.
- Do not fool around, startle or distract anyone (not even with a conversation) while either one of you is using a tool.
- Think through the entire job before starting. Prepare prints, sketches or drawings with all dimensions and specifications prior to using machines.

**Use Tools Right**

- Use tools only as they were designed to be used (a wrench is not a hammer).
- Never use a broken tool.
- Report any broken tools or machines immediately.
- Do not remove tools from the room.
- Return tools to their storage area.
- Never walk away from a tool that is still on.
- A hard hammer should not be used to strike a hardened tool or any machine part. Use a soft-faced hammer.
- Operate machines only with all required guards and shields in place.

**Specific Safety Guidelines**

Tools are safe when used responsibly. But even simple hand tools can cause accidental scrapes, cuts and pinches. Hammers can crush or produce flying debris. Here are some

other more specific safety guidelines often connected to certain kinds of tools. Appropriate personal protective equipment such as goggles, earplugs, gloves, etc. must be used at all times.

- Secure your work when using hand or power tools. Always use clamps, not your hands, to hold a work piece on a drill. If the tool binds, the work will spin dangerously.
- Aim away from yourself. When cutting with a utility knife, position yourself so that when you slip, the blade doesn't land in your flesh.
- Wear a particle mask when appropriate to avoid breathing dust and other particulate pollutants common in workshops. Sawdust from treated wood and some plastics have known health risks.
- The high-decibel noise generated by power tools such as table saws and circular saws can damage your hearing. Protect your ears by using full-sized, earmuff-style protectors.
- Wear appropriate clothing for the job, do not wear loose-fitting clothing around moving or rotating machinery.
- Remove ties, jewelry, gloves, etc. especially around moving or rotating machinery.
- Tie back securely or cover long hair to keep it away from moving machinery.
- Wear only shoes that cover the entire foot, no open-toe shoes or sandals.
- Wear suitable gloves when handling hot objects, glass, or sharp-edged items.
- **Flying objects.** Safety glasses must be worn at all times in the shop, to protect eyes from flying debris. Enforce eye protection at all times.
- **Invisible dangers.** Safety doesn't only mean avoiding gushing blood. Foster good habits of consumerism by encouraging your students to choose materials with full knowledge of the potential long-term effects of their use. For example, never use a laser cutter to cut PVC or other chlorinated plastics. Lexan and PC board are also strongly discouraged. PVC gives off chlorine gas, which is dangerous for any nearby people and also highly corrosive to the machine. Many shipments are accompanied by a material safety data sheet (MSDS), and if they aren't, then these are usually accessible online.
- **The air you breathe.** Respirators (masks) should also be worn when sanding with either a power sander or by hand. Any kind of soldering generates fumes from the rosin core of the solder so the area should be ventilated. Under normal soldering conditions, solder containing lead poses no health risk, though makers should be

encouraged to wash their hands after a long period of handling leaded solder. Lead-free solder is available but less recommended because rosin core gives off much more toxic fumes when soldering, is more corrosive to soldering tips, requires higher temperatures to solder with, and is generally harder to work with than leaded rosin core solder.

- **Note the name: “power” tools.** They are powerful. Some power tools are heavy and should be not be used by makers who don’t have the strength to control the tool well. Power tools can grab anything that dangles near them.
- **Multiple risks.** Electric saws have high-power moving blades that can quickly cause traumatic injuries. However, the chance of injury is small when properly maintained and used with care and attention. In addition to safety glasses, respirators (masks) and earplugs must be worn during use of electric saws.
- **Fire.** Heat guns and handheld torches can generate fires if used without proper attention to the work and surrounding areas.
- **Burns.** Make sure there’s cool running water nearby for burns. Use the lower-heat glue guns when possible. The tip of a soldering iron heats to about 400°F, hot enough to cause burns. It should be handled attentively. Steam irons (used in sewing) do get hot enough to cause burns.
- **Sewing** can cause a small prick from a needle, but sewing machines and sergers both have enough power to put a needle through a finger when used carelessly. Sergers also have blades that can cut a finger.

## Safety Plans

Makers who display, operate or use any items that pose a danger to others - such as fire (including all heat-producing or open-flame devices, candles, lamps, etc.), explosions, internal combustion, flammable liquids, compressed gases, hazardous chemicals, launches, sharp or otherwise dangerous materials or tools - must have a safety plan in place to keep others safe.

Safety plans make you and your students more confident that you are all aware of the foreseeable risks, considered possible consequences and have taken all the precautions you could to ensure everyone’s safety.

At a Maker Faire safety plans are necessary for any projects that would display, operate or use any of these:

- Lamps and other heat-producing devices including hot glue guns (use low temperature glue guns).
- Open flames, burners, candles, etc.

- Internal-combustion engines (which is not appropriate in classrooms).
- Flammable liquids, compressed gases or dangerous chemicals including propane and helium.
- Any potentially hazardous electrical/mechanical device or chemical/biological substance.

Safety plans typically include a description of the exhibit or demonstration, the names, qualifications and previous experience of people working the exhibit, a description of general safety precautions and the emergency plan. If the project includes fire, the safety plan should also describe the fuel source, how much is onsite, where and how it is stored, how much is burning and in what amount of time it burns and if the valve has an electronic propane sniffer.

### **Report All Injuries**

- Do not attempt to remove foreign objects from the eye or body.
- If chemicals get in the eye(s), wash eye(s) for 15 minutes in an open flow of water before proceeding for medical treatment.

### **Clean Up**

The area around the tools must be kept clean. Cleaning up is not just a measure of respect for the workspace, it also removes hazards. Regularly remove trash and debris. The cleanup policy must be followed strictly.

- Clean up every time whenever you leave an area, including sweeping the floor.
- Clean and return all tools to where you got them.
- Use compressed air sparingly; never aim it at another person or use it to clean hair or clothes.
- Shut off and unplug machines when cleaning, repairing or oiling.
- Never use a rag or brush near moving machinery.
- Use a brush, hook or a special tool to remove chips, shavings, etc. from the work area. Never use the hands.
- Keep fingers clear of the point of operation of machines by using special tools or devices, such as push sticks, hooks, pliers, etc.

- Keep the floor around machines clean, dry and free from trip hazards. Do not allow chips to accumulate.
- Mop up spills immediately and put a chair or cone over them or close the space if they are wet enough to cause someone to slip.