



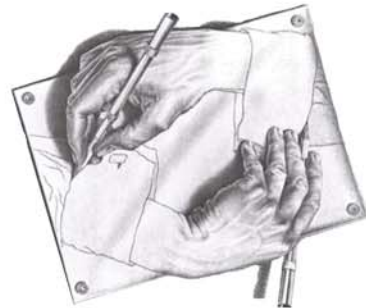
afety Manual



ASK



THINK



PLAN

University at Buffalo
School of Architecture and Planning
Material and Methods Shop
Director: Dick Yencer

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The Materials and Methods Shop, located in Parker Hall, is available for school-wide projects and independent work throughout the academic year. This complete machine and assembly shop, one of the finest in any U.S. architecture school, contains 7,000 square feet of high-bay space and is open days, evenings, and weekends. The facility is supplied with full woodworking capabilities, welding and milling equipment, lathes, sheet metal machines, a vacuum-forming machine, and a variety of hand tools.

Richard C. Yencer is the director of the Materials and Methods Shop.

Shop Goals:

- To be a safe place to explore talents and materials
- To be a safe place to learn new skills and proper safety habits
- To be a safe place to develop and construct projects

Shop Motto:

- Learn by doing

Shop Facilities May Be Used By:

- School of Architecture and Planning students and faculty

This manual was written by Richard Yencer.....
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WHAT IS SAFETY?



Safety, though difficult to define because it is an attitude, can be described as “the minimization or elimination of injury and loss resulting from non-deliberate acts such as accidents.” Failure to develop safe and proper attitudes, habits and skills is the real culprit of accidents.

SHOP GUESTS AND VISITORS:

Any person who has completed the shop safety course may accompany shop guests and visitors. He or she is responsible for that guest/visitor. In addition, guests and visitors must check in at the front desk to receive permission to enter and be sure to have safety glasses and appropriate clothing. Visits to the shop will be as brief as possible.



POLICIES AND PROCEDURES

EYE PROTECTION:

Eye protection must be worn at all times in the shop facilities. Eyes must be clearly visible through lenses. Lens cleaner is available in the shop office.

Failure to wear eye protection will result in loss of shop privileges:

- First offense: Warning.
- Second offense: Loss of shop privilege for 2 - 4 days.
- Third offense: Loss of shop privilege until meeting with department chair and shop manager.

SAFETY CLASS REQUIREMENTS:

Every student must be registered with the school of Architecture and Planning.

Every student wishing shop privileges must satisfactorily complete all required shop safety courses before they become a shop user.

All shop users must have a valid UB identity card and sign "in" and "out" of the shop facility (procedures are posted in the shop).

INJURY CAUSING ACCIDENTS:

In the event of an injury-causing accident, the following procedures must be followed:

Notify the shop supervisor immediately! Shop personnel will follow established procedures.

All personal injury accidents require a meeting between the injured person and the shop manager before shop privileges will resume. The purpose is to determine the cause of the accident for the prevention of future accidents.

NON-INJURY ACCIDENTS:

In the event of accidents resulting in machine damage, material "kick-backs," jamming, or other unsafe events, the following procedure must be followed:

A meeting is required between the person involved in the accident and the shop manager before shop privileges resume. The purpose is to the cause of the accident so that it can be corrected.

SHOP OCCUPANCY REQUIREMENTS:

In order to maintain a safe shop environment strict user limits are enforced. Therefore, faculty should always schedule their shop related projects with the shop manager, at the semester's start.

The following are user limits:

- 0 to 20 students*: Requires one shop supervisor.
- 21 to 30 students*: Requires two shop supervisory personnel.
- 31 to 40 students*: Requires three shop supervisory personnel.

* These are only guidelines; the supervisor may restrict access at their discretion.

More than 40 students are not allowed in the shop at any one time. Exceptions may be scheduled with the shop manager with adequate notice and if additional supervisory personnel are available.

CLEANING OF SHOP FACILITY:

The shop facility is under the control of the School of Architecture and Planning and is not cleaned by UB's janitorial staff. Therefore, shop users are responsible for clean-up in the shop.

Each student is personally responsible for clean up and tool return.

Each student is required to assist in a general clean up of the shop at the end of the day or when deemed necessary by shop supervisory personnel.

Students failing in their clean-up responsibilities:

- First offense: Warning.
- Second offense: Loss of shop privilege for 2- 4 days.
- Third offense: Loss of shop privilege until meeting with department chair and shop manager.

STORAGE OF MATERIALS AND PROJECTS:

Special arrangements may be made for large materials storage. Such storage is only allowed for limited time periods and requires a specific removal date.

All materials stored beyond the deadline date will be donated to the shop.

When leaving material in the shop, place it neatly under the tables with your name and the date and time it was left.

GENERAL SHOP HOURS:

Shop Hours of Operation:

Monday	8:00 am	to	9:00 pm
Tuesday	8:00 am	to	9:00 pm
Wednesday	8:00 am	to	9:00 pm
Thursday	8:00 am	to	9:00 pm
Friday	Closed		
Saturday	10:00 am	to	4:00 pm
Sunday	10:00 am	to	4:00 pm

*The shop is closed when the University is closed and classes are cancelled.

MATERIAL RESTRICTIONS:

Particle Board, Homosote and MDF (medium density fiberboard) may be sawn, but not routed, planed or sanded.

The following materials are NOT ALLOWED in the shop facility:

- Music or Piano wire
- Fiberglass, Carbon fiber, and plastic resin
- Rubber casting (requires prior approval by EHS)
- Spray paint

GENERAL SAFETY RULES

- Every person must wear eye protection at all times in the shop.
- All accidents, no matter how small, must be reported to the shop manager or student staff on duty.
- A safe attitude will protect you and others.
- Remove all rings, wristwatches, necklaces and other jewelry before operating machinery.
- Avoid wearing loose clothing, and tuck in any baggy shirts or other clothing.
- Tie back/up long hair before operating any machinery.
- All safety guards must be kept in place while operating equipment. **DO NOT REMOVE!**
- While working in the metal grinding area, a protective faceshield is required at all times.
- Use equipment for its intended use. If in doubt, ask for help.
- No one should use equipment until they have received proper and safe instruction and feel comfortable operating it.
- Do not use plaster or hydrocal on any power machines.
- Always keep your eyes on your fingers, ears tuned to the sound of the machine, and nose tuned to the smell of smoke.
- Make sure the machine work surface is clean, unobstructed and ready for use.
- Make sure machines are in OFF position and wait by the machine until all motion has stopped.
- Clean up any mess. Wipe up any spilled liquids. Pick up materials. Sweep up dust and debris.
- If you have made an adjustment to a piece of equipment, return it to its normal position after use.
- Never make adjustments to a machine's part or knob that it marked in red.
- Students are not to attempt to make repairs. Notify shop manager or student staff for help.
- Do not use broken or damaged equipment. Report it to the shop staff immediately.
- Follow all special rules and regular safety procedures while using the equipment.
- Dispose of solvents, cleaners, chemicals and other hazardous materials of any kind in the proper containers.
- Return all tools to their proper place after use.
- Think, practice, and develop good safety habits.
- Respect the rights and property of other students.
- Respect your shop staff. If you have any disagreements that cannot be resolved, quietly wait and report to the shop manager.
- Horseplay, running, yelling, and or fighting is absolutely forbidden in the shop.
- Be thoughtful and helpful to other students in the shop.
- Stack and store projects neatly in assigned areas with a label of name, date and time of day.
- No used lumber is permitted on machines.
- Personal music devices are prohibited within the shop. (Mp3 players, Cd players, etc.)
- No smoking in the shop facility. University policy only allows smoking 50 feet away from building perimeters.
- Cell phone must be turned off. Vibrate and Silent are not off!
- These rules are designed to make the shop a safe place to work. Your cooperation will also make this a safe workplace.

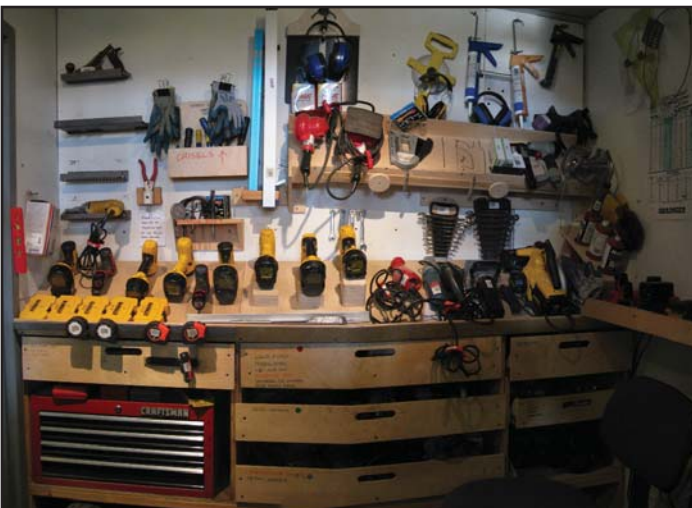
PORTABLE ELECTRIC TOOLS

DESIGN FUNCTION:

- Hand-held portable tools have specific functions. Check to be sure that you have the correct tool for the job.
- Treat all portable tools with the same respect as any power tool.

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating portable tools.
- Keep work area near hand tools clean and clutter free.
- Use the right tool for the job.
- Do not abuse electric cords.
- Keep hands clear of machine path.
- Secure work to bench when using electric hand tools.
- Do not over reach with electric hand tools.
- Make all adjustments on the tool with the power cord unplugged.
- Do not carry plugged in tools with finger on power switch.
- Use only grounded extension cords.
- Keep guards in place and working properly.
- Keep hands away from cutting portions of tool.
- Seek help if you are unsure of proper tool operating procedures.
- Unplug, clean, and put away idle tools, or when finished using tools.



WOODWORKING

Wood is either classified as hardwood or softwood. Hardwood comes from deciduous trees with broad leaves, trees that shed their leaves at the end of the growing season. Soft woods come from evergreens or needle bearing trees. Within both hardwoods and softwoods there is a range of soft and hard wood. For example, bass wood is a very soft wood, it has broad leaves that shed, thus making it a hardwood, the same as ash. Ash, however, is a much harder wood. Conversely, yellow pine has needle like leaves and does not shed them, yet it is much harder than bass wood. You will learn that within each classification of wood there is a range of soft to hard.

Woods can be challenging to work with, there is a distinct grain pattern, a range from soft to hard, open or closed grain and moisture factor that must be dealt with before you will be successful in building a project.



BELT AND DISC SANDER

DESIGN FUNCTION:

- For stock 6" long and shorter
- For sanding surfaces or edges
- For rounding or shaping edges
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Keep hands away from abrasive surfaces
- Make sure the belt is tracking correctly before use
- Make sure disc or belt is not loose or torn
- Do not sand stock if it is 1/4" or less in thickness
- Sand with the grain of the wood
- Never wear gloves or hold the work with a rag when sanding
- Always sand on downward side of the disc to keep the piece on the table
- Shut off power and wait for the machine to stop before cleaning and leaving



DRUM SANDER

DESIGN FUNCTION:

- For sanding carved pieces
- For sanding sharp edges
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Keeps hands away from abrasive surfaces
- Sand on the bottom of the drum
- Do not wear gloves or hold work with rag



EDGE SANDER

DESIGN FUNCTION:

- For sanding edges
- For material 6" or longer
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Keeps hands away from abrasive surfaces
- Do not wear gloves or hold work with rag
- Hold material with hands. Do not use clamps, pliers, etc.
- Start material at rest on the right
- Push material against the belt towards the left
- At the end of the belt, pull material away and repeat process if necessary
- Two people may operate the machine at the same time, one on each side
- Turn off machine and wait until it stops before cleaning and leaving



OSCILLATING SANDER

DESIGN FUNCTION:

- For sanding edges and inside corners
- For rounding and smoothing
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Keep hands away from abrasive surfaces
- Never wear gloves or hold work with a rag while sanding
- Select appropriate drum size for the job
- Change table insert to accommodate drum
- Hold stock firmly to table for best results
- Shut off power and wait for machine to stop before cleaning and leaving



SANDING TABLE

DESIGN FUNCTION:

- For sanding irregular shapes
- For use with handheld sanders
- Keeps dust to a minimum
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating sanders.
- Do not wear gloves or hold work with rag
- Lay material to be sanded on table
- Make sure dust collector is on
- Make sure dust collector gate is open
- Clean area when finished and return sander



SUPERMAX SANDER

DESIGN FUNCTION:

- For sanding stock to thickness
- For smoothing surfaces
- For making material uniform in thickness
- For material that is 12" or longer
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not sand stock less than 12" in length
- Cut only a 1/16" off with each pass or less
- Sand no stock that is less than 1/8" thick
- Do not sand used or painted material
- Shut off power and wait for machine to stop before cleaning and leaving



JOINTER

DESIGN FUNCTION:

- For shaving edges smooth
- For squaring edges of stock
- Edge grain only - not for flat surface
- For material 12" or longer
- Wood and Plastic Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not run stock less than 12" in length
- Depth of cut is preset to a 1/16"
- If the stock is below the top of the fence, you must use a push stick and paddle
- Do not run used or painted stock through jointer
- Feed work through so that knives cut with the grain
- Push stock through slowly to avoid ripples or tearing
- Do not adjust rear table
- Guards must be in place and used at all times
- Maintain a 4" margin of safety between you and the knives
- Make sure cutters have stopped before cleaning and leaving the machine



SURFACE PLANER

DESIGN FUNCTION:

- For planing stock to thickness
- For smoothing surfaces
- For making material uniform in thickness
- For material that is 12" or longer
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not plane stock less than 12" in length
- Do not plane stock less than 1/4" in thickness
- Do not plane used or painted material, MDF, Particle Board, Plywood or Foam
- Cut only a 1/16" or less off with each pass
- Shut off power and wait for machine to stop before cleaning and leaving



DRILL PRESS

DESIGN FUNCTION:

- For cutting holes in wood, metal or plastic when using the right cutter
- For drilling to depth or through stock
- Accessories are available for specialized work: mortise joints, etc.
- For wood, metal, or plastic

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- General rule: The larger the bit the slower the speed
- Always remove chuck key before starting the drill
- Change variable speed with motor running
- Make all other adjustments with power off
- Securely lock all bits into the chuck
- Have wood plate on metal table top
- Adjust table or depth to avoid drilling into the table
- Hold material to be drilled securely
- Plastic and metal must be clamped
- When making deep cuts, pull bit back to clear debris from hole
- When drilling metal, use WD-40 to keep the bit sharp and cool-this is located in the Drill Press Room
- Shut off power, remove bit, and clean machine when done



MORTISER HOLLAR CHISEL

DESIGN FUNCTION:

- For drilling square holes up to 1/2"
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not mortise material that does not have a flat surface
- Adjust drill bit and chisel so that they are not touching
- Remove chuck key before starting the machine
- Always hold work pieces against fence to prevent rotation
- Adjust depth stop to avoid drilling through the table
- Hole in chisel should be positioned to the right side facing the machine
- After the first cut, move work to the right so that chips may discharge freely
- Stop operating if you smell smoke
- Turn off power when down and clean machine and surface
- Do not wear gloves when operating this machine



ROUTER TABLE

DESIGN FUNCTION:

- For creating a rolling edge
- For creating decorative cuts
- For cutting dado grooves
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Feed stock from appropriate direction of work - check machine instructions
- Use extreme caution when routing through knots
- Keep fingers well away from bit
- Keep stock moving
- Hold stock firmly down to the table and tightly against the fence
- Make sure bit has stopped rotating before cleaning and leaving
- Different bits are available different cuts and edges



WOOD LATHE

DESIGN FUNCTION:

- For turning symmetrical pieces
- For creating original profiles on turned stock
- For creating bowls, platters and goblets

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Change variable speed with motor running
- Make all other adjustments with the power off
- Guards must be in place and used at all times
- Adjust tool rest height appropriately to center of work
- Keep tool rest as close to the work as possible
- Remove tool rest before sanding or polishing
- Double check setup before turning on
- Rotate work by hand to check for clearance
- Examine pieces for flaws, examine glue joints before starting
- When roughing off:
 - Do not jam tool into work piece
 - Do not make cut too big
- Disengage index pin before starting lathe
- Turning between centers
 - Make sure all tail stock is snug to work and locked
 - Lubricate tail stock center if it is not a ball bearing type
 - Check that screw fasteners do not interfere with tool at the finish dimension of the work piece
- Shut off power and clean
- Always operate lathe at the prescribed speeds:



DIAMETER OF WORK	ROUGHING OFF	GENERAL CUTTING	FINISHING
Under 2" diameter	900 - 1300 rpm	2400 - 2800 rpm	3000 - 4000 rpm
2" - 4" diameter	600 - 1000 rpm	1800 - 2400 rpm	2400 - 3000 rpm
4" - 6" diameter	600 - 800 rpm	1200 - 1800 rpm	1800 - 2400 rpm
6" - 8" diameter	400 - 600 rpm	800 - 1200 rpm	1200 - 1800 rpm
8" - 10" diameter	300 - 400 rpm	600 - 800 rpm	900 - 1200 rpm
Over 10" diameter	300 rpm	300 - 600 rpm	600 - 900 rpm

BAND SAW

DESIGN FUNCTION:

- For cutting free-hand curves
- For ripping stock into thin strips
- For cross cutting or ripping stock
- For cutting circles
- Wood or plastic only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Always maintain a 3" margin of safety
- Make all adjustments with the power off
- Adjust the upper guide to about 1/8" above stock
- Allow saw to reach full speed before beginning cut
- Hold stock flat on table top
- Do not cut stock that does not have a flat surface
- Feed stock only as fast as teeth will remove material
- Avoid backing out of cuts when possible
- Plan relief cuts in advance and cut first
- Do not make turns too tight - listen for blade twisting
- For cutting smaller pieces use the provided push sticks
- If "clicking" noise is heard, SHUT OFF POWER, the blade is damaged
- Stop machine and blade before removing scrap pieces
- Shut off and stop blade before cleaning and leaving



COMPOUND SLIDING MITRE SAW

DESIGN FUNCTION:

- For cross cuts only
- For simple mitres
- For compound mitres
- For dado cuts

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not remove or hold guards up while operating machine
- Make all adjustments with the power off
- Pull saw out, start saw, push down, and push in
- Never use the machine with arms crossed. The machine can be use with the left or the right hand
- Tuck thumb in tight to index finger
- Stop operating immediately if you smell smoke
- Wait until blade has stopped before removing material from machine, cleaning, and leaving



DESIGN FUNCTION:

- For making cuts or dados in wood
- For cuts that cannot normally be done on the table saw
- For cutting angles 0 to 90 degrees

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Ask for staff assistance for first time use
- Adjust track to hold material snugly
- Adjust blade to proper depth
- Wait for saw to come to full speed before making cut
- Wait for blade to stop before removing material, cleaning, and leaving



PANEL SAW

DESIGN FUNCTION:

- For straight cuts on panel board material
- For ripping or cross cutting large sheets
- Wood Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Keep hands out from under saw carriage
- Do not wear gloves when operating the machine
- Place stock on carriage, backside facing out for best results
- Do not drop material on roller carriage
- Feed stock through saw slowly and smoothly (for rip cuts)
- Feed stock against rotation of blade - follow arrow on saw
- Lock carriage rip lock when saw is not in use
- Tighten all adjustments to a snug fit only
- Leave saw at bottom and wait for blade to stop before removing material, then return saw to top position
- Shut off and wait for saw to stop before cleaning and leaving



SCROLL SAW

DESIGN FUNCTION:

- For making fine, small scroll designs
- For cutting wood a 1/2" thick or less
- For cutting plastic a 1/8" or smaller with slow speed
- Wood or plastic only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- This is a free hand machine
- Adjusting the blade-ask Staff for assistance if different blade is needed
 - Loosen tension to "0"
 - Loosen top thumb nut on blade
 - Lift head and place material over blade
 - Lower head, place blade under thumb nut, and tighten
 - Tighten tension to "5"
- Make sure blade teeth are pointing down
- Keep "hold down foot" tight to work
- Note "hold down foot" is also a blade guard
- Keep finger out of line of cut
- Feed stock slowly and hold firmly to table
- Turn off machine and wait for blade to stop before cleaning and leaving



TABLE SAW

DESIGN FUNCTION:

- For straight cuts only
- For ripping stock only
- For materials that are longer than they are wide
- For material up to 24" wide

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- NOT a free hand machine
- Make all adjustments with the power off
- Use fence when ripping - NEVER CUT FREEHAND
- Hold work firmly or against mitre gauge
- Right and left hand pushes material to front of the guard
- Remove left hand and continue to push past guard with right hand
- Set blade so that it extends only a 1/4" above stock
- Stand to one side of operating blade
- Do not reach across operating blade
- Keep hands at least 4" away from blade when cutting
- Always use a push stick to clear scraps from cutting table
- Move rip fence out of the way when cross cutting
- When ripping, push stock between blade and fence - until material clears blade
- Push stock beyond the blade when cutting
- Always use a push stick when ripping narrow stock
- Shut off power, wait for blade to stop, then remove any scraps and clean the machine



METAL WORKING

Metals are common, easily available materials at your disposal for architectural projects. Metals provide opportunities for bending, forming, welding and brazing which wood may not allow. Being aware of metal working capabilities in the shop can open up a whole new world of possibilities in designing and building projects.

In addition to welding and bending, the shop has machines for cutting and shaping metals. These tools are the milling machine, metal bandsaw, metal-lathe and sheet metal cutter. A wide variety of reading materials on metal working are available in the shop office. In addition, every semester upon request, there are welding classes. The staff is also available for questions and help.



BENCH GRINDER

DESIGN FUNCTION:

- For grinding ferrous metals (mild steel and hard steel)
- Metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Wear gloves to protect from sharp edges and hot metal
- Always wear a face shield when operating grinders
- Have cooling pail or water nearby
- Do not grind non-ferrous metals (brass, bronze, aluminum, copper)
- Clean area when finished



METAL SANDER

DESIGN FUNCTION:

- For metal 12" long and shorter
- For sanding surfaces or edges
- For rounding or shaping edges
- Metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Keeps hands away from abrasive surfaces
- Make sure the belt is tracking correctly
- Make sure belt is not loose or torn
- Do not sand stock if it is 1/4" or less in thickness
- Wear gloves and protective face shield
- Shut off power and wait for the machine to stop before cleaning and leaving



ENGLISH WHEEL

DESIGN FUNCTION:

- For making custom curves in sheet metal
- Sheet metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- This is a free hand machine
- It is recommended that you wear gloves
- Do not place hands near wheels



METAL BENDER

DESIGN FUNCTION:

- For bending solid metal (cold)
- For bending tubing metal (cold)
- For bending angle iron (cold)
- For bending pipe (cold)
- Metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not bend tool steel
- Mild steel only
- Setup instruction book is located on rack with dies



RING MACHINE

DESIGN FUNCTION:

- For forming circles from metal strips or rods
- Metal Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Make multiple passes while gradually increasing pressure



SHEET METAL SHEAR

DESIGN FUNCTION:

- For cutting sheet metal up to 16 gauge thickness
- For cutting sheet metal at angles
- Sheet metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not remove or readjust any guards
- Wear gloves to protect hands from sharp edges
- DO NOT cut wire or rod on machine
- Clean area when done



SHEET METAL BREAK

DESIGN FUNCTION:

- For bending sheet metal up to 16 gauge thickness
- Sheet Metal Only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Wear gloves to protect hands from sharp edges
- DO NOT bend wire or rod on this machine
- When finished replace all parts if you have readjusted the machine
- Clean area when done



SHEET METAL ROLLER

DESIGN FUNCTION:

- For rolling sheet metal
- For making cones
- For making cylinders
- Sheet Metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Wear gloves to protect hands from sharp edges
- DO NOT use wire or rod on machine
- Clean area when done



HORIZONTAL BAND SAW

DESIGN FUNCTION:

- For cutting solid or hollow metal stock to length
- For straight cuts and mitres
- For material over 1/4" thick
- Metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Make all saw blade adjustments with power off
- Adjust blade guides prior to use
- Make sure both green lights are on before starting saw
- Stop saw before putting in or removing stock from vise
- Always have stock firmly clamped
- Make sure blade is not touching stock when turning on
- Keep hands and fingers away from blade when saw is running
- If "clicking" noise is heard, SHUT OFF POWER, the blade is damaged
- Never let saw blade drop on the work piece
- Stop machine before removing waste



ALUMINUM BAND SAW

DESIGN FUNCTION:

- For cutting solid or hollow aluminum
- Can be used for freehand work on thin aluminum
- Aluminum only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Make all adjustments with power off
- Adjust blade guides prior to use
- Make sure blade is not touching stock when turning power on
- Keep hands and fingers away from blade when saw is running
- Stop machine before removing waste



METAL LATHE

DESIGN FUNCTION:

- For turning metal, plastic or wood
- For turning stock symmetrically around a point
- For creating original profiles on turned stock

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- It is recommended that you wear a face shield
- Make all adjustments with the power off
- Use recommended speeds for materials being turned
- Guards should be in place and used at all times
- Adjust tool rest height appropriately so it is roughly centered on stock
- Keep tool rest as close to the work as possible
- Double check setup before turning power on
- Rotate work by hand to check clearance before starting
- Be sure to use correct cutter for the job
- General Rule: The harder the material the slower the speed
- Shut off power and clean lathe before leaving



MILLING MACHINE

DESIGN FUNCTION:

- For making accurate inside or outside cuts
- For cutting gouges, dados and grooves
- For surfacing
- For drilling
- Metal, plastic, or wood

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Stop machine before removing waste
- Never reach by a rotating cutter
- Make sure cutter is properly installed
- Tighten all adjustments snugly
- Shut off power and clean before leaving



PLASMA CUTTER

DESIGN FUNCTION:

- For cutting metal up to 1/2" thick
- Free hand machine
- Metal only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Always wear colored face shield or welding helmet
- Always wear gloves
- Protect feet from hot sparks
- Produces ultra-violet rays, protect skin from plasma burn

SETUP MACHINE:

- Check the compressor, it must be on
- Start machine:
 - Turn on power switch
 - Both lights should turn a steady green, meaning there is power and air
 - Ground clip must be clamped to work
 - Lower face shield
 - Put torch in position and press button to begin cutting

SHUT DOWN MACHINE:

- When finished cutting, wait for airflow to stop
- Turn off machine
- Put face shield and torch in proper place
- Clean work area



MIG WELDER

DESIGN FUNCTION:

- For fusing metal together
- For joining metals by applying heat and using a filler metal

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Special eye care is required while welding
- Anyone assisting must also have special eye protection
- When working on large projects, use red curtains to protect bystanders
- Gloves are required at all times
- Protective clothing that should be worn while operating machine
 - Long sleeves
 - Long pants
 - Leather shoes or use spats
 - Leather apron
- Set up material to be fused on table
- Connect ground to table
- Set up and proceed as per instructions in Welding Safety Class
- No galvanized metal
- Aluminum requires special wire and gas-Ask staff for assistance if you need to weld aluminum



SPOT WELDER

DESIGN FUNCTION:

- For fusing sheets of metal together
- For use with sheet metal

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Wear leather gloves to protect hands from sparks and sharp edges
- Wear protective face shield



HYDRAULIC PRESS

DESIGN FUNCTION:

- For testing the strength of beams and columns
- For pressing parts together or apart

CUTTING PAPER PRODUCTS:

- Eye protection is required at all times
- Do not talk with observers while operating machines
- Place object to be tested on table of machine
- Set pressure needle gauge to zero
- Place guard in front of machine
- Stand in front of guard only
- Set hydraulic pump to down
- Pump handle until pressure gauge stops and crack appears
- Release pressure on hydraulic pump by turning handle to up
- Pump ram up
- Clean up mess on and around machine
- Beams and columns made of concrete must be removed from shop



FLETCHER 3000 CUTTER

DESIGN FUNCTION:

- For cutting glass
- For cutting Plexiglas up to a 1/4" thickness
- For cutting corrugate, chipboard, and foamcore

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Always wear gloves when cutting glass
- Load material from the left side
- Adjust turret to proper cutter (Ask for staff assistance if needed)
- Load material from the left side



FLETCHER 3000 CUTTER (continued)

CUTTING GLASS:

- Wear gloves
- Do not use clamp
- Raise head by pushing trigger and place cutting wheel above the upper edge of the glass and release trigger
- Bring head down slowly with a firm and continuous motion
- Only score glass once
- Hold glass with left hand, take right hand and apply pressure to the lower right hand corner of the glass
- Do not apply any pressure to the center of the glass

CUTTING PLASTIC:

- Set clamp
- Depress short trigger, hold it down and raise head
- Release trigger as close as possible to the top edge while still on the surface of the plastic
- Bring head down slowly with a firm and continuous motion
- For 1/8" plastic, one pass is required
- For 3/16" - 1/4", two to three passes may be required
- To break plastic:
 - Depress short trigger and set pin
 - Raise head to top of plastic
 - Depress large trigger and hold
 - Pull head down and listen for snapping sound
 - Release clamp and remove material

CUTTING PAPER PRODUCTS:

- Set clamp
- Depress short trigger and raise head above material, release trigger
- Bring head down slowly with a firm and continuous motion
- Remove material

SAND BLASTER

DESIGN FUNCTION:

- For removing surface coat from metal or plastic
- For frosting the surface of glass or plastic
- For polishing surfaces or etching

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Treat blasting gun like a loaded weapon
- Work in a well ventilated area
- Never point the blasting gun at another or yourself
- Do not blast wood or foam
- Do not blast near flammable liquids because of spark dangers
- Make sure air supply is off and lines are bled when done
- Rules of thumb:
 - The higher the pressure, the faster the job
 - The closer the material, the faster the job
 - User larger grit to remove surface material
 - User smaller grit to polish surfaces
 - As nozzle wears, adjust pressure and distance



JOB	PSI	DISTANCE FROM WORK
Metal	50 - 125	1 - 4 inches
Glass Etching	40 - 60	1 - 4 inches
Glass Drilling	50 - 125	0 - 1 inch

MODEL MAKER'S VACUUM FORMER

DESIGN FUNCTION:

- For molding different types of plastic
- Plastic only

SAFETY:

- Eye protection is required at all times.
- Do not talk with observers while operating machines.
- Do not use when combustible vapors are present
- Keep approved fire extinguisher within reach of operator
- Do not leave unattended during operation
- Do not install or remove plastic from the unit while the heaters are on or hot
- Do not use painted, oily or dusty plastic sheets
- Use plastic sheet intended for thermoforming processes only
- If unit shuts down due to an overheat condition, promptly shut off power at the remote disconnect
- Do not operate unit until the cause of the overheating has been corrected
- Wear heat resistant gloves while operating machine

OPERATION SEQUENCE:

- Read all safety precautions before operating machine
- Install the unit properly
- Remove any accumulated dust from machine and top of heat enclosure
- Install mold in center of table. Use duct tape to secure mold to mold frame
- Provide edge-seal to create vacuum cavity between plastic sheet and mold frame or table edge
- Adjust spreaders to sheet size and clamp
- Install plastic sheet, clamp firmly, move carriage to lowest possible position
- Preheat elements for 2-3 minutes at 100% heat
- Set cycle time and percentage heat control
- Raise carriage to upper position and press start
- Monitor heating, do not leave unattended
- When heating cycle finishes, vacuum motor will start
- Lower carriage over mold engaging edge seal
- Hold in position until sheet is formed, turn on fan to assist cooling.
- When part is cool, turn the heat switch off
- To interrupt heating cycle, press heat switch to reset. Cycle timer will reset, readjust the time if necessary. Pressing the heat switch to start will begin the cycle again



MODEL MAKER'S VACUUM FORMER (continued)

The chart below shows the range of thermoforming materials available today. Interest in this versatile process is encouraging development of even more plastics.

Shown are the trade names as well as common brand names, which are frequently used. Forms, or forming ability, are shown as easy, moderate or difficult. Heat is shown as a starting point and as percent, which is the same as our machine's dial. Adjustments will have to be made for exact alloy used, and thickness being molded.

The predominate feature, as it applies to model making, is also listed. Commonly stocked color is shown. Check with the suppliers on this, different manufacturers have different stock colors. How easily it is painted or finished is shown under paints – easy, moderate, or difficult. Difficult may mean not at all or without special primers or equipment. Readily accepts automotive finishes you are familiar with. Not shown are the textures; options vary, but almost always a glossy surface exists on the back.

TRADE NAME	BRAND NAME	FORMS	HEAT	FEATURES	COLOR/PAINTS	
ABS	Royalite	E	65%	Deep Draws	White/Black	E
Acrylic	Plexiglas	D	65%	Machinable	Clear	E
Acrylic/ PVC	Kydex	M	70%	Deep Draws	Earthtones	M
Butyrate	Uvex	E	50%	Thin Film	Clear	M
Olefin Foam	Volara	M	50%	Flexible	White	D
Polycarbonate	Lexan	D	55%	Impact Resistant	Clear	D
Polyethylene	Petrothene	M	50%	Tough	Milky	D
Polypropylene	P-100	M	60%	Tough	Milky	D
Polystyrene	Impact	E	60%	Cheap	White	M
Polystyrene	Oriented	E	55%	Cheap	Clear	M
PVC	Boltaron	E	60%	Deep Draws	White	M
PVC Foam	Sintra	M	55%	Light/Stiff	White	E
Vinyl Laminate	Naugafom	M	65%	Flexible	Leather	D

EXACTO/UTILITY/FOLDING KNIFE SAFETY

DESIGN FUNCTION:

- For cutting material for stencils, models, etc
- Causes more accidents than any other tool you'll use

SAFETY:

- Keep fingers away from the cutting edge
- Hold firmly in hand
- Carry knife with the blade facing down
- Do NOT put in pockets
- A sharp blade makes a better cut
 - Dull blades cause more accidents
- Blades are cheap, accidents cost
- Properly dispose of blades
- Put cap on(Exacto)/close blade(utility) when finished

PROCESS:

1. Measure
2. Mark the line to be cut
3. Check for stability of cutting surface
4. Hold **Safe-T** ruler with 2 fingers
 - Only use a **Safe-T** ruler--don't use a flat ruler!
5. Put fingers on backside of bar, away from cutting edge
6. Cut slowly and easily
 - Speed hurts

REPLACING BLADE:



Exacto:

1. Grab Handle
2. Twist Chuck
3. Remove Blade
4. Replace Blade
5. Tighten Chuck

Utility:

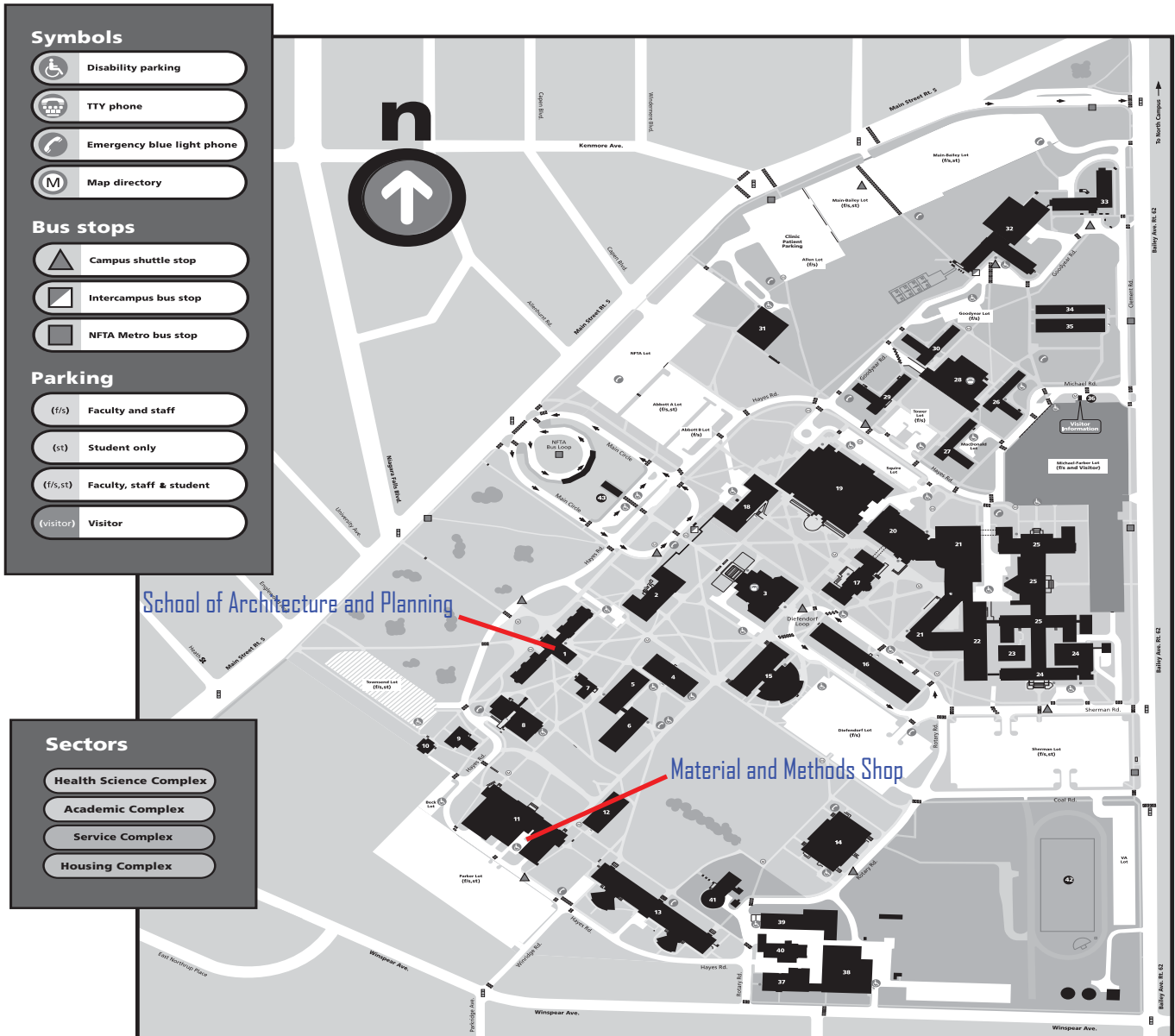
1. Remove screw from casing
2. Carefully take blade out and replace
3. Replace casing and tighten screws

Folding:

Ask for assistance as each knife is different

SHOP LOCATION

SOUTH CAMPUS University at Buffalo



Building Directory

Abbott Hall	3	Buffalo Materials Research Center	41	Foster Hall	18	Kimball Tower	28	Service Building	37
Acheson Annex	12	Cary Hall	22	Goodyear Hall	32	MacDonald Hall	27	Service Center Building	38
Acheson Hall	13	Clark Hall	14	Harriman Hall	17	Mackay Heating Plant	40	Sherman Hall	24
Allen Hall	31	Clement Hall	33	Hayes A	4	Michael Hall	26	Squire Hall	19
Annex A	34	Crosby Hall	2	Hayes B	5	Parker Hall	11	Townsend Hall	9
Annex B	35	Diefendorf Annex	16	Hayes C	6	Pritchard Hall	29	Visitor Information Center	36
Beck Hall	10	Diefendorf Hall	15	Hayes D	7	Rapid Transit Station	43	Wende Hall	8
Biomedical Education Building	21	Farber Annex	23	Hayes Hall	1	Rotary Field	42		
Biomedical Research Building	20	Farber Hall	25	Howe Building	39	Schoellkopf Hall	30		

SHOP USER SAFETY AGREEMENT

I, _____(Printed Name)
the undersigned, a student in the school of Architecture and Planning, agree to follow
all safety rules and procedures and agree to the statements below. I have:

- Successfully completed the 3 hour Safety Orientation Course
- Had shop policies and procedures explained to me
- Received demonstrations on all the major machines
- Been instructed to ask for help on any machine with which I am not familiar. I
will not operate any machine without such instruction
- Received a pair of safety glasses. I will be responsible for wearing eye
protection at all times in the shop facilities.

Date: _____

Signed: _____

Shop Safety Instructor: _____(Dick Yencer)