

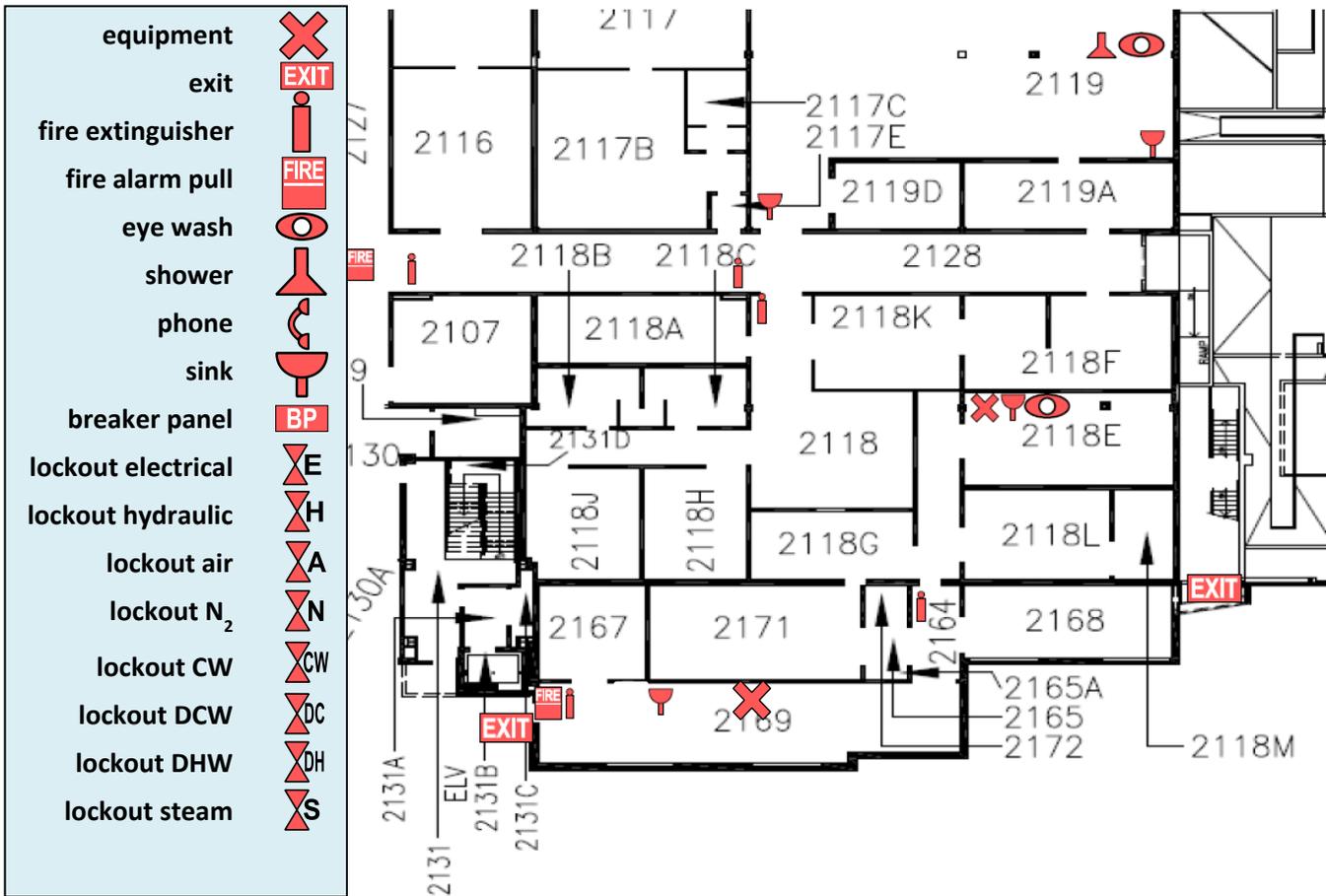
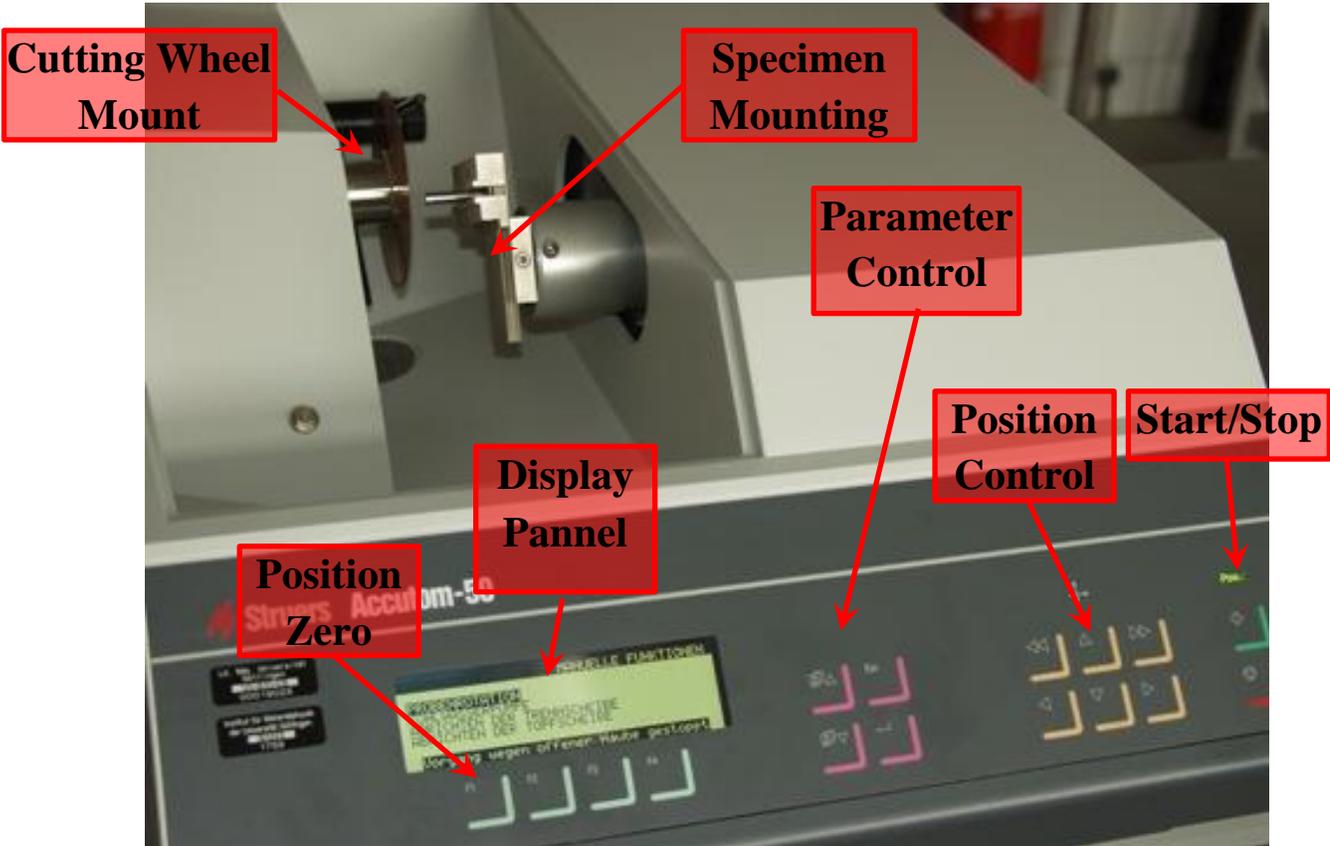
MME Standard Operating Procedure (SOP)

Name	<ul style="list-style-type: none"> • Accuton-50 wafer cutting machine
Description	<ul style="list-style-type: none"> • Precision saw for cutting samples
Location	<ul style="list-style-type: none"> • E3 2169
SOP Creation Date	<ul style="list-style-type: none"> • 13-05-2015
SOP Created By	<ul style="list-style-type: none"> • Boyd Panton, Stephen Peterkin
SOP Revision Date	<ul style="list-style-type: none"> • 22-07-2015
SOP Revised By	<ul style="list-style-type: none"> • Stephen Peterkin
SOP Location	<ul style="list-style-type: none"> • https://uwaterloo.ca/centre-advanced-materials-joining/safety-first/standard-operating-procedures
Manual Location	<ul style="list-style-type: none"> • usually inv.mme.uwaterloo.ca or an office location
Equipment Owner	<ul style="list-style-type: none"> • Prof. Norman Zhou
Authorized Trainers	<ul style="list-style-type: none"> • Dulal Saha (X. 35625), Stephen Peterkin (X. 33326)
Support Technicians	<ul style="list-style-type: none"> • Struers representative http://www.struers.com/modules/contact/default.asp <p>Terry Neudorf Senior Account Representative/Product Leader Struers Inc. Direct: 519.937.1790 Mobile: +1(647)309-2930 terry.neudorf@struers.com</p>



Significant Hazards	<ul style="list-style-type: none"> • Excessive leaking, leading to electrical short circuits • Irritation of skin or eyes from coolant water containing metals from cutting and “Corrozip” • User contact with the moving blade
Administrative Controls	<ul style="list-style-type: none"> • Permission to use the machine requires a multilevel training signoff • Only users with the prerequisite training may use the equipment unsupervised • Authorized trainers: Dulal Saha, Stephen Peterkin • Users are required to check the operation of the machine and remain with the saw during cutting to prevent excessive leaking
Engineering Controls	<ul style="list-style-type: none"> • The saw lid must be securely closed before the machine will operate, this prevents any contact between the user and the moving blade • Coolant system is set up within a double containment where failure of the lines or filter should be contained within a second container
PPE Required	<ul style="list-style-type: none"> • Gloves are recommended when the coolant water contains the Struers compound “Corrozip” this solution is labeled as an irritant
Relevant Standards and Codes	<ul style="list-style-type: none"> • None

Relevant MSDS	All MSDSs can be found at msds.mme.uwaterloo.ca <ul style="list-style-type: none">MSDS for the Struer's Corrozip additive can be found in the micro joining lab MSDS binder
Accident Procedure	<ul style="list-style-type: none">See Safety Posters in this lab
Emergency Shutdown Procedure	<ul style="list-style-type: none">In case of issues with the machine hitting the red shutoff button will cease the operationShould this be ineffective use the power button located at the rear of the machineWhen necessary the plug for the cutoff machine may be disconnected at the 240V service



Pre-start Checklist

- Check for notes left by previous user that may adversely affect the performance of the machine

- Items required
 - Specimen
 - Ensure that the specimen will fit inside the clamping fixture and that the length to be cut is less than the distance of the edge of the blade to the nut. Rough cut specimens prior to precision cutting them to prevent excessively long cut times and damage to the machine
 - Avoid cutting sections off the ends of specimens where vibrations may be an issue
 - Saw blade. Go to the Struers website (<http://struers.com/>) to determine the appropriate blade for your material
 - Tools for connecting blade and securing sample (i.e. allen keys, bar for saw)
- Water system
 - Check that there is sufficient water in the reservoir to completely cover the submerged pump
 - Use only De-ionized water with the cutoff saw as the tap water can clog the machine
 - Check the water quality to ensure that it is not excessively fouled in a manner that could block the filter or damage the saw
 - Ensure that the water outlet leads to the reservoir
 - Ensure that all lines are securely connected

Start-up Procedure

- Turn on the machine with the power button on the back *Ensure that neither specimens or blades are mounted in the machine before energizing
 - Wait ~30 seconds for the machine to zero
- Mount the appropriate saw blade
- This is an appropriate time to test the water cooling system (or before beginning cutting)
 - Ensure that the external pump is connected to the power bar behind the table. The power bar button is the ON/OFF control for the external pump
 - Make sure that the coolant water nozzles are lined up with the blade and turn on the pump
 - Check that the chamber is draining freely, that the draining tube drains into the coolant water bucket, that none of the connections between the lines are leaking excessively and that there is no air getting to the cutoff saw
 - Check that there is an acceptable amount of flow and pressure being provided by the external pump
 - If there is insufficient flow follow the procedure for changing or cleaning the coolant filter
 - Turn off the water and continue with the setup of the saw
- Clamp your specimen using the provided machine screws and Allen keys
- Use the x-y controls to setup the zeros and positions of your cut
 - The reset function when positioning your sample will zero the position
 - BE CAREFULL: not to use the fast motion controls when positioning the specimen near the blade, this option doesn't stop immediately once released and may damage the blade/specimen
 - This screen is also used to set the total cutting distance. Ensure that the total distance to cut is less than the distance between the edge of the blade and the beginning of the nut
- Setup the cutting parameters, you may use a saved set of parameters but always make sure that they have not been changed since last use
 - Follow the recommendations that were outlined in the training sessions regarding parameters for different cutting wheels paired with different materials
 - If unsure a slower cutting speed can help prevent damage to the machine
 - Ensure that the Water parameter is always set to ON

Operating Procedure

- Turn on the external pump and press the Green button once ready to begin cutting
- It is recommended that you stay with the machine for the duration of the operation

- Leaving the saw during operation can lead to flooding and potential electrical shorting of equipment in the area
- May lead to overheating and breakdown of the saw motor
- May lead to fires due to overheating of the cut, and insufficient cooling
- The cutting time will be displayed once the operation has begun
- Turn off the saw should there be an excessive leak, you hear the saw motor struggling, there are excessive sparks from the cutting process
 - If there is leaking from the inside of the machine cease the cutting operation and contact one of the approved trainers
 - If the motor is struggling the blade may get stuck in the substrate, cease cutting and slow down the feed speed or alter the RPM
 - If there is excessive sparks slow down the feed speed and check that the cooling system is properly positioned to douse the sparks
- Once the cutting operation is complete you may press the red Stop button even if the saw is still running

Shutdown Procedure

- Once cutting is complete move the substrate to a safe distance from the blade and remove it
- Remove the blade
- Turn off the power to the saw once done cutting
- Best practice to unplug the external pump from the power bar as operation of the external pump without a blade installed will lead to leaking from the bottom of the machine
- Follow the clean-up procedure
- Document the amount of time, the type of material being cut and any issues or comments about the operation in the log book

Clean-up

- Rinse out the three mesh filters at the bottom of the cutting chamber
- If the water was fouled during the cutting procedure then replace the fouled water with new DI water
 - Ensure that the water level in the coolant water level is above the external pump
- If there was issues with the coolant system during the operation then follow the procedure to clean or change the filter
- Pour some DI water into the cutting chamber if there is residual metal or particles to flush it through the drain

Lockout

- Ensure that the machine is not energized when performing maintenance
- Leave a not advising potential users that the machine is out of commission

Maintenance and Repair

- Contact one of the authorized trainers if there are broken components or issues with the machine / coolant system that cannot be easily repaired
 - Advise the lab safety manager and equipment owner of the issues, Joyce Koo and Norman Zhou respectively
 - Contact Struers if there are unfixable issues with the machine or if new parts are needed
- Coolant system upkeep
 - In order to prevent damage to the cutoff saw or the internal pump consistent maintenance to the coolant system is required
 - Notify one of the authorized trainers or lab safety manager if there are leaking connections in the system

- Some of the connections are sealed with Teflon tape and can be easily repaired
- If the water flow is an issue then the filter needs to be cleaned or repaired
 - Check the log book to see if the filter has previously been cleaned if not then disconnect the lines and open the filter housing over the sink
 - The filter can be gently rinsed and wiped down to restore flow capacity
 - Replace the filter if it has previously been cleaned
 - Reinstall the filter
 - Run the pump to refill the reservoir and top off the DI water to ensure that the water level remains above the external pump
 - Log that the filter was replaced in the log book in the back section
 - Filters are 5µm generic whole house water filters