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University of Florida	Title: <i>Precision Saw</i>		

- **Personnel performing this procedure will have training provided by the equipment manufacturer or by trained UF personnel.**

I. PURPOSE

Put the purpose for this piece of equipment is to aid in the cutting of ceramic samples. The machine that should be used is the IsoMet 1000: Precision Saw.

II. OUTLINE OF METHOD

This machine is used to make precise cuts in a sample in hopes of getting accurate dimensions. . There is no machine warm-up time and it takes approximately 5 minutes to prep the machine and only a couple of minutes to actually secure the sample and make the cut. The clean-up only takes maximum 5 minutes.

There is no standard size that needs to be used, just a sample that can safely fit into the sample holder (chuck).

III. RESOURCES

Before beginning the test, make sure the sample can be cut using a diamond wafer blade, if not, do not proceed.

A. Resources (Prior knowledge and needed materials)

1. A sample is needed of the proper size to fit in the available chucks that are provided.
2. PPE
 - a. Protective eyewear should be worn to protect from debris.
 - b. Gloves should be worn to protect the sample from impurities and oil. These gloves should be powder-free to reduce transfer. Gloves should also be worn while handling and pouring the lubricant.
 - c. Lab coat can be worn to protect clothes from unnecessary staining from the lubricant.

IV. PROCEDURE

A brief procedure on how to use the saw is provided in the equipment manual. Please be very careful when handling or working around the wafering blade. The blade is easily susceptible to nicks do not drop the sample on the blade or drop the blade. If at all possible do not touch the blade.

B. Blade Dressing

1. The new wafering blades must be dressed before making any cuts when a new blade has been installed or when the cuts are no longer clean and precise.

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2. If metal is being cut it is necessary to dress the blade before every cut.
3. The dressing stick should be put into the dressing chuck which is located under the metal protective guard. The dressing chuck can be accessed by pulling out the lubricant tank drawer.
4. Position the dressing stick as needed, so it is able to be cut by the blade.
5. Clamp down the dressing stick by tightening the dressing chuck around the dressing stick.
6. Close the lubricant tank.
7. Close the hood.
8. Turn the machine's power on by pressing the "POWER" button on the front of the machine.
9. Press the "SAW" button to activate the saw.
10. Make sure the speed of the blade is in the 100's rpm's to start with. The speed can be slightly increased for future blade dressing cuts if necessary.
11. Rotate the dressing stick feed control knob (on the front of the lubricant tank) clockwise to move the dressing stick closer to the blade.
12. Make as many cross cuts as needed to dress the blade. Three-five cuts work well.

C. Lubrication

1. The lubricant is used to reduce the cutting time and make the cuts sharper. The IsoCut Plus Fluid is best for most metals and non-metals.
2. Fill the lubricant tank with the IsoCut Plus Fluid in a 1:9 ratio with water (1 part IsoCut to 9 parts water), to a level that immerses the blade ¼-inch.
3. The lubricant should be discarded when it becomes contaminated with sludge.
 - a. Remove the sample tray, wafer blade, and flanges from the arbor shaft.
 - b. Pull the tank out from the front of the machine, and discard the lubricant in a safe manner.
 - c. Clean the tank-not using soap. Use water and acetone only.
 - d. Reinstall and refill the tank.
 - e. Replace the wafer blade, flanges, and sample tray.

D. Preparation

1. The sample can be of many shapes but should remain small enough to fit safely in the provided chucks. Safety is described as when the sample is tightened down in the chuck that the sample cannot twist, move, or slip in the chuck.

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2. There are multiple chucks that are provided for different shapes, the appropriate one should be used for the unique shape of the sample.
3. If the sample will not fit safely or it is too small to be properly clamped the can be “sandwiched” in between metal plates and then that apparatus can be fitted in between the chuck halves.

E. Testing

1. On the left side of the machine is the weight arm, lift the weight arm to the locked position.
2. Loosen the thumb screw on the load weight (the larger c-clamp style load weight).
3. Slide this weight to the zero position.
4. Attach the chuck (which already has the sample in its clamp) to the Sample Arm using the attached screw.
5. Rotate the Sample Positioning knob (large wheel on the front-left side of the machine) to move the Sample Arm to the far left.
6. Lower the Weight Arm out of the locked position so it lays horizontal.
7. Slide the Counter-Balance Weight (the round weight) up or down until balanced is achieved. Balance is achieved when the Sample Arm and Sample with chuck attached stays in any position that it is put in (the arm does not fall forward or backward). Once balanced is achieved make sure the Counter-Balance Weight’s screw is tight.
8. Set the Load Weight (c-clamp style weight) to the desired load as marked on the Weight Arm. The lighter the weight the better. The load specifies how fast the sample will move down over the blade (a.k.a. how fast the blade will cut through the sample.)
9. The End of Cut Adjustment knob (small black knob on the top of the machine under the hood) can be adjusted to set the total travel distance of the Sample Arm and the sample. This feature stop the blade after a cut has been made or can stop the blade after a certain depth into the sample.
10. Raise the Sample Arm to adjust the position of the sample.
11. Rotate the Sample Positioning knob to move the sample left or right. The front panel will display the distance moved in mm or inches.
12. Lower AND HOLD the Sample Arm with the sample just above the wafering blade and rotate the Sample Positioning knob until the samples edge is in-line with the right-side of the wafering blade.
13. Press the “Display ZERO” button to reset the POSTION LCD to zero.
14. Raise the Sample Arm to the locked position.
15. Make sure that you are in the appropriate units (mm or inches) this can be changed by pressing the “UNITS” button.
16. Advance the sample as required (the distanced will be displayed on the LCD).
17. Close the hood.
18. Press the “BLADE” button to activate the blade.

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19. Adjust the blade speed using the “INCREASE/DECREASE” buttons. The lower the speeds and lighter the weight the better. High speeds and heavier weights tend to damage the sample surface.
20. Lower the Sample Arm out of the locked position and GENTLY set the sample on the rotating blade.
21. The cut cycle will begin.
22. If the End of Cut Adjustment knob has been set the blade will automatically stop when the cut is complete.
23. If it has not been set use the “BLADE” button that was used to activate the blade to deactivate the blade. Do NOT hit the “POWER” button to stop the blade.
24. To retrieve the cut-off piece of sample open the hood and carefully remove the piece from wherever it fell. Be careful not to cut oneself on the blade.
25. If the cut-off sample is not immediately found on the top of the machine the lubricant tank might have to be pulled out slightly to retrieve the sample.
26. Tweezers should be used to extract the sample (do NOT stick your hands in the tank).
27. If the tank is cloudy and you cannot see the sample let the machine and tank sit over night and let the debris/powder in the tank settle and retrieve the piece later. Be careful not to pull the tank out too far and damage the blade.

F. Recording of Data

1. Record the speed of the blade for each sample and the actual thickness of the sample (using calipers that are in the lab).
2. Label the samples in an appropriate manner to be able to identify which sample is which.
3. All data should be recorded in a lab notebook.

G. Clean-up

1. Please see Section C under Procedure for procedure for clean-up of the lubricant tank.
2. Please remove your sample once you are done using the machine.
3. Wipe up all spills or splattering that might have occurred while using the machine, even under the hood.
4. CAREFULLY wipe down the black metal guard tray that surrounds the blade.
5. Close the hood before walking away from the machine.

H. Emergency Procedure and Shutdown

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1. If you cut yourself follow proper first-aid procedure.
2. Control the bleeding by applying pressure using gauze or towels.
3. If cut is severe contact emergency personal.
4. Do not ingest the lubricant fluid. If this occurs call poison control.
5. If lubricant gets in eyes, wash eyes out at an eye-wash station-do NOT rub your eyes. The liquid may contain fine particles of metal or ceramics. Seek medical attention if irritation persists.
6. The machine can be shut down using the power button on the front of machine, by unplugging the machine from its power source, or shutting down the power source.

I. Safety Hazards

1. The blade is very very sharp, take proper precautions to not cut oneself on the blade.
2. As mentioned in the above section do not ingest the lubricate or get the lubricate in contact with eyes, if this happens please refer above.
3. There is always a risk of electrical shock when using a machine that requires a power source. Do not get any liquids by the plugs into the wall or into the machine.
4. Always remember capacitors with-in the machine can contain retain a charge even when disconnected from the power source, be very cautious when making electrical adjustments.
5. Do not use machine around any strong electromagnetic fields.
6. Do not use at high or low temperatures or humidity.
7. Do not use an extension cord with the machine.

J. Miscellaneous

1. If the blade needs to be changed please see the operating manual for instructions.
2. See Figures in operating manual.
3. If parts or accessories need to be re-order look in the operating manual for catalog and part numbers.