Suss Delta 80 Spinner SOP

Note: latest updates are blue.

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1.0 Safety

Moving Components – The User should be aware at all times of the moving components associated with this tool. The spin chamber door must be closed at all times while processing your sample. The spin chamber door is interlocked and tool will not operate with the door open. DO NOT ATTEMPT TO DEFEAT THIS INTERLOCK. Users are not allowed to adjust any mechanical devices within this machine and are prohibited from opening any doors except the spin chamber door. If a error or problem occurs, put the coater down in the NRF web site with comments and notify NRF Staff. Do not attempt to fix the problem.

2.0 Quality Control and Calibrations

Photoresist thickness and uniformity checks are currently performed once per year. The repeatability of the system is very good but if you need a specific accuracy of thickness or uniformity you must run dummy samples. Thickness measurements may be made using the Filmetrics F40 located in the Bio/Nano Bay. Staff is available for help and advice. For full processing instructions, see the “NRF Photolithography SOP”. The recipe “named” thickness applies to a bare 4" silicon wafer that has been processed per the “NRF Photolithography SOP”. Be advised that thickness and uniformity will be affected by your sample size, surface tension and topography of the sample.

3.0 Equipment Uses and Restrictions

Each spinner in the NRF is dedicated to certain materials. The Suss Delta 80 is dedicated to AZ1512 and AZ9260 photoresists. These are the ONLY materials you may spin without Staff consent. This system has the ability to dispense other materials by automated syringe. If you have a material that you are having trouble coating in a standard manual dispense system such as the Laurell spinner or Headway spinner, contact NRF Staff.

4.0 Equipment Specifications

- Sample sizes: 4”, 3”, 2” round or square, fragments from 10mm to 100mm
- Pump 1 = AZ1512 photoresist
- Pump 2 = AZ 9260 photoresist
- Autosyringe dispense = available for dispensing other materials (email Staff)
- Automated Photoresist solvent strip for non-hardbaked and non-etched photoresists
- Maximum RPM Open bowl 4” wafer (No Gyrset = 5000)
- Maximum RPM with Gryset = 4000
- Max sample size: 4” round or square
- Maximum sample thickness is 4mm. Contact NRF Staff if you have something taller.

5.0 System Preparation

Note: The Suss Delta 80 System includes the unique capability of "Inhibited Drying" by spinning the sample inside a solvent rich environment. The benefits are a wider thickness range than normally possible for a given photoresist viscosity and a larger area of good uniformity for asymmetrically shapes substrates such as glass microscope slides. This is accomplished via the "Gryset" head. It's basically a stainless cup shaped dome that comes down over the sample prior to spinning the sample to the desired thickness. The Gryset head will only be used for:

- asymmetrically shapes substrates such as glass microscope slides
- thinner than normal AZ1512 photoresist
- thicker than normal AZ9260 photoresist.

5.1 Log into the Tumi. The waste bottle full sensor is interlocked through the Tumi system. If the screen shows the error "**Waste bottle full or not connected"**, just press the return key and the message will disappear.

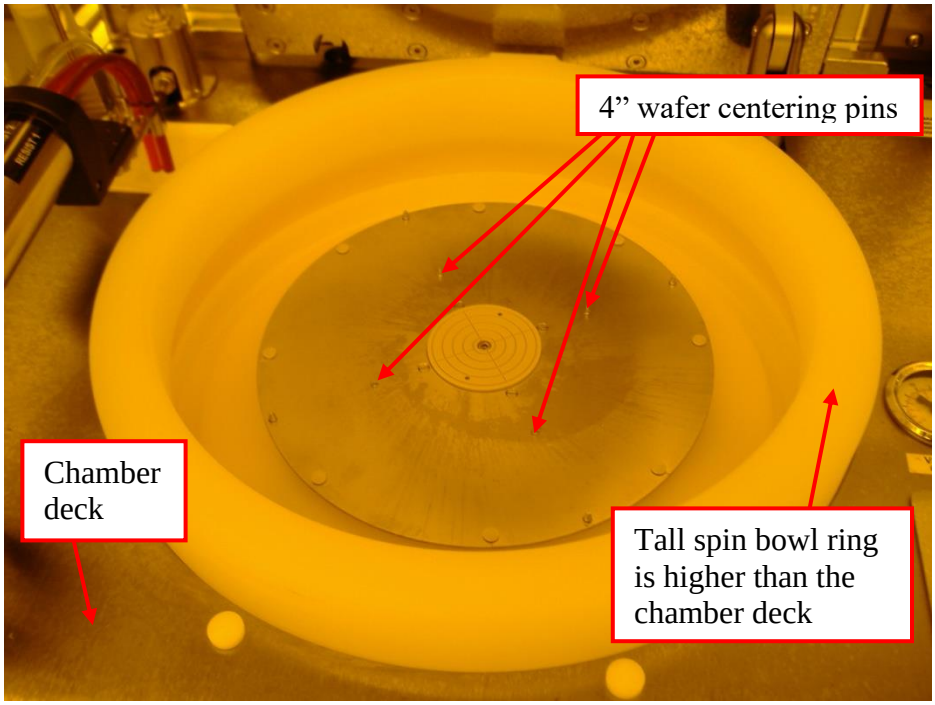
5.2 Determine which of the 2 setup modes you will need based on your samples size and shape:

Standard Coating Mode–Tall bowl ring installed (see pic below)

- **all round and square substrates**
- **all substrates <15mm**

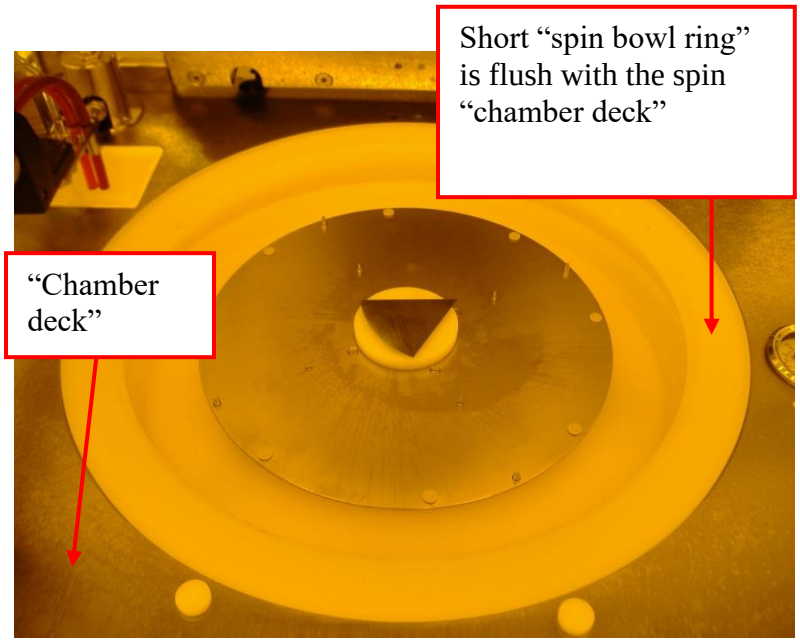
"Gyrset" Mode-Short bowl ring installed (see pic below)

- **For asymmetrical shaped substrates unless <15mm**
- **microscope slides and similarly shaped samples.**
- **For AZ1512 when <1.0um thickness is needed**
- **For AZ9260 when >11.5um is needed for a single coat.**



Standard Coating Mode

5.2 The picture above shows the standard bowl setup using the Tall spin bowl ring for standard photoresist thicknesses and will be used most often. If you need to coat small samples, add the appropriate size fragment adapter, shown in section 6.0 below.



“Gyrset” Mode

5.3 The bowl setup above is for Gyrset mode. In the picture the fragment adapter is being used but is not needed for 4" wafers. Notice the upper bowl ring is shorter and flush with the main chamber platform short bowl ring. The shorter bowl ring allows the "Gyrset" head to come down during processing.

5.4 Use the table below to select the correct recipe and to determine if you need the tall bowl ring for non-inhibited drying or short ring for Gyset IHD mode.

Recipe Selection Table

Round or Square Substrates

Resist Type	Substrate Size	Thickness Range um	Use this recipe	Spin Bowl Ring	Exceptions:
AZ1512	<60mm	1.2-2.0um	S_1512_(xx.x)	TALL	
AZ1512	60-100mm	1.2-2.0um	L_1512_(xx.x)	TALL	
AZ1512	All	0.72-1.1um	Gyset_1512_(xx.x)	SHORT	
AZ9260	<60mm	6.5-11.4um	S_9260_(xx.x)	TALL	
AZ9260	60-100mm	6.1-11.5um	LP_9260_(xx.x)	TALL	DON'T use for multiple coats
AZ9260	60-100mm	6.5-11.4um	L_9260_(xx.x)	TALL	Use only when multiple coats are needed
AZ9260	<60mm	12, 14um	Gyset_S_9260_(xx.x)	SHORT	
AZ9260	60-100mm	12, 14um	Gyset_L_9260_(xx.x)	SHORT	

Asymetrical Substrates

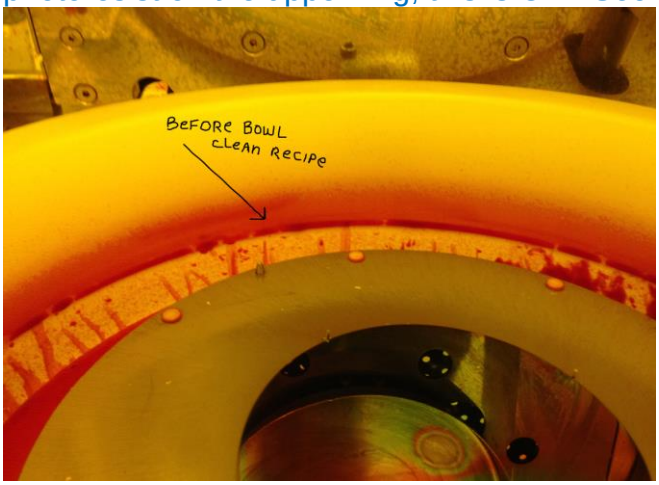
AZ1512	All	0.72-1.8um	Gyset_1512_(xx.x)	SHORT	
AZ9260	<60mm	6.5-14um	Gyset_S_9260_(xx.x)	SHORT	
AZ9260	60-100mm	6.5-14um	Gyset_L_9260_(xx.x)	SHORT	

Recipe name letter meanings:

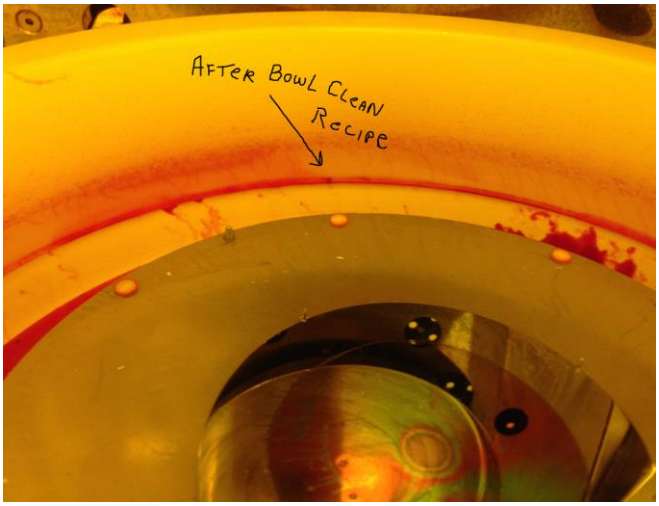
Gyrset=Gyrset Head comes down, S=short dispense, L=long dispense, P=solvent prewet

5.5 If the ring must be changed for your setup, the ring presently installed must be cleaned by YOU! Place a clean wipe under the ring (just in case it drips) while removing it from the tool. Use the work space in the left side of the wet bench near the Laurell Spinner, not the right side near the hotplates. Clean the ring using a liberal amount of acetone and wipes. When the ring is clean, place it on the white tray on the chrome rack. It should look like this!

5.6 **A Note about bowl cleanliness:** The “bowl clean” recipe will be run at the end of each use. This recipe will leave a significant amount of photoresist on the lower bowl and the lower ring. It will also leave a smaller amount of photoresist on the upper ring, this is OK. See the 2 pics below.



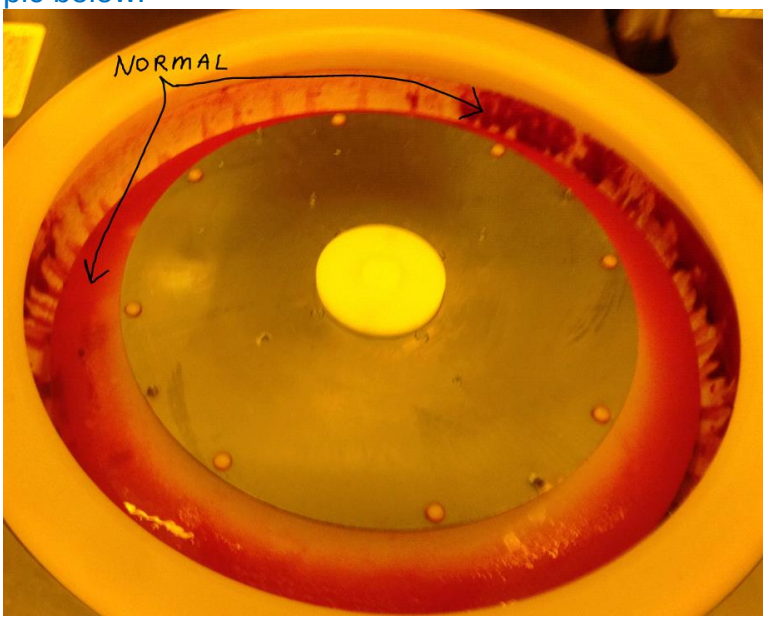
Pre “bowl rinse” recipe



Post “bowl rinse” recipe

5.7 As you can see the change is not real obvious. Leave the bowl in the system when you are done. Just MAKE SURE you run the “bowl clean” recipe.

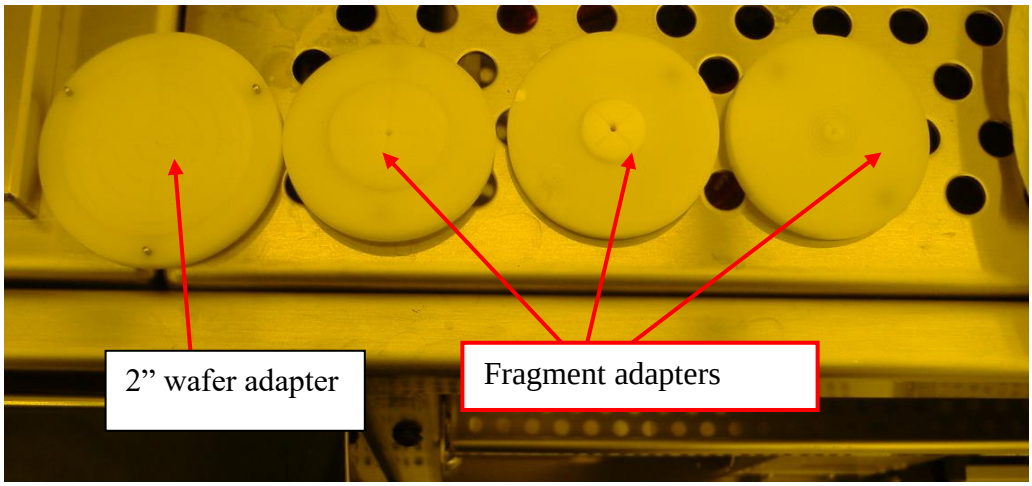
5.8 NOTE: some parts of the bowl will always have a photoresist coating. See pic below.



6.0 Coating

6.1 If coating a 4” wafer no fragment adapter is needed. Just place the wafer directly on the chuck inside the 4” alignment pins. If you are coating anything other than a 4” wafer, select the proper fragment adapter for your sample (see picture 3 below). Use the adapter with a vacuum surface that is approximately 50% of the size of your sample. More importantly, make sure the entire

vacuum surface is easily covered by your sample or the spin motor will be damaged by photoresist or solvents. Your sample backside must be very clean and flat. If it is not you will either get a vacuum error or the spinner may launch your sample off the vacuum chuck and you will be very disappointed by it.

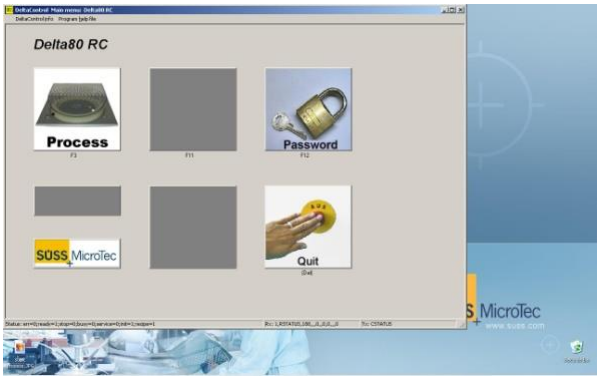


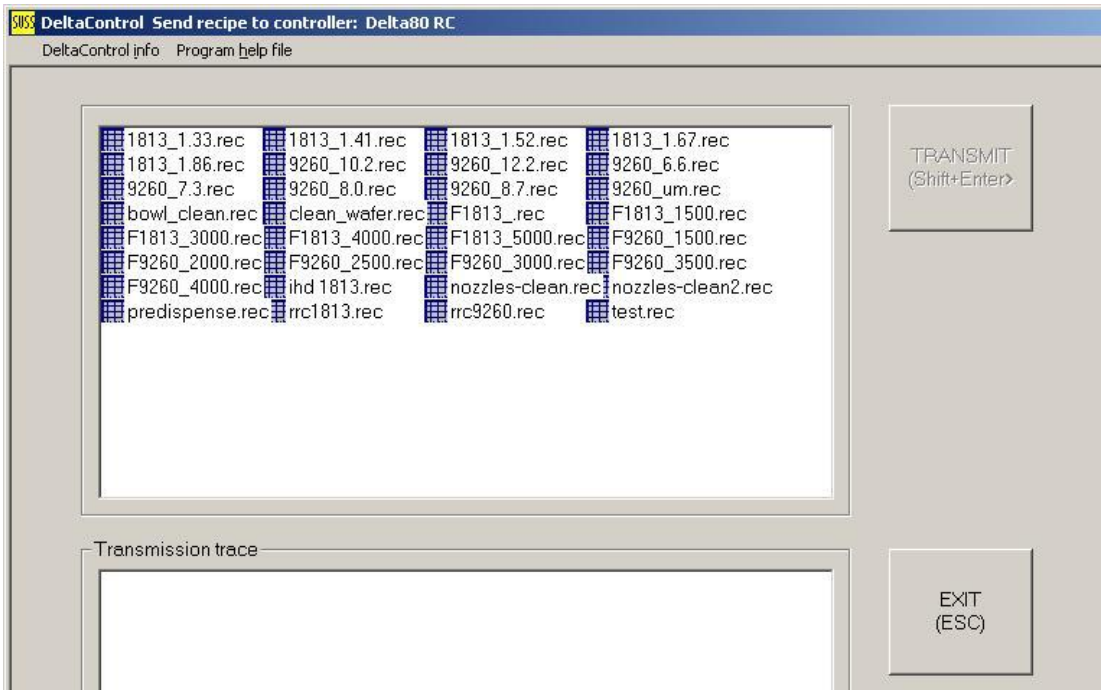
Picture 3

6.3 If using the fragment adapter, place the fragment adapter on the chuck by aligning the 2 pins with the holes in wafer chuck.

6.4 Place your sample centered on the chuck and close the spin chamber door. The system will not run with the door open.

6.5 Click the "Process" icon on the Delta 80 RC laptop main screen.





6.6 Select the recipe “predisp_1512” or “predisp_9260” depending on what type of resist you will need. The recipe will just clean the resist nozzle. It won’t dispense on your sample. You only need to run this recipe one time during your tool use.

6.7 Click once on the recipe and click “TRANSMIT” button.

6.8 Click “START PROCESS” to run the wafer. The final dispense should stream straight out of the nozzle (exactly centered) and the flow should be smooth. If an error shown below do the following.

- **Error 40** - ignore it. It’s just a warning that the spinner is spinning.
- **Error 170 and 171** - Do not press “ignore”. Stop processing. Contact staff immediately if during normal work hours. If after hours, put sign on tool and email staff. Error 170=resist 1 empty, 171=resist 2 empty.
- **Error 172** - you may press “Ignore” to continue processing and immediately notify RSC Staff by phone or email so that we can add solvent to the tank. Error 172=solvent tank empty.
- All other errors, contact staff and stop work.

6.9 Select and transmit the your process recipe per the Table in section 5 above. Press start.

6.10 When the process is complete the spin motor will rotate to home position and the chuck vacuum will turn off. Do not open the door until this is complete of the system will error. Remove your sample.

6.11 Please refer to the “NRF Lithography Processes SOP” for all photoresist baking instructions.

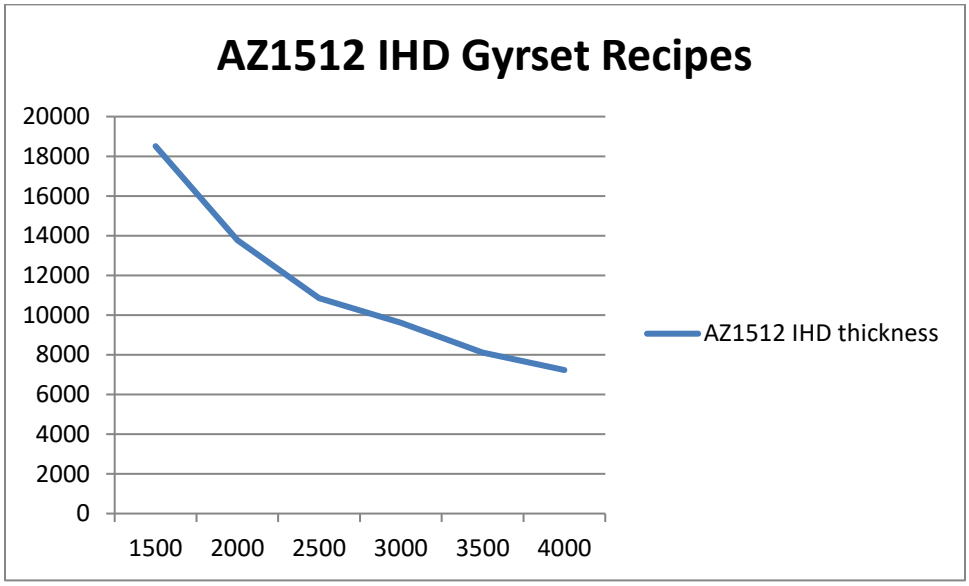
When you are done with all your samples, remove the fragment adapter if used. Clean the top and bottom of the fragment adapter using wipes and

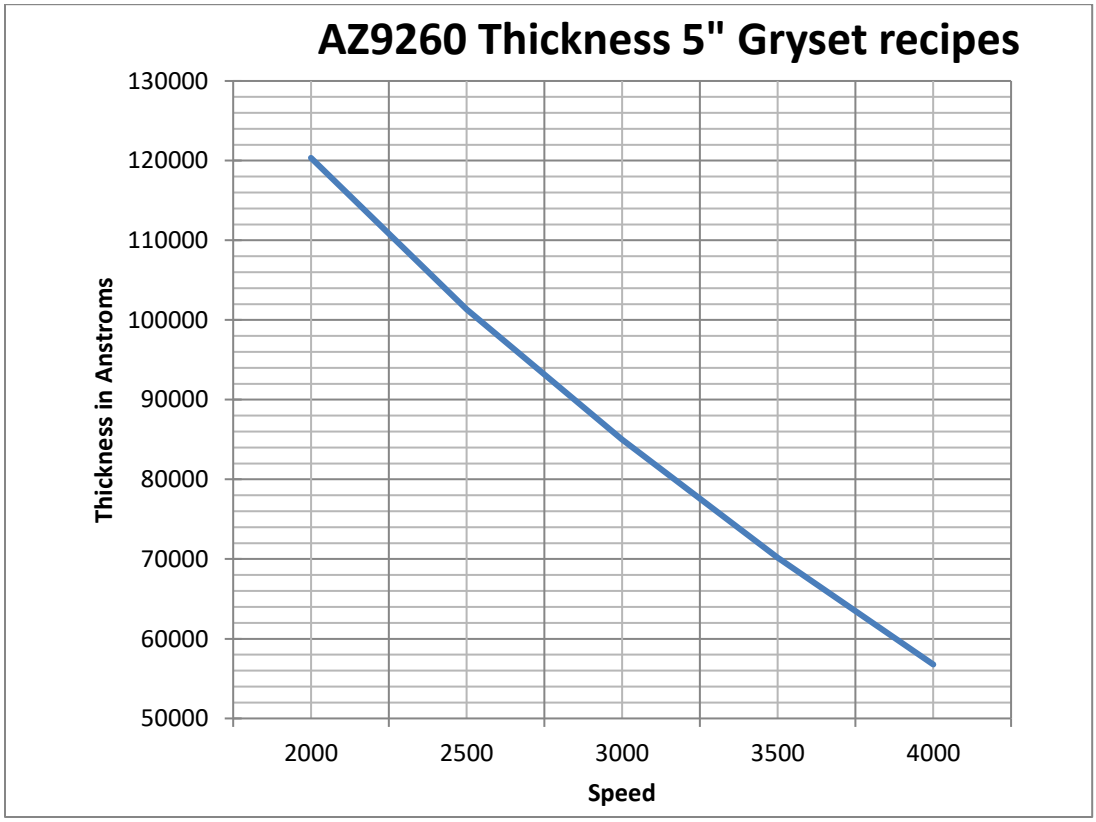
acetone. Moisten a clean wipe with acetone and clean the spin chuck and the metal surface all the way out to the 4” wafer alignment pins. See the following picture.

6.16 Load the 4” wafer found on the top of the system . Use the 4” guide pins as reference to center the smaller wafer. Execute the “Clean_Bowl” recipe. Do not run the “Clean_Bowl” recipe with anything but a 4” wafer.

DO NOT RUN THE “BOWL CLEAN” RECIPE ON SMALL PIECES….4” WAFERS ONLY!!!!

NOTE: IF YOU FAIL TO CLEAN THE SYSTEM PROPERLY YOUR PREVILEGES TO USE THE SYSTEM WILL BE REVOKED.


AZ1512 IHD Gyrset Recipes
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1500
2000
2500
3000
3500
4000
AZ1512 IHD thickness


AZ9260 Thickness 5" Gryset recipes
130000
120000
110000
100000
90000
80000
70000
60000
50000
Thickness in Anstroms
2000
2500
3000
3500
4000
Speed