COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK
COLUMBIA NANO INITIATIVE / CENTER FOR INTEGRATED SCIENCE AND ENGINEERING

DICING SAW - DISCO DAD3220

These instructions are intended for reference only, and will *not* replace the thorough training required for proper system operation. Contact a clean room staff member with questions or to report a system problem.

Written and edited by Brian Stern, Oscar Adrian Jimenez Gordillo, and Dr. Jaeeun Yu

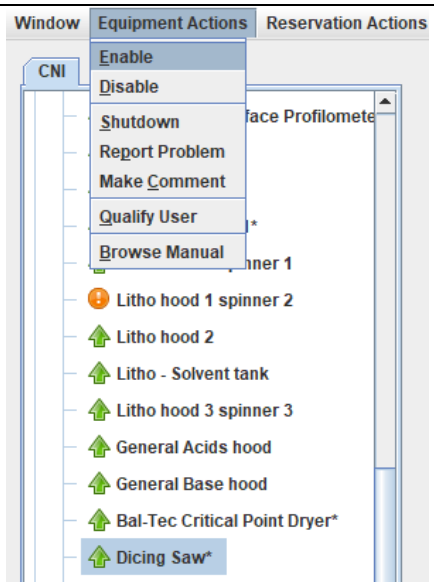
CNI Shared Facilities

1. PAY ATTENTION TO:

a. **No GaAs!** If you don't know what you are dicing, find out and only dice when you know.
b. The 50 µm Si blade is always installed on the tool. A small number of users are qualified to change the blade. **Don't change the blade unless you are qualified**.
c. Keep UV tape in a covered package and put it back inside the cabinet.
d. Avoid shooting the air gun more than 1-2 sec at a time. If it alarms, disable the alarm and initialize.
e. Dry chuck with air gun when done.

2. BADGER:

Enable the tool in badger

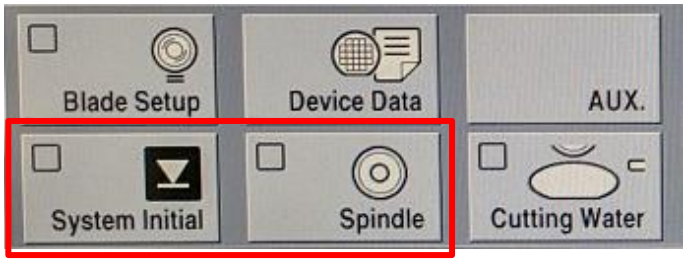


3. START THE SYSTEM:

Turn the key to start dicing saw. Wait for the system to boot up.

Press 'System Initial'. Wait for the message to say, "Initialization completed".

Turn on 'Spindle'. Wait for the message to say, "Spindle is ON".



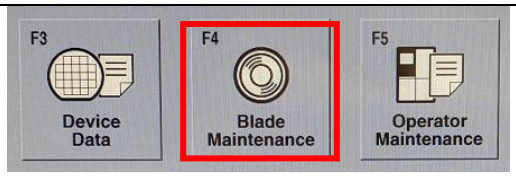
4. NON-CONTACT SETUP:

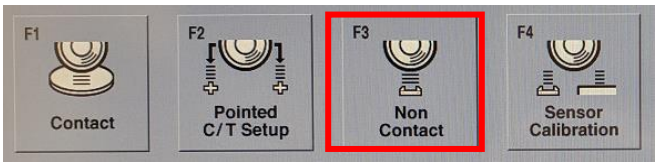
Perform non-contact alignment to calibrate the height of the blade and to measure how much the blade has been consumed.

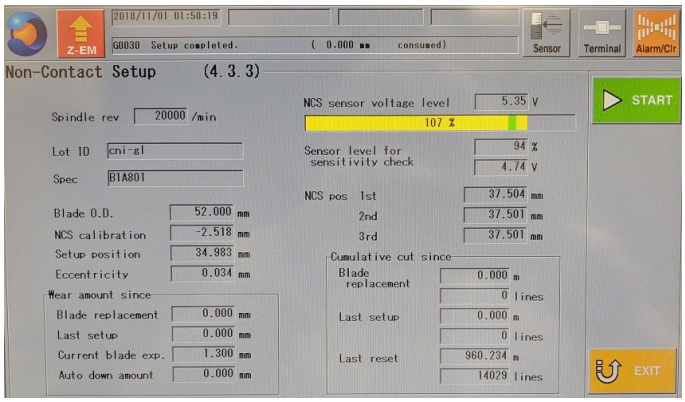
Wait for 10 min or longer to let the spindle rotate before performing the setup.

Click ‘Blade Maintenance’, ‘Blade Setup’, and ‘Non-Contact’. Press ‘Start’. Once set up is completed, check the measured value to see if the blade needs to be replaced. Contact superuser or clean room staff for the blade replacement.

Click ‘EXIT’.



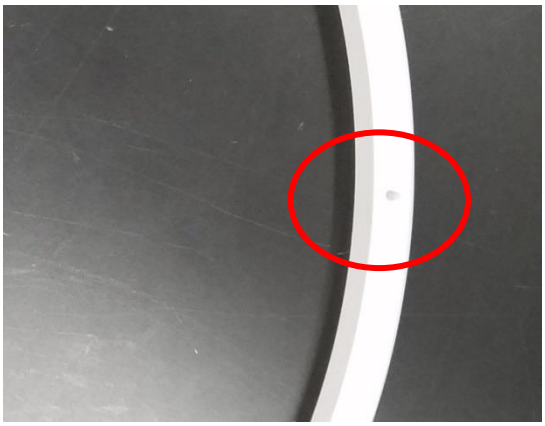


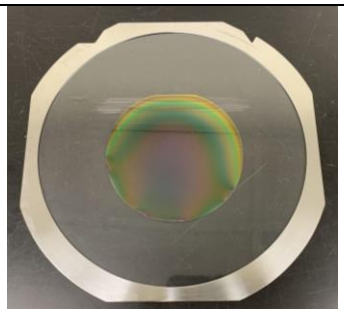
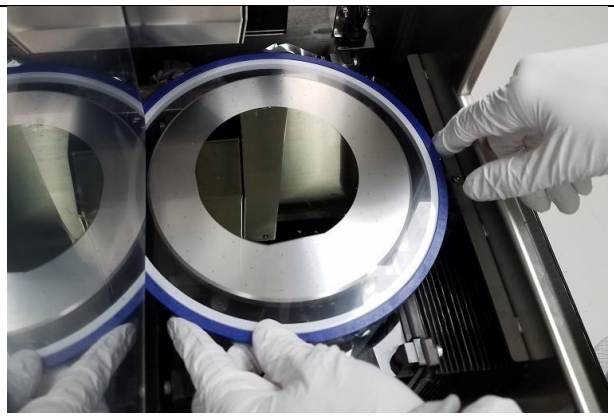
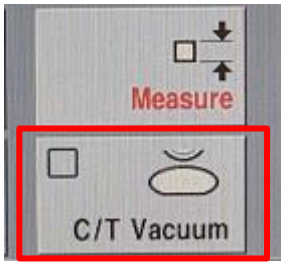
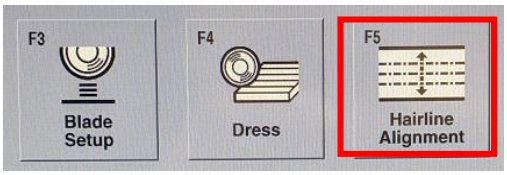
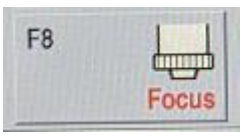
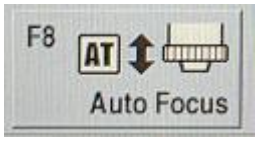


5. MOUNT YOUR SAMPLE:

Dots on the white ring are facing up. Place the sticky side of the UV tape over the white ring. Then, press the blue ring over the tape. Dots on the blue ring should be aligned with those on the white ring. Cut the extra tape outside of the grip rings.

Remember to put UV tape back to the cabinet to keep out of light.



	Place your wafer at the center of the assembly. The alignment marks side should be facing up. You can also use the stainless steel mounting ring. Remove bubbles from the backside of the tape.	 
6.	**LOAD SAMPLE:** Open the door and place your wafer/sample at the center of the chuck. Close the door and turn on the C/T vacuum. Check the green light of the vacuum gauge.	  
7.	**HAIRLINE ALIGNMENT (OPTIONAL):** Click 'Blade Maintenance' and then, 'Hairline Alignment'. Click 'Focus'. On the 'Focus Adjustment' page, click 'Auto Focus' and then, 'EXIT' the page.	  

To align your sample, find the first alignment mark or the reference point on the left side of the sample. Click ‘Align Θ’. The head will move to the right side of the sample. Find the second alignment mark and then, press ‘Align Θ’ again.

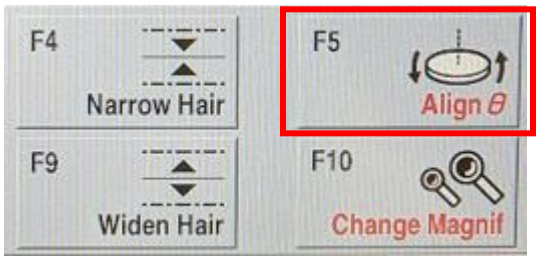
You can move the head around by pressing the scan arrows or by touching the screen with the pen.

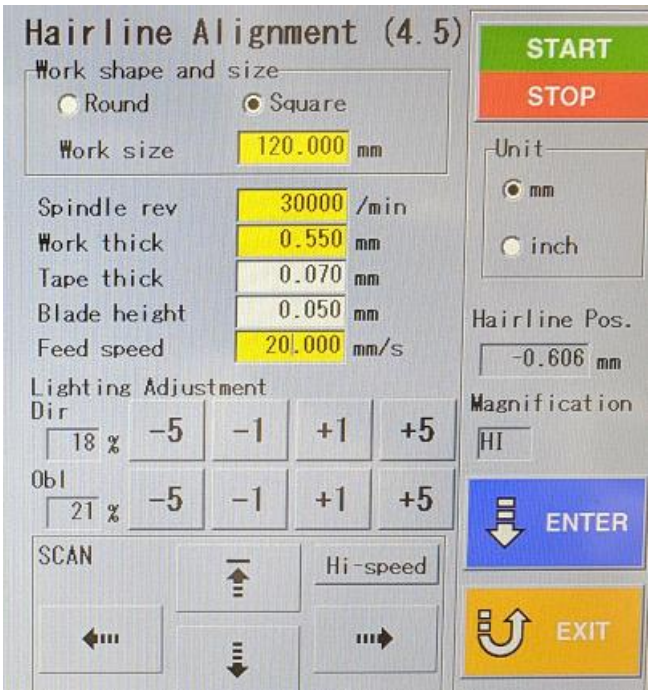
Once your sample is aligned, you can move to the test area or the position where you want to have the first cut.

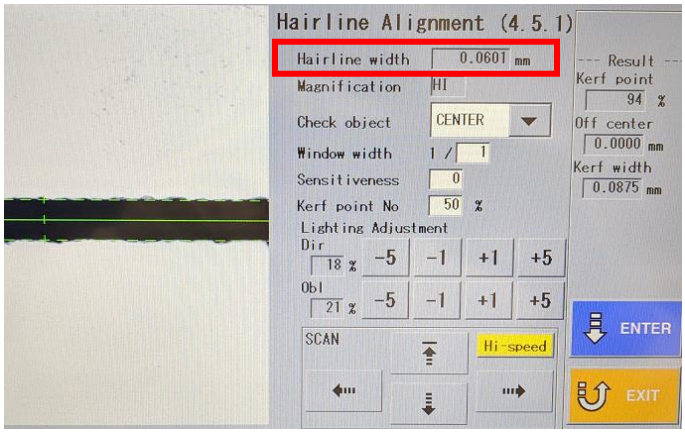
You have to give “Work size” larger than the actual size of the sample to avoid breaking the blade. For other dicing parameters, please see **step 8**.

Click ‘ENTER’ to save the parameter changes. Press ‘START’. The machine will cut one line.

Use ‘Narrow Hair’ and ‘Widen Hair’ keys to adjust the hairline width. Click ‘ENTER’ and then, ‘EXIT’ the page.

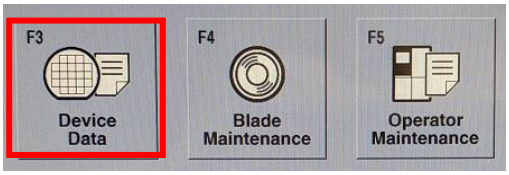




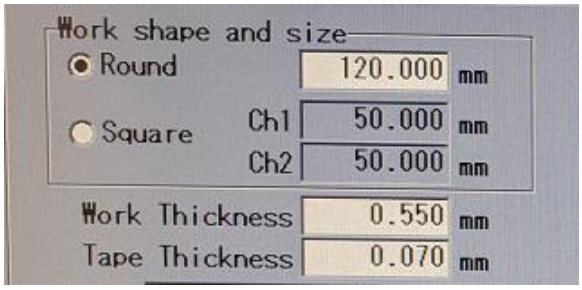


8. DEFINE YOUR PROCESS:

Press “Device Data”. Go to your group’s folder and choose your recipe.

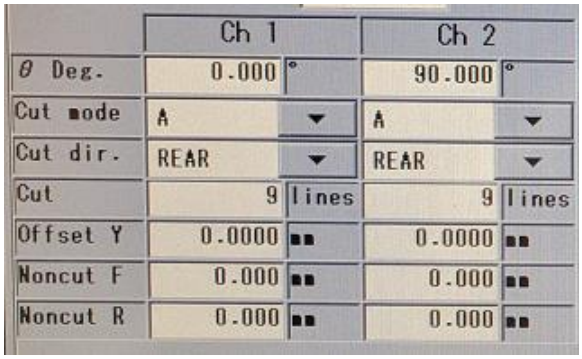


Set the workpiece size: **to avoid breaking the blade** it has to be a number larger than the dimensions of your sample (at least 20 mm larger).

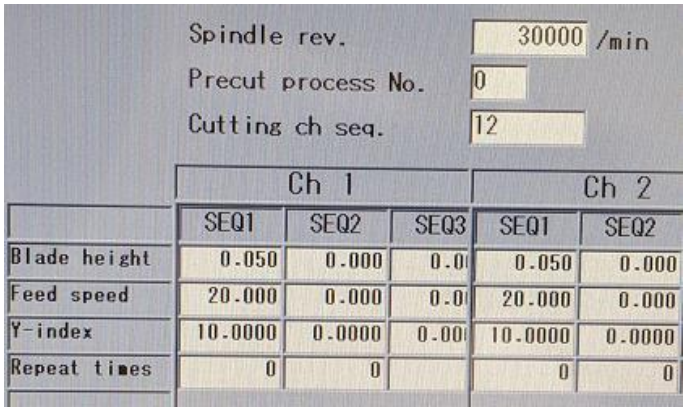


Work thickness is your wafer thickness. Make sure the blade is correct for your thickness. Tape thickness is 0.070 mm.

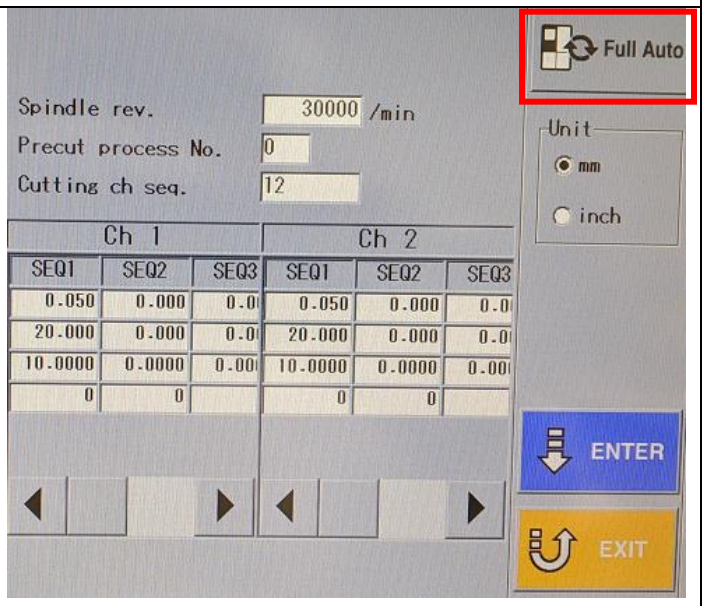
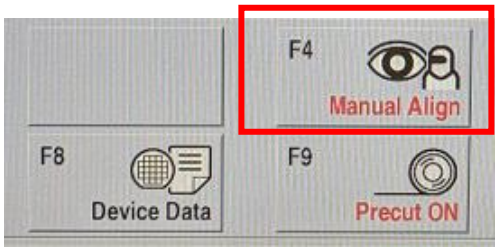
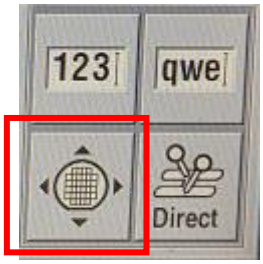
Ch1 is the horizontal cuts, and Ch2 is the vertical cuts. Cut dir. ‘REAR’ means it cuts front to rear, so you define the first cut in the front of the wafer. “Cut” is the number of cuts. Leave the last three as 0.

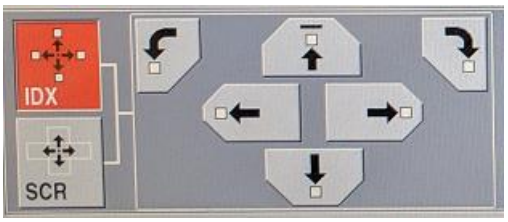
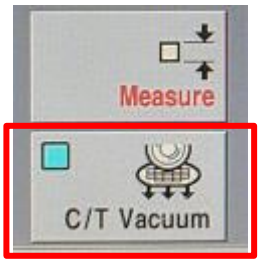


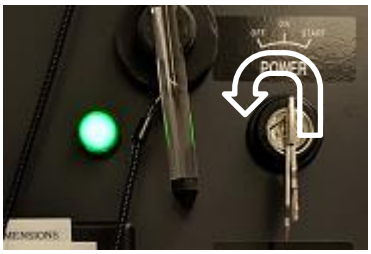
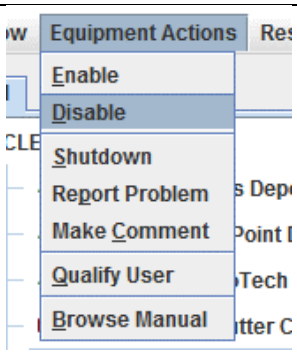
Check spindle speed: 30,000 rpm works for Si and 10,000 rpm for glass. Type the cutting ch seq. as 1 for O horizontal cuts and 12 for both horizontal and vertical cuts.



Ch1 SEQ1: Set “Blade height” 0.050 to cut all the way through the wafer and 0.02 mm through the tape. Remember y=0 at the bottom of the tape. Feed speed

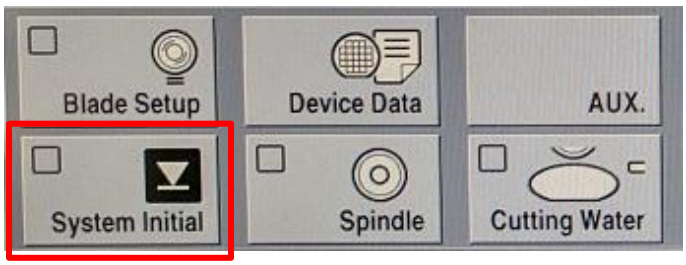
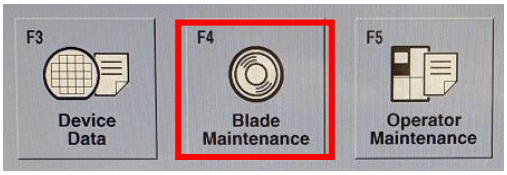
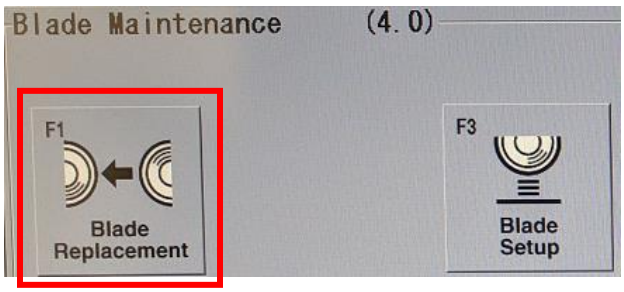
	of 20-30 mm/sec should be fine for silicon and 5-10 mm/sec for glass. Enter y-index (pitch/ spacing between cuts). Leave all other sequences (e.g., SEQ2) set to 0 unless you want irregular spacing.	
9.	**RUN PROCESS:** Press “ENTER” to save and “Full Auto”. On the ‘Full Automation’ page, click ‘Manual Align’. Check lights are on (DIR ~ 15% usually works). Place Hairline (crosshair) on street edge or left alignment mark and press ‘Align Θ’, the machine will move to the right, move the same hairline to same street edge or right alignment mark and press ‘Align Θ’ again. The machine moves back to the left. Read messages at the top while doing this. Move to the position where you want to have the first <u>horizontal</u> cut. Press ‘ENTER’. *If you get an error ‘press underlined y-axis…’, try selecting the wafer icon and jumping by	  

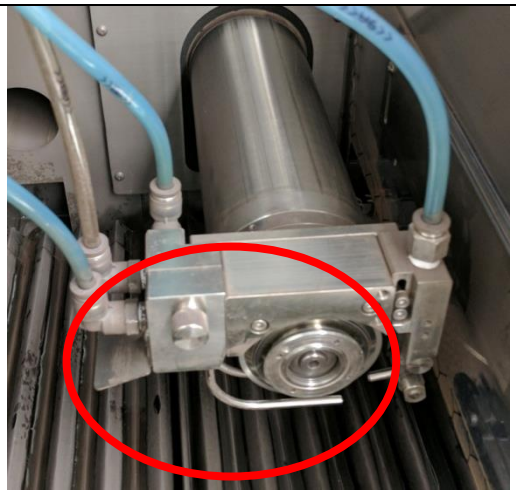
	one index up and then, back to where your first cut was. Now 'ENTER' should work. The machine will then rotate to the degree specified in the program. Do 'Align Θ' as per Ch1. Move to the position where you want to have the first <u>vertical</u> cut. Press 'ENTER' and then, 'START'. The machine will start dicing. Monitor the current while it cuts. *If you want to pause at the end of the current cut – press 'STOP' on the top right. If you want to pull up the blade immediately press 'Z-EM' on the top left.	 
10.	**RETRIEVE SAMPLE:** Open the door and blow water off from the frame – careful not to alarm. Turn off the C/T vacuum and take the frame out. Blow water off the chuck. Close the door. Cut your sample out of tape. Remove tape from the frame. Dry the frame rings.	

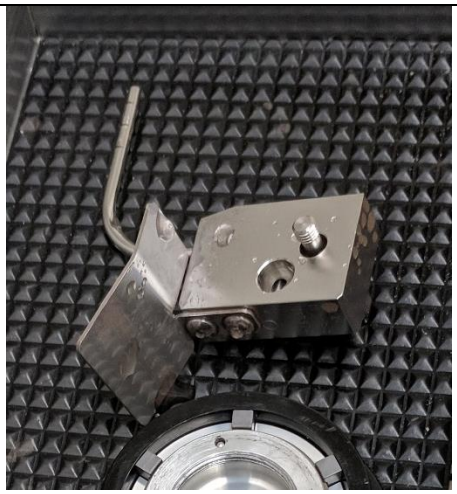
11.	**RETURN TO NORMAL:** Do blade setup non-contact alignment (see **step 4**). Press 'System Initial'. Check no parts are on the chuck. When done initializing, turn key to off.	
12.	**BADGER LOGOUT:** Don't forget to disable the tool in badger after you're done.	

DICING SAW - DISCO DAD3220

Blade Change Procedure

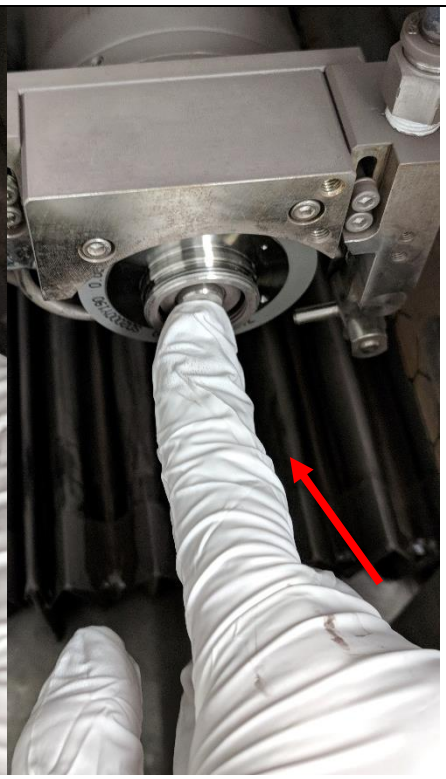
13.	**BADGER:** Enable the tool in badger	
14.	**START THE SYSTEM:** Turn the key to start dicing saw. Wait for the system to boot up. Press 'System Initial'. Wait for the message to say, "Initialization completed".	
15.	**BLADE REPLACEMENT (1):** Press 'Blade Maintenance' and 'Blade Replacement'. Wait for the spindle to be off if it was already on. The head will then move forward. Open the guard door. Unscrew a pin and take part out (marked as a red circle). Hold it with your left hand while unscrewing a pin. It is a very delicate piece.	 





16. BLADE REPLACEMENT (2):

Using these two tools to take other parts out and replace the dicing blade – see the photos.



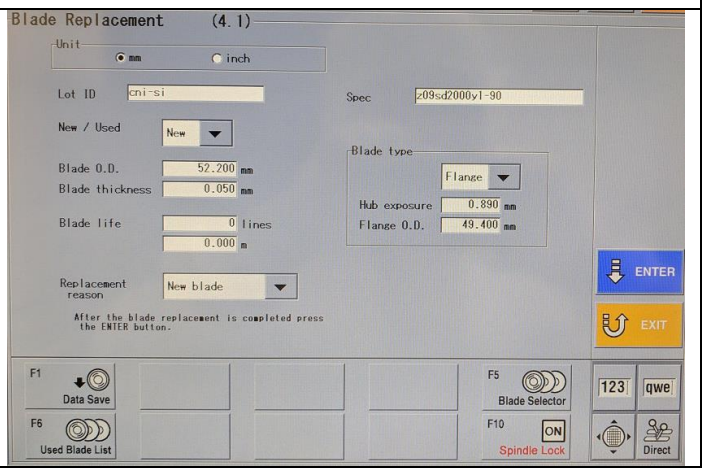
17. BLADE REPLACEMENT (3):

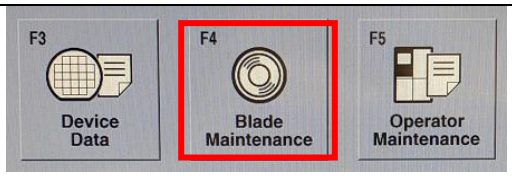
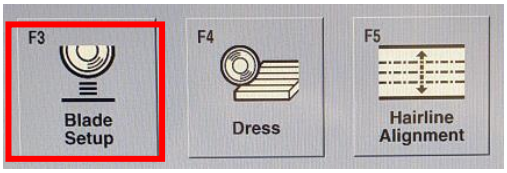
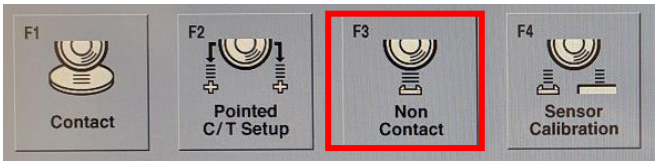
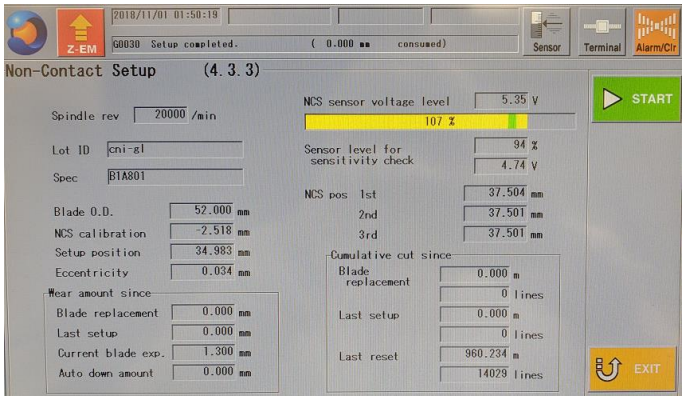
Carefully take out the used blade and load a new one.
Assemble all three parts back on the head in reverse order.
If necessary, use the tool to tighten firmly.

18. UPDATE BLADE INFO:

Update the blade information if it's necessary.

You can use 'Date Save' to save the current blade information.
The saved blade information can be found in 'Used Blade List'.



	Press 'ENTER' to save the changes and 'EXIT'. The machine will show 'Confirm jig has been removed. If OK, press button to continue.' Press 'EXIT' again to accept.	
19.	**NON-CONTACT SETUP:** Perform non-contact alignment to calibrate the height of the blade. Turn on 'Spindle'. **Wait for 10 min or longer to let the spindle rotate before performing the setup.** Click 'Blade Maintenance', 'Blade Setup', and 'Non-Contact'. Press 'Start'. Once set up is completed, click 'EXIT'. *At this point, a user can continue the work from **step 5** on the SOP. Press 'System Initial'. When done initializing, turn key to off.	   
20.	**BADGER LOGOUT:** Don't forget to disable the tool in badger after you're done.	