**Disco DAD321 Dicing Saw**
The Disco Dicing Saw is a single spindle dicing saw, capable of handling work-pieces up to a maximum of 6” diameter. A LCD screen prompts the user for the information needed for entry using a keyboard. Guidance is displayed for easy correction of errors. The system is fully interlocked for safety. Alignment and speed adjustments are easily entered. The video microscope simplifies alignments.

Ultron Systems UH114 Wafer/Frame Film Applicator and UH102 UV Curing System are provided for use in conjunction with the dicing saw.

**Ultron UH114 Tape Mounter**
The Ultron Tape Mounter mounts wafers to dicing tape and the metal frame to be used with the Disco Dicing Saw. Diced pieces are held in place by the tape until the dicing process is complete. The mounter has an easily adjustable spring-loaded roller assembly, along with film-tensioner bars along the x- and y-axes to ensure bubble-free lamination of the film to the wafer and film frame. Additionally, the UH114 features an adjustable cutting pressure and roller pressure to accommodate various tape base materials and thicknesses. A digital temperature controller ensures consistent work stage temperatures for repeatable mounting.

**Ultron UH102 UV Curing System**
The Ultron UV Release System exposes the dicing tape to UV radiation making the adhesive less sticky. This allows you to more easily remove your diced wafer pieces. You can vary the exposure time to get the desired stickiness after exposure.
General Facility Information

The Disco DAD321 Dicing Saw, Ultron UH114 Tape Mounter & Ultron UH102 UV Curing System are located in NFCF Room SB02A, Benedum Hall.

- Room SB02A is available for use Monday thru Friday, excluding holidays, from 8:00 AM to 5:00 PM.
- Room SB02A is accessed by means of a key which can be obtained in the NFCF Office, Room M104.
- All work in Room SB02A must be completed, the area cleaned & the key returned to the NFCF Office by 6:00 PM.
- The door to Room SB02A must remain open at all time when the lab equipment is in use.
- Eye protection is provided & required at all time when using the lab equipment.
- Nitrile gloves are provided and it is suggested they be worn when using lab equipment.
- Cleanroom wipes, paper towels and all necessary accessories tools are provided.

It is suggested that users coat their wafers with resist before dicing. The resist should be hard baked prior to dicing. Resists can then be removed from the diced pieces by using the appropriate stripper or remover.

Blade changes are done on a weekly basis by the NFCF Staff. We will be alternating between Silicon and Sapphire blades on a weekly basis. Appointments for installation of other blades can be requested by contacting the NFCF Staff. This will typically be done on Fridays. Only the material that matches the installed blade should be cut.

Users are not allowed to change blades.

Never use the wrong blade to cut your samples. This can cause damage to your sample as well as the tool.

We stock blades to cut the most common thickness of the following materials:
Sapphire
Silicon
Glass
Quartz

If you wish to cut a different material, you will need to request the correct blade be ordered. The request must include a sample of the material you wish to cut. There is a 4 to 6 week lead time for new blades so plan appropriately.

Stop work immediately, do not continue & contact the NFCF Staff if:

- You have any questions at any time, do not guess!
- Any red light alarm
- Any water flow errors, shut down tool immediately.
- Blade measurement fails.
- Blade cuts completely through the film.
- Blade breaks, do not attempt to clean up.
- You notice anything not operating properly.
• Make sure the house Vacuum valve is turned on

• Turn the system ON using the orange power button on the left of the front panel.

• The Tape Mounter should be at 30°C at when used. After turning the system on allow the temperature to stabilize to 30°C

• Place wafer face down in the tape applicator, aligning the wafer with the straight-line grooves while centering it using the concentric circular grooves as guides.
• Center a Film Frame around the wafer, aligning it using the frame notches with the three silver pins on the mounter surface. Film frames are kept in drawer “6” below the tool.

• Gloves should be worn when handling the frames and your sample.

• Flip the vacuum toggle switch on the right front of the tape mounter from OFF to ON. This turns on the vacuum to both the wafer and the frame.

• Pull tape over the wafer and film frame, without touching either, and affix to the sides of applicator.
  o Note: Make sure tape is not too wavy and look for any cloudy/discoled spots on the tape overtop of the wafer to be mounted. If there are sections of cloudiness, pull additional tape so that only clear tape covers the wafer.

• Slowly pull the roller by the handle from the back of the tool to the front.
• Slowly move the roller back and forth over the wafer and film frame 2-3 times to assure good adhesion. In most cases, bubbles may be smoothed out with your fingers.

• Return roller assembly to its stored position.
- Close hinged top.

- While pushing down lightly on the Circle Cutter knob, rotate the cutting assembly one full circle (clockwise is recommended). Do not rotate more than one full rotation.
  - If the Film Frame is old and heavily scored, you may need to go around more than once, but don’t do this more than is necessary.

- While applying slight downward pressure on the Linear Cutter knob slide it left to right and back to the left home position. This cuts the tape from the roll.

- Open hinged top.

- Carefully, lift up tape trimmings, pulling radially outwards to prevent lifting up tape from Film Frame, in case there are spots where it hasn’t been cut through. Sometimes it is helpful to hold down the frame at the edge, while peeling the excess tape off.

- Turn the vacuum toggle switch to the OFF position.

- The wafer/film frame assembly can now be removed from the mounter.

- When finished for the day turn the instrument OFF using the orange power button on the left of the front panel.

- Turn off the house Vacuum valve.
This DAD321 dicing machine is used to cut wafers up to 6” in diameter and 1.5 mm in thickness. Currently it is configured for cutting Si, Sapphire and Borosilicate glass only. The cutting recipe allows up to 6 different cutting spacing on each channel (X and Y direction).

Panel of the dicer
Attention: Please reserve the dicer through FOM and send email to NFCF staff at least one day in advance, with the information of your wafer(s) to be cutting: material, size and thickness.

1. Log onto the dicer through FOM, take the key from NFCF office and write down your start time on the logbook.
2. Start the machine
   1) Turn on the compressed air and water valves on the wall.
   2) Turn the start key to ‘ON’->‘START’ then release.
   3) Press ‘SYS INIT’ to initialize the system, wait about 1 min, it will show ‘initialization completed’.
   4) Press F4, it will show a list of device data. Select the data ‘STARTER’, press ENTER twice to have data updated. Press EXIT twice back to the main menu.
   5) Press ‘SPNDL’ to turn on the spindle. On the monitor, it will show ‘Spindle On’. Wait at least 15 minutes for warming up. Upon finish, Press ‘SYS INIT’.
3. Perform non-contact sensor setup
   1) Press SET UP to show <NONCONTACT SETUP>. Press Enter to execute. Follow the prompt to proceed. It will do measurement three times. When finished, it will show ‘setup completed (*.***mm consumed)’.
   2) If it alarms and show ‘NONCONTACT SETUP CAN NOT BE COMPLETED’, press ‘ALRMCLR’ to mute and exit to main menu. Press F5->F8 for ‘SENSOR CLEAN’. Press F1 and run for 5 seconds, Press F1 again to stop. Press F2 and run for 5 seconds, Press F2 again to stop. The voltage level should be above 91% and highlighted. If not highlighted or smaller than 91%, use a Q-tip to wipe the sensor area. If the voltage level still does not go above 91% Stop and contact staff for help!
3) Exit to main menu.

4. Run crosshair alignment
   1) Take the framed hairline wafer of the same material you are going to cut. Mount and center it on the chuck table. In order for the wafer to be well centered, align the frame notches to the two pins.
   2) Press C/TVAC to turn on the vacuum, make sure the red light above C/TVAC is on.
   3) Press F5 to run ‘Blade Maintenance’. F5 again to run ‘HAIRLINE ALIGNMENT CORRECTION’. On the monitor, it will show the live optical image. Focus and adjust light intensity to see the wafer surface.
   4) Press buttons X>, X<, Y˄ and Y˅ to move the camera to see the existing cutting lines. Find the upmost line and move up about 1 mm.
   5) Set up and confirm the hairline cut parameters (from the hairline wafer frame, also on the table below):

<table>
<thead>
<tr>
<th>Blade spec. table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Material</th>
<th>Part Number</th>
<th>Cut Speed</th>
<th>Spin Rate</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si</td>
<td>Z09-SD1700-Y1-60 54X0.08ASX40</td>
<td>20~30 mm/s</td>
<td>30~45krpm</td>
<td>0.454 mm</td>
</tr>
<tr>
<td>Si</td>
<td>Z09-SD2000-Y1-60 54X0.08ASX40</td>
<td>20~30 mm/s</td>
<td>30~45krpm</td>
<td>0.454 mm</td>
</tr>
<tr>
<td>Borosilicate (ITO glass)</td>
<td>R07-SDC600-BB101-75 55X0.2A2X40</td>
<td>5 mm/s</td>
<td>20~30krpm</td>
<td>0.713 mm</td>
</tr>
<tr>
<td>Sapphire</td>
<td>VT07-SD400-VC100-50 54X0.2A3X40-L</td>
<td>0.5~1 mm/s</td>
<td>15~20krpm</td>
<td>0.421 mm</td>
</tr>
<tr>
<td>Quartz?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CUT SHAPE / RND WORK SIZE / WORK HEIGHT / TAPE HEIGHT / BLADE HEIGHT / CUT SPEED / SPINDLE REV**

Input value and press RETURN button ← → | to go to the next.

DOUBLE CHECK all the parameters!

!!! Any incorrect setting can cause damage to the blade/sample!!!

Press ENTER to confirm the device data.

6) Press START/STOP Key to begin. Wait to finish.

7) Move the camera to align the hairline to the cutting line, adjust the hairline width (HAIRWIDE/NARROW) to match the line width.

8) Press F5 to align. It will move along the cutting line to the other side of the wafer. Align it again if necessary. Then press F5 again. It will show ‘θ adjustment done’. Press ENTER to finish. It may show a warning ‘Last jog direction of Y axis must be rear’, press Y ˄ and ENTER to finish.

9) Press C/T VAC and remove the hairline wafer from the chuck. Blow it dry and put back to the original location.

5. Load the sample and set up device data
1) Align the framed cutting wafer onto the dicer chuck. Press C/TVAC to vacuum the wafer, make sure the red light above C/TVAC is on.

2) Press F4 to show DEVICE DATA list. Data 000-008 are default data setting, DO NOT change them. Data 006/007/008 are starter program for cutting sapphire/ITO glass/Si wafers. To create your own device data, select one of the starter data and press F2 to copy it, it will ask you to Input device no., type a last used serial number and press ENTER to confirm.

3) Press Enter again to show the setting of the cutting recipe as below:

![Device Data Image]

i. SPINDLE REVOULTION: check the blade specification table

ii. CUT MODE: A, single spacing; AS: multiple spacing. You can press F1 to switch between A and AS (see the details in the following page)

# if you only need to cut wafer with single spacing on each direction, select CUT MODE: A
iii. WAFER SHAPE: round or square. If a wafer is round, select ROUND and enter diameter of wafer (100mm = 4” wafer). If a chip, select SQUARE and enter dimensions that are 5mm larger than your chip.

iv. WORK THICKNESS: enter known wafer thickness, accurate within +/- 0.050mm (50 μm). If unknown, measure it with the micrometer. Your sample thickness might be different than the hairline wafer!

v. TAPE THICKNESS: for our tape, it is 0.15mm (150 μm).

vi. BLADE HEIGHT: use a height of 0.1-mm.

**DEPTH OF CUT = WORK THICKNESS + TAPE THICKNESS - BLADE HEIGHT**

vii. INDEX CH1/CH2: CH1-X direction, CH2-Y direction. Enter the center-to-center spacing between dies, orthogonal to the CH1/CH2 cut direction.

viii. FEED SPEED: check the blade spec. table.

# if you need to cut wafer with multiple spacing’s, in addition to set up the above settings, you need to press F1 to change CUT MODE: AS. Then press F3: DATA2 to check/modify the settings for AS mode as below:
You can have up to 6 different spacing’s. Take two-spacing for example.

**Mode AS** (AutoSpecial): Multi-spacing cutting

Cutting lines -- -  Alignment lines

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**CH1:**
CUT DIR: REAR; θ AXIS: 0; CUT LINE: as needed;
BLADE HEIGHT: 0.1 mm; FEED SPEED: check the table; Y INDEX: Cutting spacing; ALIGN: mm (offset from the alignment mark, + to real direction, - to front direction).

**CH2:**
CUT DIR: REAR; θ AXIS: 90; CUT LINE: as needed;
BLADE HEIGHT: 0.1 mm; FEED SPEED: check the table; Y INDEX: Cutting spacing; ALIGN: mm (offset from the alignment mark, + to real direction, - to front direction).

4) Double check all the settings; press ENTER to confirm. It will show ‘data updated’ on the monitor. Press EXIT twice to back to main menu.

6. Run the cutting recipe
1) Press F1: AUTO CUT. The camera will move down and you will be able to see the wafer surface. Move wafer up/down or left/right and adjust illumination/focus to find the alignment mark (the bottom most one).

2) First locate at the left side of the mark, move the mark to the center of hairline, press F5 to align. The camera will then move to the right side of the wafer, locate the mark on the right and move it to the center of hairline, press F5 again to finish alignment. It will show ‘θ adjustment done’. Do the alignment again if necessary. If you do not have alignment mark, you can just press F5 twice to align cutting along X and Y directions.

3) Press ENTER to accept the alignment on CH1. The chuck will rotate CCW for CH2 alignment. Do the alignment on CH2 (same as CH1 but θ AXIS: 90, also the bottom most one) and press ENTER to accept the alignment. Sometimes it may show warning ‘Last jog direction of Y axis must be rear’, press Y˄ and ENTER to clear this warning.

4) You can check if it will cut on the right lines by pressing ‘INDEX’, then pressing Y˄ or Y˅ to move to the cutting lines.

5) Press START/STOP key to run the cutting recipe. The indicator will be in green!

6) Option for F2: SEMI AUTOCUT. With this option, you can select just cut along one channel (CH1). Check/modify the settings and run step 2) to 4).

7) After cutting finished, the alarm will sound, press ALARMCLR to mute. Press INIT to initial. Then press C/TVAC to vent the wafer.
8) Take out the wafer and use air gun to spray the water and dry it.

7 Cleaning and machine shutdown
1) Press SYS INIT to initialize. Turn AXIS RELEASE key and open the cover. Spray water/air to remove water/dust on the bottom. Use wipes to clean and dry the backside of the cover. Close the cover fully.
   Attention: DO NOT TOUCH/HIT THE SPINDLE!!
2) Shut down the power, water and air.
3) Check all the three tools, the bench and the drawer, make certain everything is clean and in order.
4) Log off the dicer through FOM and return the key to NFCF office, write down finish time on the logbook.
UH102 UV Curing System User Guide

- Make sure Air and Nitrogen are turned on and set to the proper pressure

- Press the square orange ‘POWER’ button
  - Allow tool to complete the “WARMING UP” cycle

- After the “WARMING UP” cycle is complete the Display Screen should ready “READY”
  - NOTE: if display does not ready “READY” stop and contact the NFCF Staff
  - Allow system 5 minutes to warm up before attempting first exposure

- Press the green ‘TIME’ button on the tool control panel

- The Display Screen will now read “EXPOSURE TIME XXX”, where “XXX” is exposure time in seconds
• Using the key pad, enter an exposure time up to a maximum of 128 seconds
  o Note: An exposure time of 90 seconds will remove most of the stickiness of the tape. For those who would like the tape to remain somewhat sticky after exposure, use a shorter exposure time. A trial run to determine your preferences is recommended.

• When you have completed entering the desired exposure time, press the green ‘TIME’ button again to set it. The Display Screen will read “READY” again.

• Raise the Door of the unit until it rests against the stops.

• Place the film frame, grip ring with the wafer facing up, aligning the frame cut-outs against the alignment pins.

• Close the Door of the unit.

• To start the exposure, press the round green ‘START’ button.

• The tool will cycle through a “PREEXPOSE PURGE” and then the exposure, displaying a countdown during the process – “EXPOSURE TIMEXXX”.

• When complete, the tool will again display “READY”.

• You can now open the lid and remove the frame/wafer.
• If additional exposures are required, the process above can be repeated.

**Cleanup and Waste Disposal**

• Discard any unwanted diced substrate in the waste container.

• Discard all waste tape in the trashcan.

• Return Film Frame to the drawer.