Dicing Saw Instructions

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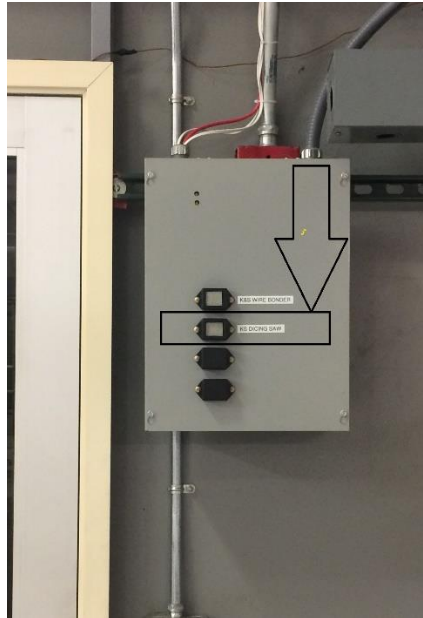
Dicing Saw Instructions (Supplemental Instruction Set)

1) Assure that all the recourses are active (water (mixture used for coolant), CDA (compressed dry air), pump)
2) Sign into iLab and activate your session
    a. Locate the electrical box located on the wall fixed perpendicular to the dicing saw and assure that the box reads "on."

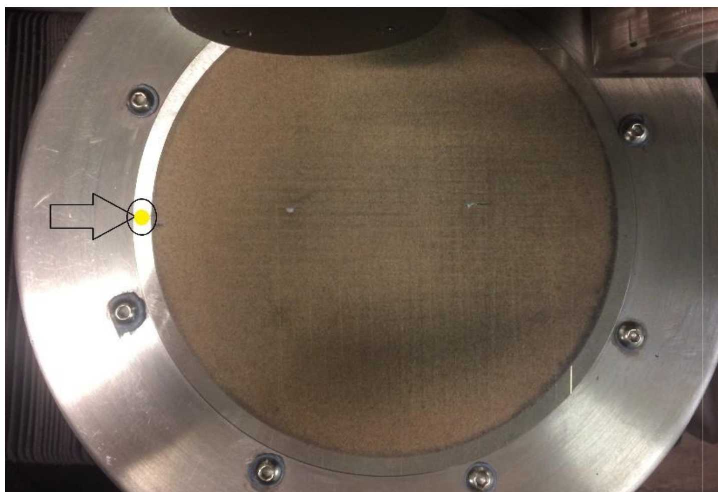


(image 1: iLab verification box)

3) If the box reads "On", the dicing saw is now ready to be turned on.
    a. Pull the large red switch towards you to turn the device on.
4) When the device turns on, wait for the screen to reset itself.
    a. Once the interface is done loading, you MUST perform a manual reset to activate the "auto theta level" feature. This is done by selecting the red reset button on the interface one time (refer to image below).

(image 2: Dicing saw controller interface)

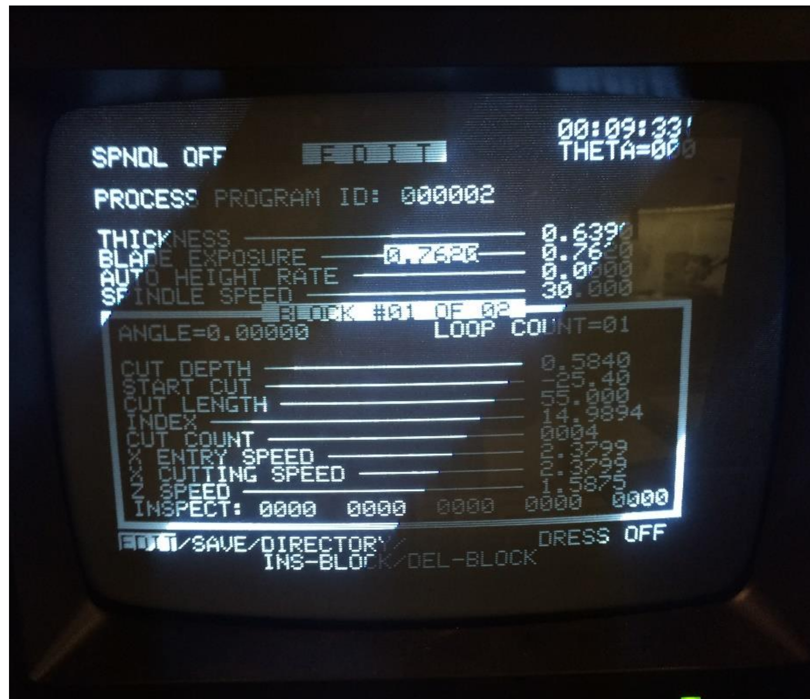
5) After selecting the manual reset the camera and spindle controller will begin to move and auto level itself. The next menu it will display is a menu asking for a date input, simply push enter and allow the auto leveling to continue until the settings display screen appears.
   a. After the settings display screen appears, you are now ready to level the bed.
6) To level the bed, select “Teach” on the controller interface.
   a. Then select “B” on the interface to teach the device the Z axis (the only axis not auto taught in the initial reset. It is very important that you follow the proper methods for Z-axis alignment or you will destroy the blade or potentially even worse outcomes may occur.
7) **Z-Axis Leveling:** Following the selection of the “B” in step 6 the arm will auto align to the middle of the cutting bed and allow for you to manually control the camera position. You must now align the camera with the edge of the bed (the metal circle part, PLEASE refer to image). The yellow circle represents where the camera light should be aligned. Following alignment, press “enter” and wait for 10-15 minutes while the system automatically levels the Z-axis.



(image 3: Dicing bed)

8) Following the Z-axis leveling it will prompt you for “new blade” or “old blade.” Simply select based upon specific situation (if you replaced blade, select “new blade” and vice versa).
9) Now you are ready to set your cut specific settings. Please refer to “Breakdown for Variables” section to optimize your cut and to determine the required settings for programming a cut without error or damage.

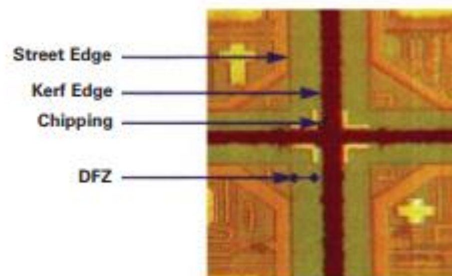
Breakdown of Variables (required for achieving a higher-level dice)



(image 4: Settings Display)

Global Variables:

1) Thickness: Thickness is the thickness of the wafer (measured within the street to be cut) added to the thickness of the film (0.11mm)



(image 5: Wafer analysis)

2) Blade exposure: is specific to the blade being used. It is essentially the amount of the blade being exposed to the wafer during the cut. Please refer to the image below to get a generalized reference point for choice of exposure. The exposure you require will effectively decide what blade you must use for your process (please refer to blade image to view for exp (exposure) is written).

Blade Exposure Recommendations

WAFER THICKNESS		BLADE EXPOSURE	
microns	mils	microns	mils
< 254	< 10	380 - 510	15 - 20
254 - 330	10 - 13	510 - 640	20 - 25
330 - 432	13 - 17	640 - 760	25 - 30
432 - 533	17 - 21	760 - 890	30 - 35
533 - 635	21 - 25	890 - 1020	35 - 40
635 - 762	25 - 30	1020 - 1140	40 - 45

Based on 10 mils (254 microns) of wear

(image 6: Blade exposure chart)

(image 7: Blade box)

3) Auto Height Rate: is a height setting that the blade returns to before and after the cut. This should be set to approximately 0.05 mm for our specific system. This reduces blade drag without harming the cut (to avoid imperfections in the cut, make sure the Auto Height Rate is less than the thickness minus the cut depth)
4) Spindle Speed: this is set in krpm and for silicon should remain 30.00. If you cut a different substance, look up the material to determine optimal spindle speed required.

Local Variables: this is broken up into a minimum of two subsections (block 1 and block 2). Unlike the global variables, each of the local variables must be set individually for both block 1 and block 2

1) *Block 1: is the original cut direction*
2) *Block 2: is the second cut direction and is essentially block 1 rotated at a 90-degree angle*

1) Cut Depth: this is calculated by taking the thickness of the wafer in the street and then adding (0.5 multiplied by the thickness of the film).
2) Start Cut: this is set to -25.40mm to allow for easier x-axis setting when setting the starting cut. This setting is essentially saying that the cuts will occur 25.40mm to the right of where the camera is initialized when choosing the x-axis cut later in the procedures.
3) Cut Length: the cut length is the distance the cut will occur from the initialization position (from where the blade enters the wafer). This is suggested to be 10mm greater than the size of the wafer, leaving approximately 5mm on each side (if you don't feel comfortable with your accuracy you can allow for more room to be allotted by increasing the overall cut length but be sure not to make it greater than the length of the bed as this will ruin the blade).
4) Index: the index is the distance between each cut. To accurately set the index you must know the exact distance from the center of each street. A trick to obtain this is to go into cut mode and use the camera to scroll from the center of one street up to the next and record the coordinates (make sure to do this as accurately as possible to as many significant figures as your can because it makes a large difference).
5) Cut Count: this is the number of cuts that you are going to make, from bottom to top. The system always cuts from bottom to top.
6) X Entry Speed: this is the speed at which the blade enters the wafer. We have found that a good point of reference is to take the thickness and increase it by a factor of 10. Ex: if the thickness is 0.500 then a good suggested entry speed would be 5.000.
7) X Cutting Speed: this is the speed of the blade in the x direction. The blade always cuts in the x direction. We have found that this speed should be similar to the x entry speed, however, there are times when you may want to vary this to be even more precise. For a good cut without complications I'd suggest just keeping it the same as the x entry speed.
8) Z Speed: this is the speed of the blade head in the z-direction. To avoid dragging the blade (which can ruin the blade or your cut or create marks on the film) you want to assess the distance the blade will have to move (above the film and possible other cuts) and assess the speed at which it must rise to achieve this distance.

Glossary of Important Terms

Street: the street size is the distance between 2 dies.

Kerf (aka blade thickness): the kerf size comes from the blade and is the size of the cut that will be made by the specific blade. The kerf must be reasonably less than the street size to avoid cutting into the die and avoiding errors that could permeate into the die.

Blade Thickness Recommendations

STREET WIDTH		BLADE THICKNESS	
microns	mils	microns	mils
50	2.0	15 - 20	0.6 - 0.8
50 - 64	2.0 - 2.5	15 - 20	0.8 - 1.0
64-76	2.5 - 3.0	20 - 25	1.0 - 1.2
76-89	3.0 - 3.5	25 - 30	1.2 - 1.4
89-102	3.5 - 4.0	35 - 41	1.4 - 1.6
102-127	4.0 - 5.0	41 - 51	1.6 - 2.0
127-152	5.0 - 6.0	51 - 64	2.0 - 2.5

(image 8: Street vs. kerf analysis)

Die(s): this is the microchips or areas of which you would like to cut out and individualize.

Krpm: units for kilo revolutions per minute.