ROCHESTER INSTITUTE OF TECHNOLOGY
MICROELECTRONIC ENGINEERING

K&S Wafer Saw Recipes

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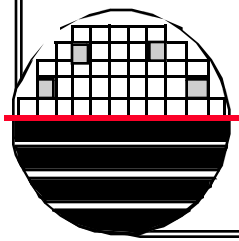
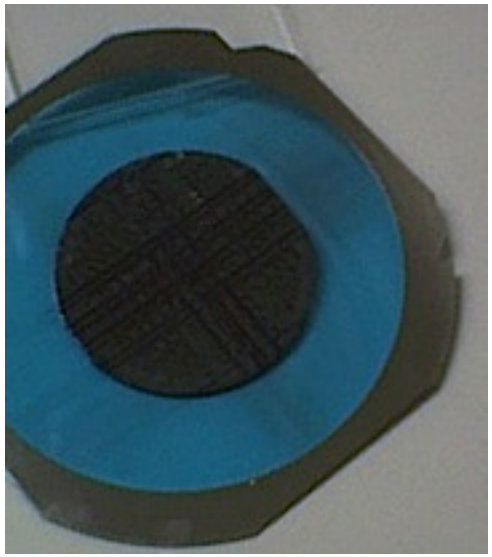


K & S FOUR AND SIX INCH WAFER SAW



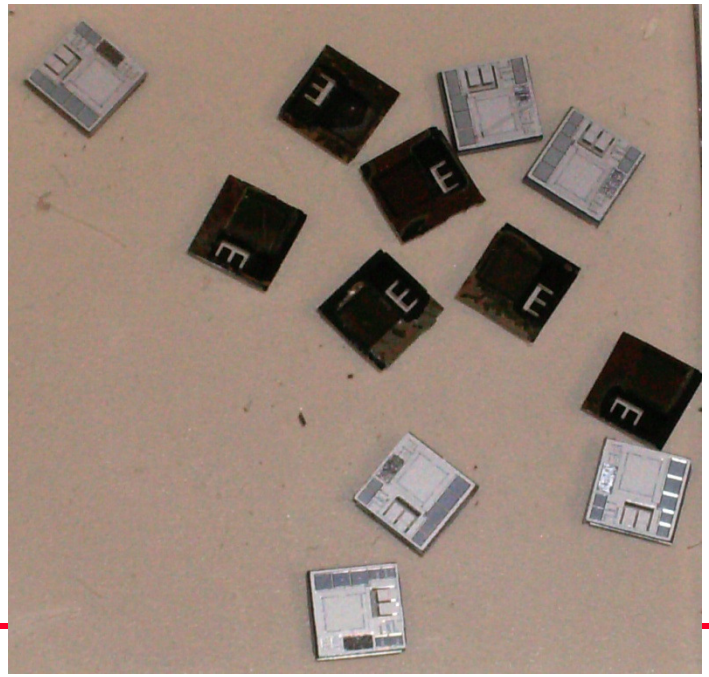
4” wafer attached to blue backing tape. The tape has adhesive that holds the chips in place after sawing.

K&S Wafer Saw

TAPES FOR DICING

Nitto Denko Corporation (http://www.nitto.com)
Lintec Corp., Tokyo, Japan

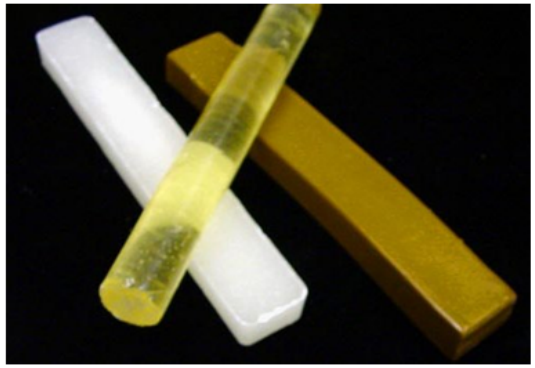
UV Light Release ADWILL T-5782, 200 mm x 10 m roll
Extra Sticky, ADWILL G-19, 200 mm x 10 m roll



Dicing tape comes in rolls

CRYSTAL BOND WAX

Crystalbond™ and Wafer-Mount™ washaway mounting adhesives are ideal materials for temporarily mounting objects that require dicing, polishing, and other machining processes. These adhesives exhibit high bond strength and adhere readily to metals, glass and ceramics. When processing is complete, Crystalbond™ and Wafer-Mount™ adhesives are removed by reheating and cleaning with a wide range of different solvents.



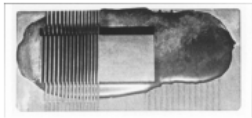
Appearance of Crystalbond 509, 555, or 590

Crystalbond Products

This family of adhesives has won wide acceptance in metallography and other materials science sample preparation laboratories because of the success users have had with the preservation of the most delicate of structures. Make sure you understand and compare the differences in characteristics between the different products in this unique family of temporary adhesives.

Typical Applications:

- Machining advanced ceramics.
- Lapping and polishing optical components.
- Dicing ceramic substrates and semiconductor wafers.
- Dicing ferrites, glasses and piezoelectrics.
- Dicing metal and optical single crystals.
- Mounting cross-sections for electron microscopy.
- Backfilling components for temporary mechanical support.



Crystalbond™ 590 bonds an advanced ceramic which is diced into 25-50 mil sections.

Vacuum compatibility:
We are often asked about the vacuum compatibility of the Crystalbond products. We do not have hard information on that subject except we do know of users who routinely put samples mounted in Crystalbond 509 into their SEMs. We do not know at this point if such SEMs are conventional or UHV systems. At this point, we would not recommend any of the other Crystalbond products for use in high vacuum, but it is mainly for lack of any information, rather than knowledge that they would not work. We would welcome any customer experiences, good or bad, working with 509 or any of the other Crystalbond products in their SEMs.

Adhesion of the mounting material to the sample:
Generally speaking, users report excellent adhesion. The best adhesion is obtained when the part to be embedded is first heated to the temperature of the flow/melting point of the resin being used. If this is not done there can inferior adhesion might be experienced. Also, if there is organic contamination on the surface, and if a metal, then a short "plasma cleaning" in the SPI Supplies Plasma Prep™ II plasma etcher will generally improve adhesion greatly.

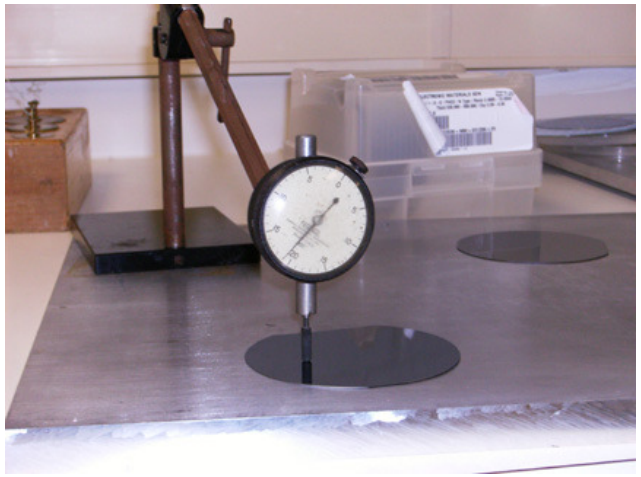
Crystalbond 509
Provides excellent adhesion and minimizes clogging of diamond tools compared to waxes. Transparent in thin cross-sections. Soluble in acetone or 509-S stripper, an odorless, non-flammable, biodegradable

DICING SAW BLADES FOR WAFERS, GLASS AND CERAMIC

Resin-bonded dicing blades are made of epoxy with diamond grit for cutting glass, ceramic, pzt, sapphire, etc. Thermocarbon Inc., 391 Melody Lane, P.O. Box 181220, Casselberry, Florida 32718-1220, Tel (407) 834-7800 supply a variety of metal and resin bonded blades. We have 2.25M-15B-46Ru7-3 hubless blades and hubs to hold them. The blades are $25.50 each in Qty of 10. The 2.25 is 2 1/4 inch diameter, the 15 is 0.015 in thick, the 46 is the diamond grit size in µm. Mike Reeves (800) 523-1946 said that this blade should be good for 1 mm thick glass.

Kulicke and Soffa Industries Inc., Micro-Swiss Division, 2101 Blair Mill Road, Willow Grove, PA 19090 Tel(215)784-6975 make metal bonded and resin bonded dicing blades. Their Resinoid Blades with and without hubs are for cutting glass, ceramics, pzt, sapphire, etc. They also have a wide range of nickel hubless and hub-type blades for silicon and GaAs wafers.

WAFER THICKNESS MEASUREMENT



Wafer Thickness Measurement

You need to know the wafer thickness.
Standard 4" wafer is normally 500µm,
Standard 6" wafer is normally 650µm,
MEMS wafers are thinned so measure,
Dicing tape is 50µm or thicker, so measure

DEFINITIONS

Thickness: wafer + thickness of back tape + thickness of optional front tape
Blade Exposure: Set automatically and changes with blade wear.
Auto Height Rate: distance the saw will cut before doing a height check, 750 mm if cutting silicon, 150 mm if cutting quartz
Spindle Speed: 20 means 20,000 rpm
Angle: normally 0 for loop 01 and 02, 90° for loop 03 and 04
Loop Count: this is the number of times that a block is repeated. (most = 1)
Cut Depth: depth the saw will cut into the wafer from the total thickness, normally cut half way through the tape, thus, cut depth = thickness – tape/2
Start Cut: for 6" wafers use -10 mm for
Cut Length: typically 25 mm longer than width of substrate (125mm or 175mm)
Index: in an alignment block this is the distance between where the alignment was locked and where the saw will move to make the 1st cut
Cut Count: number of cuts
X Entry Speed: speed of entry, typically 2mm/sec for silicon,resinoid blade 30µm grit
X Cut Speed: speed of cut, typically 3 mm/sec for silicon, resinoid blade 30µm grit
Z Speed: speed the blade comes down, typically 0.35mm/sec
Inspect: if the right most digit is 1 saw will stop after first cut for inspection, if 0 saw will not stop for inspection

LIST OF RECIPES

Name for some of Dr. Fuller's Recipes

FULL1 – 6" silicon wafer, single cut in X or Y
align where you want to cut

FULL4M – 4" MEMS silicon wafer cut into small die
align cut to street above bottom row of die, adjust recipe for appropriate wafer thickness

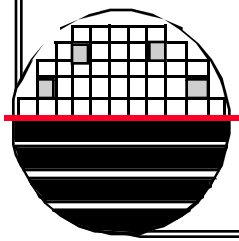
FULL6 – 6" silicon wafers cut into small die
align cut to street at top of bottom row of die

FULLC1 – 6" Quartz wafers cut into small die
align cut to street above bottom die, very slow about 13 min. per cut, note blade wear is ~1.5 mm for every 20 cuts across 6" wafer, so a new blade is needed every ~40 cuts, blades are ~115 mm dia.New and about 4 mm extends beyond the hub, so after 40 cuts only 1 mm of blade is left, check height each cut

LIST OF RECIPES

Name for some of Dr. Fuller's Recipes

FULLH0 – 6" silicon wafers cut into small die
align cut to street above bottom row of die. This recipe cuts only 2/3rds of the way through the wafer



RECIPE FULL4M BLOCK 01 AND 02

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.400 mm	THICKNESS (wafer + blue tape + cover tape)	0.400 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #01 OF 04		BLOCK #02 OF 04	
ANGLE = 0 LOOP COUNT = 01		ANGLE = 0 LOOP COUNT = 01	
CUT DEPTH	0.37 mm	CUT DEPTH	0.370 mm
START CUT	0	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	125 mm
INDEX (distance to move before 1st cut)	-4.5 mm	INDEX (distance for between cut center-to-center)	4.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	2.0 mm/sec	X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	2.5 mm/s	X CUTTING SPEED	2.5 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULL4M BLOCK 03 AND 04

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.400 mm	THICKNESS (wafer + blue tape + cover tape)	0.400 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.370 mm	CUT DEPTH	0.370 mm
START CUT	0	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	125 mm
INDEX (distance to move before 1st cut)	-4.5 mm	INDEX (distance for between cut center-to-center)	4.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	2.0 mm/sec	X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	2.5 mm/s	X CUTTING SPEED	2.5 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULL1 BLOCK 01 AND 02

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.675 mm	CUT DEPTH	0.675 mm
START CUT	0	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	0 mm	INDEX (distance for between cut center-to-center)	0 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	1 OR 0
X ENTRY SPEED	2.0 mm/sec	X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	3.0 mm/s	X CUTTING SPEED	3.0 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULL1 BLOCK 03 AND 04

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500
SPINDLE SPEED	20
BLOCK #03 OF 04	
ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.670 mm
START CUT	0
CUT LENGTH	0
INDEX (distance to move before 1st cut)	0 mm
CUT COUNT (number of horizontal cuts)	0
X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	3.0 mm/s
Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000	

THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500
SPINDLE SPEED	20
BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.670 mm
START CUT	-10 mm
CUT LENGTH	175 mm
INDEX (distance for between cut center-to-center)	0 mm
CUT COUNT (number of horizontal cuts)	0 OR 1
X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	3.0 mm/s
Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00001	

RECIPE FULL6 BLOCK 01 AND 02

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.625 mm	CUT DEPTH	0.625 mm
START CUT	-10 mm	START CUT	-10 mm
CUT LENGTH	175 mm	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	-5.5 mm	INDEX (distance for between cut center-to-center)	5.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	1.0 mm/sec	X ENTRY SPEED	1.0 mm/sec
X CUTTING SPEED	3.0 mm/s	X CUTTING SPEED	3.0 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULL6 BLOCK 03 AND 04

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.625 mm	CUT DEPTH	0.625 mm
START CUT	-10 mm	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	-5.5 mm	INDEX (distance for between cut center-to-center)	5.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	1.0 mm/sec	X ENTRY SPEED	1.0 mm/sec
X CUTTING SPEED	3.0 mm/s	X CUTTING SPEED	3.0 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULLC1 BLOCK 01 AND 02

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.670 mm	CUT DEPTH	0.670 mm
START CUT	0	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	-5.5 mm	INDEX (distance for between cut center-to-center)	5.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	0.2 mm/sec	X ENTRY SPEED	0.2 mm/sec
X CUTTING SPEED	0.2 mm/s	X CUTTING SPEED	0.2 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULLC1 BLOCK 03 AND 04

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.670 mm	CUT DEPTH	0.670 mm
START CUT	0	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	-5.5 mm	INDEX (distance for between cut center-to-center)	5.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	0.2 mm/sec	X ENTRY SPEED	0.2 mm/sec
X CUTTING SPEED	0.2 mm/s	X CUTTING SPEED	0.2 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULLC1 6 INCH GLASS WAFER WAXED ON A 6" SILICON WAFER

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

THICKNESS (wafer + blue tape + cover tape)	1.700 mm	1.700 mm	1.700 mm	1.700 mm
BLADE EXPOSURE	7.0 mm	7.0 mm	7.0 mm	7.0 mm
AUTO HEIGHT RATE	500	500	500	500
SPINDLE SPEED	20	20	20	20
BLOCK	#01 OF 04	#02 OF 04	#03 OF 04	#04 OF 04
ANGLE = 90 LOOP COUNT = 01				
CUT DEPTH	0.1 mm	0.8 mm	0.1 mm	0.8mm
START CUT	0	-25 mm	0	-25 mm
CUT LENGTH	0	175 mm	0	175 mm
INDEX (distance to move before 1st cut)	-6.666 mm	6.666 mm	-6.666 mm	6.666 mm
CUT COUNT (number of horizontal cuts)	0	19	0	19
X ENTRY SPEED	0.2 mm/sec	0.2 mm/sec	0.2 mm/sec	0.2 mm/sec
X CUTTING SPEED	0.2 mm/s	0.2 mm/s	0.2 mm/s	0.2 mm/s
Z SPEED	0.35 mm/s	0.35 mm/s	0.35 mm/s	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000				

RECIPE FULLH0 BLOCK 01 AND 02

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

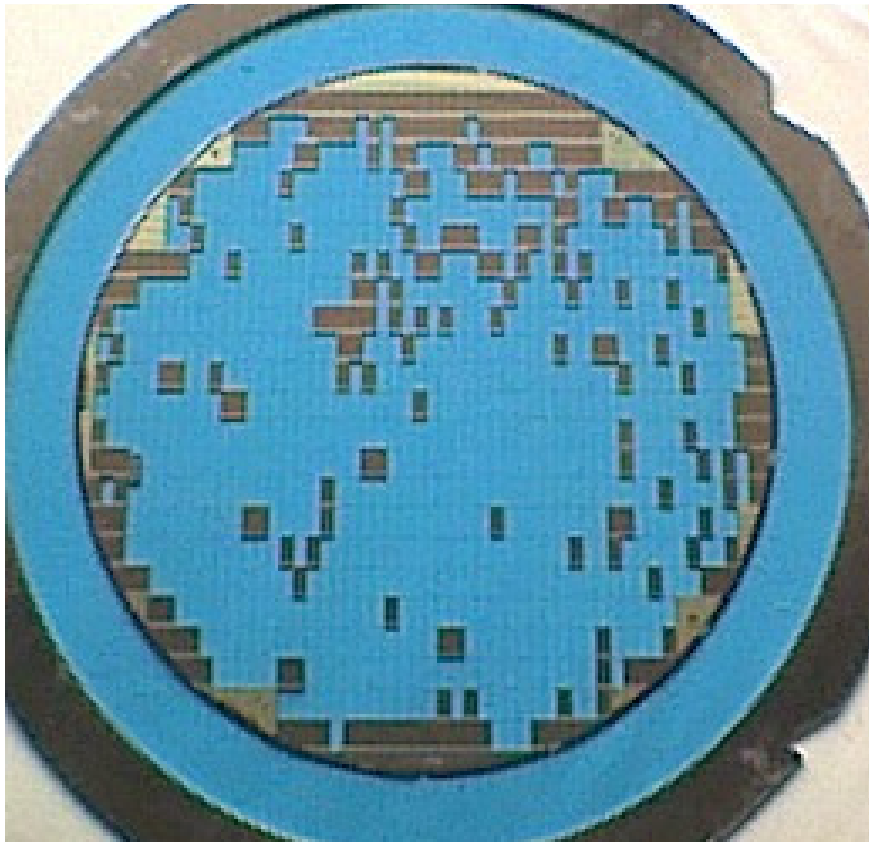
THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.425 mm	CUT DEPTH	0.425 mm
START CUT	-10 mm	START CUT	-10 mm
CUT LENGTH	175 mm	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	-5.5 mm	INDEX (distance for between cut center-to-center)	5.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	2.0 mm/sec	X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	4.0 mm/s	X CUTTING SPEED	4.0 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

RECIPE FULL6 BLOCK 03 AND 04

UNIT INCH / MM ALIGNMENT MANUAL / NO / AUTO
CUTTING TYPE DICE / SCRIBE PROCESS FLOW: SINGLE / DUAL / ONE / DUAL2
REF. POINT YES / NO QUALITY DIAMETER 152.39

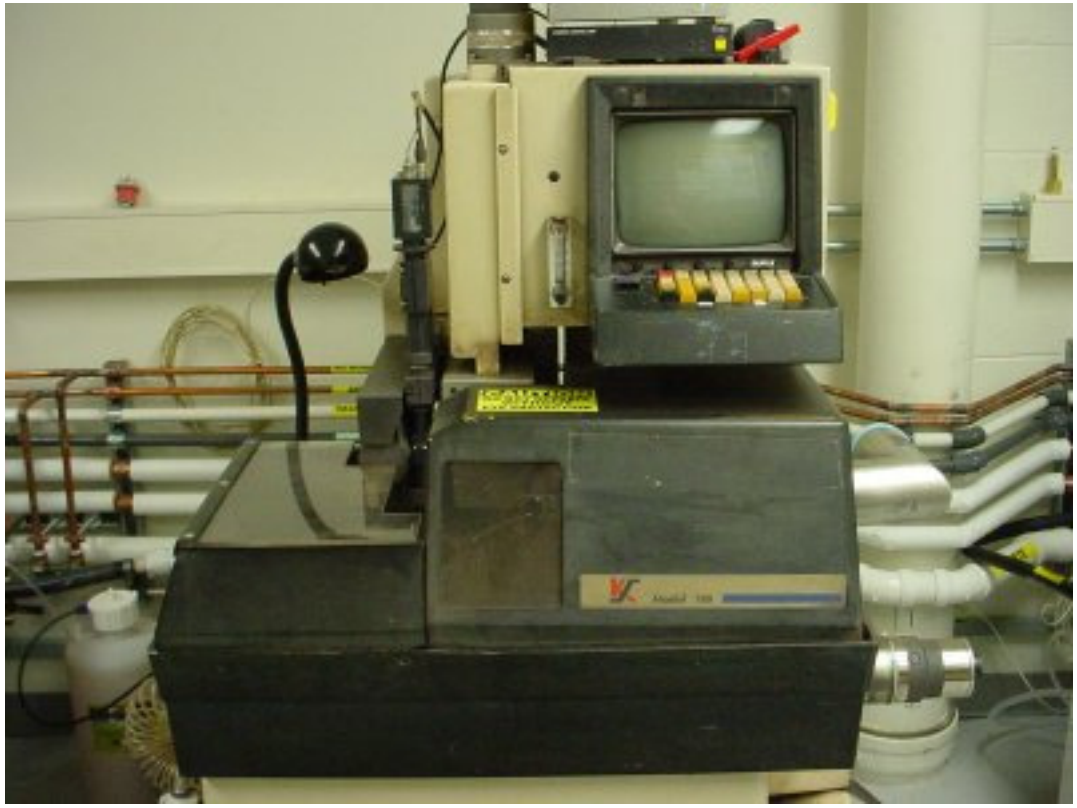
THICKNESS (wafer + blue tape + cover tape)	0.700 mm	THICKNESS (wafer + blue tape + cover tape)	0.700 mm
BLADE EXPOSURE	7.0 mm	BLADE EXPOSURE	7.0 mm
AUTO HEIGHT RATE	500	AUTO HEIGHT RATE	500
SPINDLE SPEED	20	SPINDLE SPEED	20
BLOCK #03 OF 04		BLOCK #04 OF 04	
ANGLE = 90 LOOP COUNT = 01		ANGLE = 90 LOOP COUNT = 01	
CUT DEPTH	0.425 mm	CUT DEPTH	0.425 mm
START CUT	-10 mm	START CUT	-10 mm
CUT LENGTH	0	CUT LENGTH	175 mm
INDEX (distance to move before 1st cut)	-5.5 mm	INDEX (distance for between cut center-to-center)	5.5 mm
CUT COUNT (number of horizontal cuts)	0	CUT COUNT (number of horizontal cuts)	21
X ENTRY SPEED	2.0 mm/sec	X ENTRY SPEED	2.0 mm/sec
X CUTTING SPEED	4.0 mm/s	X CUTTING SPEED	4.0 mm/s
Z SPEED	0.35 mm/s	Z SPEED	0.35 mm/s
INSPECT 00000 00000 00000 00000 00000		INSPECT 00000 00000 00000 00000 00001	

AFTER SAWING AND REMOVAL OF GOOD CHIPS



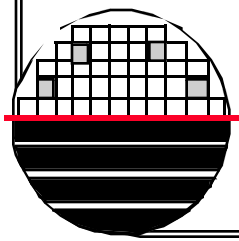
MINI OPERATION MANUAL

http://smfl.microe.rit.edu/pdf/tool_manuals/KS_775_Wafer_Saw_Manual.pdf



REFERENCES

1. Technical manuals for the K&S Wafer Saw are in the file cabinet near the door.
2. Saw Blades
3. Dan Jaeger's notes



SETUP OF HEIGHT BUTTON

Saw Height Check Button Calibration

Purpose:

When the saw begins to produce erratic cut depths, or when the saw warns you upon reset that the maximum number of height checks have been reached and that the height check button needs to be re-setup, it is necessary to recalibrate the height check button. This routine teaches the saw the height difference between the height check button and the stage of the saw. If these parameters become incorrect, the saw may produce cuts that do not completely clear the water, or worse may cut through the wafer into the stage.

Procedure:

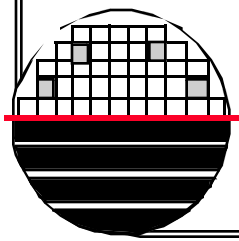
1. Perform a manual height check by going to <TEACH> and then selecting <HEIGHT>.
2. Enter technician mode by holding down <SHIFT>, pressing <STOP>, and then releasing both keys.
3. Press <TEACH> once, and then press <TEACH> again to "Enter Setup".
4. On the setup menu, press <A> for "Stations".
5. On the stations menu, press <8> for "Button".
6. The teach button screen is displayed, along with the current height button parameters (parallelism, effective diameter, and delta z).
7. From this menu, press <D> for "Teach".
8. A warning will be displayed saying that it is important that the camera and spindle stations are accurate, press <ENTER> to continue.
9. You now have the opportunity to specify the parallelism and diameter for the routine. Diameter allows the saw to calculate the area on the height button that will be used to perform height checks. Parallelism should be thought of as the "levelness" of the height button or the acceptable error in height checks. It is the number of millimeters difference across the area used for height checks that will be acceptable for the routine to continue. I recommend using a parallelism of 0.010 mm (10 µm) and a diameter of 10 mm. The diameter will determine how long you can go before needing another height button calibration, but the larger the diameter, the more perfect you have to level the height button so that the difference across it is minimal.
10. The saw will then move the camera to the center of the chuck, and ask that you "move to center of chuck". Since the spindle and camera routines are accurate, simply hit <ENTER> to continue.
11. The saw now performs a height check to the actual stage, not to the button.
12. When complete, the saw will instruct you to move to center of button, and be sure that it is in focus. Being in focus of the button allows you to see the scratches and cuts in the button from previous height checks. Using the arrow keys, move over to the height button so that the microscope light is in an unused section of the button. To change focus, hit <SHIFT> and <ENTER> so that the up and down arrows now control the Z-axis instead of the Y-axis. You can resume control of the Y-axis by hitting <SHIFT> and <ENTER> together again. Once in place, key <ENTER>.
13. The routine will now perform a boundaries check. It will move to the four corners of the area it will use on the height button, based on the diameter parameter entered previously. While it moves to each corner, take a glance at the button and make sure that the microscope light is on the height button at all times. If it is not, you risk performing a height check off the height button and possibly cutting into the stage or another piece of the saw.

When finished with the boundary check, the saw will then ask if you want "Automatic Teach" or "Manual Teach". Choose "Automatic Teach".

SETUP OF HEIGHT BUTTON

15. The saw will now begin its calibration routine by performing a height check at each corner, beginning with the lower left corner and proceeding clockwise. As each check is completed, the measured height will be displayed on the screen, and the parallelism parameter will be updated on the screen. If the saw makes it around to each of the four points without exceeding the parallelism initially set, then the routine will be a "Success", if the error across the four points is higher than the specified parallelism parameter at any time, the routine will be deemed a "Failure".
16. If the routine succeeds, then the saw will move around to four new points using a larger diameter, and more of the height button, but if it fails it will repeat using a smaller diameter and less of the height button. Once the saw finds a diameter that produces a parallelism just under what you specified it will finish the routine and inform you of the new parameters. More specifically it will give you the delta z and number of heights parameters. **It is very important that the delta z parameter be a negative number. This means that the height button needs to be slightly below the stage. If the height button is not below the stage and delta z is not less than zero, when the saw goes to perform an automatic height check, it will strike the height button going very fast and severely scratch the button as well as destroy the blade!**
17. If the routine continues to fail after a few attempts at smaller diameters, then it is likely that the button platform is not very level. Stop the routine by keying the <STOP> key, and then turn off the spindle by hitting the <SPNDL> key. Get the small level in the cabinet in the back of CMP with the tool box, and using an Allen wrench re-level the platform the best you can. If you pay attention to the routine as it fails, you will notice which side of the platform is high and low, which may help you in terms of figuring out which screws to turn. Once done re-leveling, begin this entire procedure again, starting at the beginning.
18. After successfully completing the routine, and the delta z number is less than 0, and there are 100 or more height checks allowed, you will be returned to the main button station setup menu. This is the screen where in step 7 we keyed <D> to teach the routine. Now that we have re-setup the station, we must "SAVE" the new parameters. Without keying the letter for "SAVE", all of the work we just performed will be lost as soon as we exit this menu. **Make sure you save the new settings!** It will take a few seconds to save this information to the saw's main memory.
19. Now that the settings have been saved, feel free to return to the program directory, select a program and begin dicing again.

Notes: Keep in mind that you will need to perform this procedure again, depending on how many height checks have been performed. A typical C/F series wafer uses 5 height checks. After running the routine a few times, most likely there will no longer be an unused section on the height button. At this time, you need to find Scott Blondell and ask him to polish down the current height button. After it has been polished, you can now run the procedure again. One other common error that occurs during this procedure is an "X has reached limit error". What this means is that when moving to the center of the area on the button you want to use for height checks that you have moved too far to the left on the button. Because of this, the saw blade cannot reach that section of the button to perform a height check. To fix this error, choose a smaller diameter or choose a point further to the right to be the center of the area used for height checks. This is something that we are trying to fix with Scott by allowing for more X-travel of the stage.



REMOVE AIR BUBBLES FROM BLADE WATER HOSE

After height check
Shift + Stop
ManL button (twice) get you to DEBUG screen
B takes you to UTILITY
2 takes you to Blade Water >> ON
2 takes you to Blade Water >> OFF
Dsply button returns you to normal operation