GENERAL PROCESS AND OPERATION SPECIFICATION

Dicing Saw Model 1100A

I. SCOPE

a. The purpose of this document is to describe requirements and basic operating instructions for the Assembly Technologies Model 1100 Dicing Saw. It also includes basic instruction in preparation of samples or wafers using tape and tape rings, which allows 100% through-cuts on samples without damage to the wafer chuck.

II. SAFETY

a. Be sure that you are trained and signed off to use this equipment.
b. Be sure to keep all doors and protective shields in place before operating this equipment.
c. Be sure to wear safety glasses at all times when operating this equipment.
d. When you receive an “F” error code (ex. F201, F202, etc.), reset the saw, turn the spindle off at the saw and at the Hitachi spindle drive, and resolve the “F” code before restarting the spindle drive.
e. If you are unsure about any procedure or indication while operating this equipment be sure to contact a staff member or trainer for assistance.

III. APPLICABLE DOCUMENTS, MATERIALS AND REQUIREMENTS

a. For more information about the detailed operation of this tool refer to the Model 1100 Wafer Dicing Saw Operation Manual – available near the tool in hard copy binder, or the file: Model 1100 Wafer Dicing Saw Operational Manual.pdf.
b. For assistance with changing a worn or broken blade, please contact a staff member.
c. Appendix A: Program parameters and descriptions

IV. OPERATION

a. Preparation.
   i. Select pair of saw mount rings.
   ii. Cover the white ring using blue tape with the sticky side facing up.
   iii. Place the black ring around the white ring so the blue tape goes between the rings.
   iv. Secure the sample to the blue tape and remove air bubbles between blue tape and sample using a Q-tip or tweezers.
   v. Cut excess tape using scissors. See Figure 1.
   vi. Verify that the blade is installed and not broken by removing the plastic blade cage. Upon inspection, remount the cage back in place.

b. Turn on the dicing saw’s utilities and power.
   i. Water - turn on the yellow water valve located on the older dicing saw.
   ii. Check the water trap below saw frame. If there is water, unscrew the glass container, empty into a wet bench drain, and rinse with DI water.
   iii. Air - open the Swagelok valve behind the saw.

    iv. Vacuum - flip the light switch to the on-position on the back of the older saw.
    v. Main power - turn on the main saw power on the right-hand panel.
    vi. Monitor – turn on the power strip behind the saw.
    vii. Spindle/blade controller – turn on the controller using the light switch box it is plugged into.

c. Prepare the saw for use.
    i. Press “RESET” on the saw panel and wait for the lights to initialize.
    ii. Press “PROG”, then “ENG/MET” to set up the program parameters in metric units.
    iii. See Appendix A for information about the program parameters. See Figure 2 for a picture of the program screen.
    iv. Press “PROG” again to finish programming.
    v. Press the “ON SPINDLE OFF” button and wait until the light stops blinking.
    vi. Press the green “RUN” button on the spindle controller to turn the spindle on. The spindle speed is calculated by multiplying the number on the controller by 60.
    vii. Place the gage block towards the operator-side of the chuck and press “WAFER LOCK” to secure it. See Figure 3 for correct placement of the gage block.
    viii. Press “CHUCK ZERO” to zero the chuck, then press “CHUCK ZERO” again to verify that the gage block is being used.
    ix. Once the chuck is zeroed, press “WAFER RELEASE” and remove gage block.

d. Load and align substrate and perform the cut.
    i. Place substrate with blue tape over the chuck and press “WAFER LOCK”. The substrate should not move rotationally.
    ii. Press “ALIGN” to bring the camera over the substrate.
    iii. Use the directional buttons (forward, back, left, right, CW, CCW) on the right panel to align the cut reticle to the cut location on the substrate.
    iv. Once properly aligned, press “SINGLE CUT” to make a cut of length “DIM 1” or “AUTOCUT” to make multiple cuts as set up in the program parameters.

e. Unload substrate and power off saw and utilities.
    i. Once all cuts are complete, turn the spindle off press “STOP/RESET” on the spindle controller. Once the spindle has stopped, press “ON SPINDLE OFF”. Wait until the red light stops blinking.
    ii. Turn off the spindle controller.
    iii. Press “RESET”.
    iv. Press “WAFER RELEASE” and remove substrate and blue tape.
    v. Turn off monitor, saw power, vacuum, air, and water (in that order) the same way they turn on.

V. SIGNATURES AND REVISION HISTORY

a. Author: Ethan Morse, Student Technician
   i. Date: 14 August 2018
   ii. Revision: D
b. Author: Jung Hwan Woo, AggieFab Staff
   i. Date: 17 December 2021
   ii. Revision: F
   iii. Updates: Revised Appendix A, Added Appendix B

Approvals:

Technical Manager Signature: Sandra G Malhotra______________________________

Date: 4 January 2022____

Revision History:

Revision	Author	Date
Original Issue	L. Rehn	7/24/2015
Rev A	L. Rehn	9/1/2015
Rev B	L. Rehn	9/30/2015
Rev C	E. Morse	11/16/2017
Rev D	E. Morse	08/14/2018
Rev E	J. Woo	03/17/2020
Rev F	J. Woo	12/17/2021

Figures

Figure 1: A wafer placed on the blue tape with excess tape cut off.

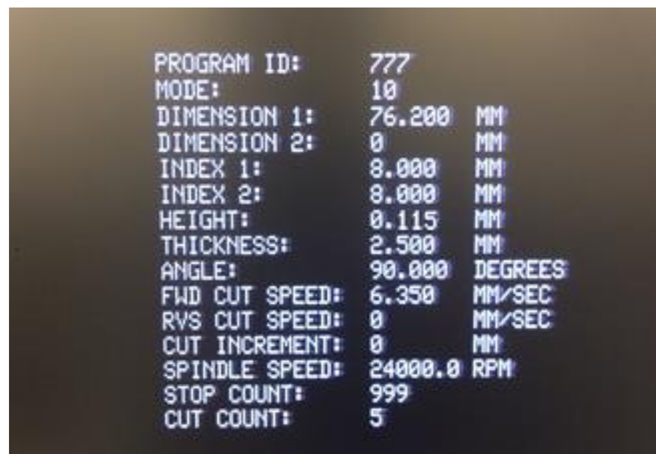

Figure 2: The program screen using metric units

Figure 3: Correct placement of gauge block for chuck zeroing.

Appendix A: Program parameters and descriptions

The default program is Program 300 and works well for silicon or glass samples. The cut dimensions (DIM 1 and DIM 2) will provide an extra 10 microns to the x- and y- dimensions of the desired sample.

Program: 300

MODE: 30

CUT SPEED = **TBD USER**. 5 mm/s works well for silicon, while harder materials, such as sapphire, require cutting speeds as low as 1 mm/s and a different blade

1st Index = **TBD USER** (Pass 1 cut spacing, if using auto cut. Enter “8” if single cut will be used.)

2nd Index = **TBD USER** (Pass 2 cut spacing, if using auto cut. Enter “8” if single cut will be used.)

ANGLE: 0-90°

CUT INC (Cut increment): 0 mm (For thick or hard samples. It is an incremental depth when making multiple cuts per street. Utilizing this function significantly lowers the stress on the spindle, allowing cuts on thick or hard samples without damaging the blade.)

STOP COUNT = 999 CUT COUNT = XXX

HEIGHT = 0.090 mm (Distance between bottom of cut and the chuck. The blade must cut through the sample to create a 90° angle at the bottom of the cut.

THICKNESS (of your sample or wafer plus the blue tape) = actual sample thickness + 0.5 mm, for example: 1.5 mm for 1 mm sample or 1.0 mm for 0.5 mm. This is the distance above the sample at which the alignment step takes place.

DIM 1 & DIM 2 = **TBD USER**, Sample length, or Wafer size + 10 mm (for example 25.4 mm + 10 mm = 35.4 mm for 1 inch sample)

SPL SPEED (spindle speed) = For Si, 24,000 rpm is recommended. Use lower speed for harder samples. Do not exceed 24,000 rpm.

See the Model 1100 Operating Manual for more detailed programming instructions.

Appendix B: Dicing parameter references

1. Silicon wafer
    a. Blade type: 2.25M-8B-22RU-3
    b. Cut speed: 5 mm/s
    c. Cut increment: 0 mm
    d. Height: 0.090 mm
    e. Spindle speed: 24k-25k rpm
    f. Sample thickness range: 250-2000 µm
    g. Note: a smaller diamond sized blade (not provided) can be utilized to reduce chipping and get smoother edges.

2. Glass & sapphire wafer
    a. Blade type: 2.187-8B-54RU7-3
    b. Cut speed: 1 mm/s
    c. Cut increment: 0 mm
    d. Height: 0.090 mm
    e. Spindle speed: 18k rpm (glass), 15k rpm (sapphire)
    f. Sample thickness range: 500-1000 µm
    g. Note: It is recommended that the sapphire thickness is ≥ 500 µm. Thin samples cannot adequately support the blade and may cause blade breakage.