ADT Provectus 7100 Dicing Saw Standard Operating Procedure

**QUICK GUIDE**

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### CRITICAL PRECAUTIONS AND COMMON MISTAKES

- If you do not know which recipe to use, please contact the MNFL Staff
- Ensure that the Cut Depth in your recipe is set so that the Blade does not enter the Workpiece
- Check Blade status to verify if blade exposure is satisfactory
- Perform a spindle height calibration
- Always do Y-Offset to verify the blade alignment

### Before you start

- Know the layout of your wafer:
  - Thickness and diameter of the Workpiece
  - Location of alignment marks and width of streets
  - The Index Value

### Tool condition for the next user

- If you change a blade, the standard 2045 blade MUST be replaced and Y-offset alignment must be done before log out
1. Mounting Wafer on a Dicing Tape

1.1 Place the metal frame on a mounting station
1.2 Place the wafer with device side down in the middle of the metal frame
1.3 Switch on the vacuum to hold the wafer

1.4 Pull the tape over the wafer and metal frame
1.5 Roll the roller back and forth

1.6 Lower the cutting panel and cut the tape around metal frame
1.7 Cut the tape in the back
1.8 Remove the excess tape

1.9 Turn off the vacuum and pick up mounted wafer (Workpiece)
2. ADT Dicing Saw Startup Procedure

2.1. Activate your reservation in the NEMO system
2.2. Open the nitrogen valve (N2)

2.3. Login to machine
2.4. Initialize the system by selecting "System Init" from the menu for User
2.5. Perform a spindle height calibration by “Right Clicking” on the Spindle RPM gauge and Select/Run <Height>
2.6. Check blade status by checking the blade indicator and the black pointer that moves up the guide as the blade is worn
   - Green: Blade exposure satisfactory, cutting can continue
   - Yellow: Blade exposure critical, cutting can only continue for a short time
   - Red: Blade requires changing, no cutting possible

If the blade needs to be changed, inform the staff of it, or go to section: “Changing Blade”

**Note:** Blade 2045 - hub nickel bond diamond blade is mounted as a standard for silicon wafer dicing (0.75" ID, 2.188" OD, 0.002" thick, 0.045" exposure, 2 - 6 µm diamonds)

2.7. When the following dialog boxes appear on the screen click: "OK" and “Create Backup”
3. Changing Blade

3.1 Right-click the Blade Indicator and select "Blade Change"
3.2 The "Define Blade" screen will appear
3.3 Make sure that the spindle is stopped

3.4 Open spindle module
3.5 Release the latch to open the spindle cover

3.6 Fit torque
3.7 Hold torque wrench by grip and twist black handle clockwise to loose blade holding nut
3.8 Remove blade holding nut
3.9 Remove the blade using the Blade Handling Tool and place in the blade container

**Note:** If using a hub blade (e.g. 2045) the 0.050” steel spacer needs to be installed; If using hubless blade (e.g. ADT RESIN), remove steel spacer and mount the hubless ADT RESIN blade directly on the spindle.

3.10 Install the new blade using the Blade Handling Tool
3.11 Put the blade holding nut and tighten with torque wrench counterclockwise until you hear a click
3.12 Close the spindle cover and lock the latch
3.13 Close the cover of the spindle module
3.14 Choose the blade from the list of "Define Blade" screen
   Note: If 2045 hub nickel bond diamond blade, choose blade 2045 from the list and press "OK" in the Define Blade screen

3.15 Click Finish and wait for automatic height check: “Blade Change Process to be Completed”

   Note: If the hubless ADT RESIN blade is installed, choose blade ADT from the list and input the flange diameter
   • Check the box of "Change flange"
   • Input the flange diameter of hubless blade holder, (Large or Small)
   • Click "OK" in the Define Blade screen
   • Click Finish in the Wizard and wait for automatic height check: “Blade Change Process to be Completed”

3.16 Install our “standard” hub blade 2045 and do Y-offset alignment after finishing work with any other blades
4. Defining Job
4.6 Click Auto in the top left corner of the drop-down menu and select "Define Job"
4.7 Choose a recipe from the "Recipe" box
   • **Note**: Use your recipe. Ensure that the Cut Depth in your recipe is set so that the Blade does not enter the Workpiece. Do not change any parameter in other recipes. If you do not know which recipe to use, please contact the staff.
4.8 Click "OK" to assign the Recipe and close the dialog box

5. Loading Workpiece into the Chamber
5.1 Click the “Load Wafer” icon in the manual menu
5.2 Open the Load/Unload Cover
5.3 Place a Workpiece on the Cutting Chuck
   • **Note**: Insert stoppers into notches of the metal ring
5.4 Close the Load/Unload Cover and click the "Finish" button in the Wizard
6. Aligning Workpiece and Defining Cut Positions

**Note:** Align the Workpiece to ensure the Streets are parallel to the Blade, then define the Cut Position. Once Manual Alignment has been performed, the Workpiece can be cut, using the parameters defined in the Recipe. But remember to verify if the blade is aligned with the microscope before dicing using Y-OFFSET!

6.1 Click the “Auto Alignment” icon in the manual menu
6.2 Adjust focus and illumination as needed
6.3 Follow the direction given in the Wizard

6.4 Find a right hand alignment mark for angle 0°; click “Next”
6.5 Find a left hand alignment mark for angle 0°; click “Next”

**Note:** You should see the rotation correction at this point; If you click “Next”, the Workpiece moves along the X-Axis allowing additional correction. You may also click “Finish” to complete the first step in the Auto Alignment procedure.

6.6 Define your cut “street” position for angle 0° and click “Finish”

**Note:** For GPC recipe algorithm, the defined cut position is in the center of a street anywhere on the wafer. The cut map is displayed across the entire wafer. For APC algorithm the defined cut position is normally the point where the blade enters the Workpiece.
6.7 Repeat aligning procedure and defining cut position for the other angles defined in the Recipe. For instance, if Angles 0° and 90° have been defined, Auto Alignment is first performed at 0° then at 90°
6.8 Define your cut “street” position for angle 90° and click “Finish”; You should now have a cut map overlaid on your substrate animation

**Note:** The Workpiece can be cut, using the parameters defined in the Recipe. But remember to verify if the blade is aligned with the microscope before dicing using Y-OFFSET!

7. **Y-offset Alignment between the Blade and the Microscope**

7.1 Click the “Manual Y-Offset” icon in the menu

**Note:** If a cut map for the wafer already exists, the system goes to the defined cut position; To repeat the alignment, manually click “Back”

7.2 Choose a place to make a single cut; Move to an area on the wafer where you can cut. Make sure the cut is not close to critical features; and click “Next”

7.3 Click “Yes” to perform a single cut

7.4 Align cut with crosshairs using the up and down arrows of the X/Y-Axis Controls to move the reticule to the center of the cut

7.5 Click “Finish” to automatically update the system
8. Wafer Dicing (Full Cut or Single Cut)

8.1 **For automatic full wafer cut**: click the “Full Cut” icon in the menu
8.2 Click “Finish” when cutting procedure is done

8.3 **For single cut**: click “Manual” < “Cut” < “Partial Wafer Cut” in the drop-down menu

8.4 Select angle: click “Finish” to select current angle or click “Next” to rotate 90°
8.5 Click “Next” for Manual Alignment (follow 6.4-6.6 steps)
- Find a right hand alignment mark; click “Next”
- Find a left hand alignment mark; click “Next”
- Click “Finish” to complete the Alignment procedure

8.6 Move to an area on the wafer where you want to make a cut and click “Finish”

8.7 Click: “Next” Animation Mode

8.8 Follow the procedure below to perform single cut:
- Click: “Next” 1st Index Position
- Click: “Next” Last Index Position
- Click: “Finish” Complete Teach @ Current Angle
- Click: “Finish” to cut wafer and exit
9. Unloading Workpiece from the Chamber

9.1 Click “Unload Wafer” icon in the menu
9.2 Open the Load/Unload Cover, use water gun and nitrogen gun to clean and blow away particles from the wafer surface
9.3 Click the "Finish" button in the Wizard to release the Workpiece from the chuck
9.4 Remove the metal ring with the sample
9.5 Close the Load/Unload Cover

10. Shutoff Procedure

10.1 Make sure that the spindle is stopped; if not, click the RIGHT mouse button and stop the spindle
10.2 Logout by selecting "Logout and Login" from the menu for User

Note: Do not shut power off

10.3 Turn off nitrogen and the pump

10.4 Logout form Mendix system
11. Curing UV Tape after Dicing

11.1 Place metal ring with the wafer into UV curing system and press "Start"
11.2 The system will warm up and automatically start counting time down
11.3 Wait until curing is finished and display shows "READY"; then pick up your sample

Appendix 1. Common Blades Specifications

- **2045 (K4T20L45) - Hub nickel bond diamond blade**
  - Used to cut Silicon and III-V
  - 0.75" ID, 2.188"OD (19.05 x 55.57 mm) with 2 - 6 micron diamonds
  - 0.002" (50 µm) thick, 0.045" (1.14 mm) exposure

- **CA-010-325-125-H - Hub resin bond diamond blade**
  - Used to cut ceramic, quartz, sapphire and glass
  - 0.75" ID, 2.25" OD (19.05 x 57.15 mm), 325 mesh with 40-60 micron grit size
  - 0.01" (254 µm) thick, 0.125" (3.175 mm) exposure

- **ADT RESIN (00777-8045-010-QIP) - Hubless resin bond diamond blade**
  - Used to cut ceramic, quartz, sapphire and glass
  - 40 mm ID, 2.25" OD, (40 mm x 57.15 mm) with 45 micron grit size
  - 0.01" (254 µm) thick
  - Mounted on a large flange gives blade exposure: 1.54 mm
  - Mounted on a small flange gives blade exposure: 2.32 mm

Other blades in stock:

- **K0820-Q500-000 - Hub nickel bond diamond blade**
  - Used to cut Silicon and III-V
  - 2 - 6 micron diamonds
  - 0.0008" (20 µm) thick, 0.02" (0.5 mm) exposure

- **K1025-Q500-000 - Hub nickel bond diamond blade**
  - Used to cut Silicon and III-V
  - 2 - 6 micron diamonds
  - 0.001" (25 µm) thick, 0.025" (0.63 mm) exposure