

# DAD3240 Automatic Dicing Saw



**University of Notre Dame**

**Department of Electrical Engineering**

## Contacts

For problems, clarifications of procedures, or general information pertaining to this machine, please contact lab staff at [staff-ndnf-list@nd.edu](mailto:staff-ndnf-list@nd.edu).

**In Case of Emergency, Please Contact Notre Dame Security at**

**911**

## **DAD-3240 Setup Instructions**

1. Enable the tool in iLab.
2. Turn on the compressed air; the yellow handle should be vertical. Turn on the water chiller, normal readings are 19.5 deg. C & 20-30 PSI. Turn on the dicing saw, turn the key to “Power On - Start” and release it, wait for the system to initialize (about 60 seconds).
3. Press “System Initial” on the Main Menu, wait for the message “Initialization Completed”
4. To install a blade, press “Blade Maintenance” – F4
5. Press “Blade Replacement” – F1
  - a. Install the blade on to the spindle hub:
    - i. Open the left hand door to gain access to the blade.
    - ii. Remove the front spray nozzle
    - iii. Remove the outer threaded washer with the round gripper tool
    - iv. Wipe down the spindle, spacer, blade and or the blade flange with Propanol.
    - v. Place the blade on the chuck using the black 3-prong gripper tool. Also, for hubbed blades use the spacer, for Thermocarbon blades remove the spacer.
    - vi. Replace and tighten the outer threaded washer with the round gripper tool by hand. If the spin rotates, make sure “F12 – Spindle Lock” is ON. Leave the gripper tool in place
    - vii. Insert the T handle torque wrench into the gripper tool. Make SURE! to insert the torque wrench parallel to the axis of the spindle. Turn the torque wrench to tighten clockwise “1 click”, remove it and the gripper tool from the spindle
    - viii. Install the front spray nozzle
    - ix. Close the left hand door
6. Select the blade using one of the following steps. Step “b” will give a list of user blades.
  - a. “Used Blade List” – F7, this is for blades previously entered in the system & have been used in a previous dicing operation. Select the used blade then press “OK” – F6. Make sure the blade data is correct and that “Used” is displayed under New/Used, press “Enter”.
  - b. “User Blade” – F5, This is for blades previously entered in the system & are new or have been used. Select the blade then press “OK” – F6. Make sure the blade data is correct and that “New” or “Used” is displayed under New/Used, press “Enter”.
  - c. “Disco Blade” – F11, This contains a list of some of the blades Disco manufactures that can be selected for a dicing operation. Select the desired blade and press “OK” – F6.
  - d. To add a blade that is not in the system
    - i. Make sure you are at screen 4.1, “Blade Replacement”
    - ii. Do not put in an entry into the “Lot ID”
    - iii. Use the “123” & “qwe” keypads to enter the blade data, when finished, press “Enter” to set the data
    - iv. Toggle the keypads to display the single function keys to the left
    - v. Press F1 to save the data, then press Exit
    - vi. Press “User Blade” – F5
    - vii. Press “User Entry” – F4, the blade data should now appear in the system
    - viii. Press “Exit”

- ix. Follow the steps in “b.” to enter this as the selected blade.
    - e. Press “Exit” as necessary to get back to the Main Menu.
  7. Perform a Non-Contact Setup, i.e. measure the edge of the blade
    - a. Press “Spindle” & “Cutting Water” to turn both on. Wait 5 minutes for temp stabilization.
    - b. Press “Blade Maintenance” – F4 on the Main Menu
    - c. Press “Blade Setup” – F3 on the Blade Maintenance Menu
    - d. Press “Contact Setup” – F1
    - e. Press “Non-Contact Setup” – F2
    - f. Press “Start”, this should do a non-contact setup
    - g. After Setup is complete, press “Exit” to get back to the main menu
    - h. Press “Spindle” to turn it off.
  8. Prepare your wafer on the 12” metal ring and blue tape.
    - a. Put blue sticky tape onto the round metal frame.
    - b. Pull the tape away from the metal frame, stretch it slightly and press it to the metal frame.
    - c. Remove the excess tape from around the frame.
    - d. Turn the wafer over on a clean-room wipe and remember its orientation.
    - e. Place the metal frame over the wafer with the sticky side towards the back of the wafer.
    - f. Tap the center of the frame/sticky tape onto the wafer.
    - g. Using the silicone stopper and starting at the center of the wafer, gently press the tape down onto the wafer while moving the stopper from the center to the edges.
    - h. Press out any bubbles between the tape and wafer
  9. Perform a Hairline Adjustment on the blue tape: This will align the blade cut to the center hairline on the screen image. The hairline adjustment will be done on the ring with your sample.
    - a. Open the right hand door and place the ring with only the tape on it, close the right hand door, press “C/T Vacuum” to hold the ring/tape in place.
    - b. From the main menu select “Blade Maintenance” – F4
    - c. Select “Hairline Alignment” – F5
    - d. Enter the working parameters.
      - i. Work Shape: Square
      - ii. Work Size: 10mm
      - iii. Work Thickness: 0mm
      - iv. Tape Thickness: 0.075mm
      - v. Blade Height: 0.025 mm
      - vi. Spindle Speed: 20,000 RPM
      - vii. Feed Speed: 10 mm/s
    - e. Move to a location away from your sample where the test cut is to be performed. *This location should be at the back of the ring and away from your sample (NOT AT THE FRONT!), then press “Enter” to fix the location. (Picking a location at the back of the ring will prevent error conditions with the Z-axis if the sample is thick and the spindle touches it while trying to do the Hairline Alignment.)*
    - f. Adjust the initial light level: Direct + 25%, Oblique + 20%

- g. Press “Focus” – F9 and hold for 2 seconds, this should start the autofocus on the image. If it does not increase the Direct Light by 5% and try the process again and/or move the chuck table slightly.
- h. When in focus and at a desired location, press “Enter” then “Start”, this should cut a single line.
- i. Change to high magnification view if not already there.
- j. Align the cut on the blue tape with the center hairline using the position controls and hairline width controls.
- k. Press “Hairline ADJ” – F12. If you get an error message saying that the adjustment is > 0.05 mm, Press F12 again and repeat the Hairline Adjustment process.
- l. The blade cut and the hairline should now be aligned.
- m. If the tool asks for a direction and you to press the Y up arrow to set the axis direction, do a quick touch to the Y up arrow so as not to move the chuck.
- n. Press “Exit” until you are back at the main menu

## DAD-3240 Dicing Instructions

1. From the Main Menu press “Device Data” – F3.
2. Make your own directory under your PI or adviser’s name. There are several commands that allow you to Create/Delete a Directory, Rename/Delete/Copy files, or List them. The commands are straight forward and should be easy to use.
3. Select your directory from the “Device Data List”. Select the appropriate “Device Data” file. This is the file and the data inside it that will be used to cut your wafer.
  - a. If you are changing the cutting parameter list or adding a device, make a new file, this file should have your name and the current date as the label.
    - i. Use the “Copy” function - F2, to make a new file
    - ii. Select the desired directory as the “Destination Directory”
    - iii. Enter your name and the current date for the file name under “Destination Data” using the software keyboards
    - iv. Press “Enter”
  - b. Select the Device Data file you wish to use and press “Enter”
  - c. Make sure the parameters are correct and match the cuts you want to make
  - d. For a Progressive Depth Cut, see the instructions for modifying your Device Data file.
  - e. Press “Exit” until you return to the Main Menu Screen
4. From the Main Menu screen press “Manual Operation” – F2
5. Press “Auto Cut” – F3
6. Press “Manual Align” – F4
  - a. Adjust the initial light level: Direct – 25%, Oblique – 20%, or as necessary
  - b. Move the wafer under the microscope field of view if necessary.
  - c. Press F9 and hold for 2 seconds, this will autofocus the sample, if not already focused. *If the sample is thick, focus may not occur, use Manual Focus*
    - i. *To use the manual focus option, Press F9 momentarily. This should bring up the Manual Focus Screen.*
    - ii. *Move the microscope over the sample, and Press F3, “AF by Data”. This will look at the sample height in the recipe data and focus at that height. Adjust the manual controls for fine focus control if needed, F2 & F8.*
  - d. Change to the low “Magnification” view – F11, adjust the light levels as necessary.
  - e. Pick a feature on the left side of the wafer and move that to the solid center Hairline on the display. This is your left side Theta alignment point. When finished, Press “Align” – F5, the chuck table should move to the right side of the wafer.
  - f. Pick a similar feature on the right side of the wafer and move that to the solid center Hairline on the display. Once that is done, Press “Align” – F5, this should move to the left side of the wafer and the wafer should be Theta adjusted. Toggle F5 back and forth and adjust as necessary until the alignment is complete. Once complete, make sure the display is on the left side of the wafer.
  - g. (Note 1) Pick a location where a cut is to be made. Align that location of the wafer in the display with the solid horizontal center line of the “Hairlines”, use the width controls to match the width of the location.

- h. Switch to high “Magnification” – F11
  - i. Once this is finished, press “Enter”. This should complete the alignment and cutting location for this pass. The wafer should rotate 90 degrees automatically for the 2<sup>nd</sup> pass alignment.
  - j. Press the up arrow “Y-Axis” button once, press “Enter”.
  - k. Repeat the process (e thru j) for second set of cuts.
  - l. This should complete the wafer alignment in both directions and be ready to cut.
7. Press Start to begin the wafer cutting process.
  8. Upon completion you will get a “Beep” from the tool, press the “Alarm” button to acknowledge & clear this notification. Press Exit until you are returned to the main menu
  9. Remove your sample
    - a. Press C/T vacuum to release the ring/tape/wafer.
    - b. Open the right hand door
    - c. Close the right hand door
  10. Remove the blade
    - a. Press “Blade Maintenance” – F4, then press “Blade Replacement” – F1
    - b. Open the left hand door to gain access to the blade.
    - c. Remove the front spray nozzle
    - d. Remove the outer threaded washer with the round gripper tool
    - e. Remove the blade on the chuck, if you removed the spacer for a Thermocarbon blade, replace it back on the spindle at this time.
    - f. Place the outer threaded washer with the round gripper tool back onto the spindle and lightly tighten (this is for storage of the part not operation)
    - g. Install the front spray nozzle
    - h. Close the left hand door
    - i. Press “Exit” to get back to the main screen.
    - j. Press “System Initial”
  11. Turn off the dicing saw, turn the key to the off position and release
  12. Turn off the compressed air and chiller.
  13. With the wipe, gently wipe off the chuck and discard the wipe.
  14. Disable the tool in iLab.

## DAD3240 Dicing Instructions for a Single line cut

1. From the Main Menu press “Device Data” – F3.
2. Make your own directory under your PI or adviser’s name. There are several commands that allow you to Create/Delete a Directory, Rename/Delete/Copy files, or List them. The commands are straight forward and should be easy to use.
3. Select your directory from the “Device Data List”. Select the appropriate “Device Data” file. This is the file and the data inside it that will be used to cut your wafer.
  - a. If you are changing the cutting parameter list or adding a device, make a new file, this file should have your name and the current date as the label.
    - i. Use the “Copy” function - F2, to make a new file
    - ii. Select the desired directory as the “Destination Directory”
    - iii. Enter your name and the current date for the file name under “Destination Data” using the software keyboards
    - iv. Press “Enter”
  - b. Select the Device Data file you wish to use and press “Enter”
  - c. Make sure the parameters are correct and match the cuts you want to make
  - d. Press “Exit” until you return to the Main Menu Screen
4. Open the right hand door, place the ring/tape with your sample on the chuck, closed the door, press “C/T Vacuum” to hold the ring/tape in place
5. From the Main Menu screen press “Manual Operation” – F2
6. Press “Semiautomatic Cut” – F4
7. Press “Manual Align” – F4
  - a. Adjust the initial light level: Direct – 25%, Oblique – 20%, or as necessary
  - b. Move the wafer under the microscope field of view if necessary.
  - c. Press F9 and hold for 2 seconds, this will autofocus the sample, if not already focused. *If the sample is thick, focus may not occur, use Manual Focus*
    - i. *To use the manual focus option, Press F9 momentarily. This should bring up the Manual Focus Screen.*
    - ii. *Move the microscope over the sample, and Press F3, “AF by Data”. This will look at the sample height in the recipe data and focus at that height. Adjust the manual controls for fine focus control if needed, F2 & F8.*
  - d. Change to the low “Magnification” view – F11, adjust the light levels as necessary.
  - e. Pick a feature on the left side of the wafer and move that to the solid center Hairline on the display. This is your left side Theta alignment point. When finished, Press “Align” – F5, the chuck table should move to the right side of the wafer.
  - f. Pick a similar feature on the right side of the wafer and move that to the solid center Hairline on the display. Once that is done, Press “Align” – F5, this should move to the left side of the wafer and the wafer should be Theta adjusted. Toggle F5 back and forth and adjust as necessary until the alignment is complete. Once complete, make sure the display is on the left side of the wafer.

- g. (Note 1) Pick a location where the cut is to be made: align the location of the wafer in the display with the solid center horizontal line of the “Hairlines”.
        - h. Switch to high “Magnification” – F11, Press “Enter”.
        - i. Press F6 or F12 to set the direction of cutting.
        - j. Set the “Cut Lines” = 1 (for a single cut or set to the number of cuts desired).
8. Press Start to begin the wafer cutting process.
9. Upon completion you will get a “Beep” from the tool, press the “Alarm” button to acknowledge & clear this notification. Press Exit until you are returned to the main menu.
10. If you desire to make another cut 90 degrees, select the “Wafer” icon from the lower right icons. Select “Index” and then press one of the curve arrows to rotate the chuck. Follow procedures 4 through 6 to complete this cut.
11. Remove your sample after you are finished.
  - a. Press C/T vacuum to release the ring/tape/wafer.
  - b. Open the right-hand door
  - c. Close the right-hand door
12. Remove the blade
  - a. Press “Blade Maintenance” – F4, then press “Blade Replacement” – F1
  - b. Open the left-hand door to gain access to the blade.
  - c. Remove the front spray nozzle
  - d. Remove the outer threaded washer with the round gripper tool
  - e. Remove the blade on the chuck, if you removed the spacer for a Thermocarbon blade, replace it back on the spindle at this time.
  - f. Place the outer threaded washer with the round gripper tool back onto the spindle and lightly tighten (this is for storage of the part not operation)
  - g. Install the front spray nozzle
  - h. Close the left-hand door
  - i. Press “Exit” to get back to the main screen.
  - j. Press “System Initial”
13. Turn off the dicing saw, turn the key to the off position and release
14. Turn off the compressed air and chiller.
15. With the wipe, gently wipe off the chuck and discard the wipe.
16. Disable the tool in iLab.



### **Note 1: Moving a fixed distance from the Theta alignment position**

If you want to move some additional fixed distance from the Theta alignment position, this must be done prior to pressing “Enter” to set the Street position for cutting.

1. From the lower right corner soft keypads, select the “Direct” icon. This should bring up the Direct action keypads.
2. Select the “Measure” box to measure the distance.
3. Press F7, “Clear to 0”. Both the X & Y “Position” locator on the screen should be reset to zero.
4. Move the desired amount in the Y direction. Read the distance on the Y “Position” locator on the screen.
5. When finished, press “Exit”. This will return you to the previous screen, which is the street alignment location for cutting.
6. The screen will not have any instructions on it but it will be waiting for you to press “Enter” to set the street location for cutting.