TRESKY Flip Chip Bonder Standard Operating Procedure

QUICK GUIDE

PROCEDURE OVERVIEW
1. Changing Pick & Place Tool
2. Startup Procedure
3. Pick & Place (Die Bonding) Operation
4. Using the Quick Heat Controllers
5. Using The Flip Chip Optics Assembly
6. Stamping Operation
7. Dispensing Operation
8. Force Calibration Results

CRITICAL PRECAUTIONS AND COMMON MISTAKES
• Please be aware the Flip-Chip Optics may have a collision during pick and place process with the spindle.
• When running pick and place program, the Flip-Chip Optics Assembly must be in rear X stop position.
• “! ! SERVO ERROR ! !” on the display indicates that Pick & Place arm gets obstructed and the tool is in a stop mode.
  – Switch the machine for a few seconds OFF.
  – Remove the obstacle that caused the overload security stop.
  – Check the conditions for a restart.

Tool condition for the next user
• Bring Flip-Chip Optics Assembly to rear X stop position.
• If you install a custom pick-up tool, the standard tool MUST be replaced before log out.
• Clean up stamping/dispensing tools and mixing glue mixer.
• Power off the tool and turn off the light.
• Logout form Mendix system.
• Clean up anything you bring in
1. **Changing Pick & Place Tool**

1.1 Use Allen key to unfasten screw that holds the pick-up tool.

1.2 Replace the pick-up tool and fasten screw to hold the pick-up tool.

1.3 If needed mount the tool heater.

**Note:** To order custom pick-up tools form SPT you need to know Dr Tresky shank style that is: 2141 (3 mm diameter and 25 mm length).
2. Startup Procedure
2.1 Log into the tool using Mendix system.
2.2 The Flip-Chip Optics Assembly must be in rear X stop position.
2.3 Power on the tool and turn on the light.
2.4 Follow instructions on Display Operation Panel.
2.5 Unlock Worktable and bring it to back (Y stop) position using positioning arm.
2.6 Press R/S button on Pick & Place Arm for automatic adjustment of Pick & Place Panel.
3. Pick & Place (Die Bonding) Operation

3.1 Place the dies (samples) on the Worktable.
3.2 Position the die 1 (sample 1) under the pick-up tool by moving the stage.
3.3 Select [P+P] mode from Display Operation Panel.

**Note:** You can use existing Pick & Place program by pressing [M] → Read from Memory → press [MENUE] and choose program number with (+) and (-) buttons; → press [MENUE] again to activate the program → press [M] and → press [P+P]. Now you can start using selected program.
3.4 You can also create new Pick & Place program (or modify existing program) by selecting [P+P] mode on Display Operation Panel.

3.5 Adjust [P+P] parameters: Force (10) and Time (11) using [MENU], up (+) and down (-) buttons from Display Operation Panel:

- Click [MENU] and move up (+) and down (-) to next or previous parameter line for editing.
- Press [MENU] to select and highlight the parameter line.
- The value of highlighted parameter line can be changed up (+) or down (-) and accepted by pressing [MENU] again.

10 Force
10a Pick – The vacuum switches ON when the pick-up force is reached.
10b Place – Placement (bonding) force.

11 Time
11a Pick – Time of adjusted pick-up force.
11b Place – Time of adjusted bonding force; the vacuum switches OFF after that time.
11c Scrub and 11d Del. S – These options do not exist in our system.
3.6 Adjust [P+P] parameters: Pick (12a), Place (12b) and Clear (12c) Height manually using Pick & Place Arm buttons:

- Unlock Pick & Place Arm and move manually pick-up tool close to the pickup level about 1 – 2 mm before the goal and press (˅) button on Pick & Place Arm. The Pick 12a coordinates will be recorded and shown on the display.
- Move manually pick-up tool to clearance position (focus height of the camera) and press (^) button. The Clear 12c coordinates will be recorded and shown on the display. Make sure you will not hit Optics Assembly when in clearance position.
- Move manually pick-up tool close to the place level and press R/S button. The Place 12b coordinates will be recorded and shown on the display.
- The fine tuning can be done later while the tool is actually following the [P+P] program.

12 Height
12a Pick – Set “close” (1 - 2mm) to the pickup level.
12b Place – Set “close” (1 - 2mm) to the place down level.
12c Clear – Secure clearance height / flip-chip focus level.
12d Clear2 OFF (not needed for standard operation).

Note: Pick, Place and Clear Height can also be set using automatic mode. To program Pick, Place and Clear Height in automatic mode:

- Lock Pick & Place Arm using Z Lock button.
- Highlight the line (Pick, Place or Clear Height) with [MENU] button form Display Operation Panel.
- Move pick-up tool using Pick & Place Arm buttons (˅) and (^) to the desired heights.
- Save the values with the button [M] on Display Operation Panel.
3.7 Puff Time (13) and Puff Offset (14) are not needed for standard operation.  
**Note:** When using Puffs be careful to not blow off your samples.

3.8 **DO NOT CHANGE** Speed (15) parameters of [P+P] program.

3.9 If NOT heating the plate and pick-up tool, set Quick Heat OFF (17a).

**17 Eutectic**

**17a Quick Heat OFF** – if NOT using heating tools sequences.

3.10 To write program to memory press [M] → Write to Memory → press [MENUE] and choose program number with (+) and (-) buttons, → press [MENUE] and → press [M]; Press [P+P] button to exit the editing mode.

3.11 To start running selected [P+P] program, position tool over Die 1, set Pick & Place Arm to automatic mode using Z Lock button and press ENT button. Perform the fine tuning at pick search height and press ENT again. Continue pressing ENT until program is finished.
4. Using the Quick Heat Controllers

4.1 If heating the plate or pick-up tool, select QH Place Force (17a).

17 Eutectic

17a QH Place Force – Starts the heating sequences when the programmed place force (10b) is reached on heating plate.

- **17b Confirmation ON** - Time schedule of heating sequence is operated by programmed time and temperature of the Quick Heat controller.
- **17b Confirmation OFF** - Time schedule of heating sequence is operated by programmed time and temperature of menu 11b Place.

**Note:** Pick-up tool and plate have separate heating controllers. The heating plate controller is currently set as a master controller which means that Pick & Place Arm moves up when heating plate sequence is finished.

4.2 Turn ON Heating Plate Controller and/or Pick-up Tool Heating Controller.
4.3 Make sure iTools Program was started before T-Vision.
4.4 Click “Scan” and when window (Enable Background Scans) shows up on the screen click OK; the program is finding and synchronizing controllers data to the computer.

4.5 Choose the controller (COM4 and/or COM5) and click “Programmer” button to bring the heating profile.

4.6 The only parameters that you should adjust in the program are:
Target Temperature (Step 3) and Dwell Time (Step 4). Do not change any other parameters in the program.
5. Using The Flip-Chip Optics Assembly

Note: The Flip-Chip Optics Assembly is a unit of camera, prism and illumination to display two opposed pictures at the same time on screen.

5.1 Make sure the Flip-Chip Optics assembly is in rear X stop position when starting [P+P] program.
5.2 Start [P+P] program.
5.3 When pickup tool is in clearance height position (12c), which is also focused height of the camera, bring Flip-Chip Optics between the dies using X-direction positioning spindle.
5.4 Start T-Vision Program.

5.5 Adjust position of Flip-Chip Optics with X and Y positioning spindles, so the whole sample area sample can be seen on the monitor screen.

5.6 Focus on the bottom die using Substrate Focus Knob.

5.7 Adjust illumination with three knobs: top, bottom and radial illumination.

5.8 Carefully focus on the top die using (˅ and ˄) automatic Z-movement buttons; be careful to not hit the optics.

**Note:** At this point you can save readjusted 12c Clearnace Height (Focus Height of the Camera) to the [P+P] program.

5.9 Lock the stage and align the die positions using rotation knob and fine stage movement knobs.

**Note:** You can also use remote control to adjust the Focus and Zoom In and Out.

5.10 When dies are aligned, carefully move flip-chip optics assembly in rear X stop position and continue [P+P] program by pressing ENT button.
6. Stamping

6.1 Mount stamping tool on the arm.
6.2 Prepare glue (epoxy) and apply on the round, glue mixer.
6.3 Adjust thickness of the glue with the adjustment screw.
6.4 Bring Worktable to the back (Y stop) position.
6.5 Round glue mixer will start to rotate and uniform film with designed thickness of glue will be created on the mixer.

6.6 Select [D/S] mode on Display Operation Panel and press [ENT] to bring stamping tool down.
6.7 Select [MENU] and move up (+) and down (-) to select Stamping (20a) function.

6.8 You can manually perform stamping by unlocking the arm with Z Lock button and applying glue on stamping tool. Then bring the tool with glue over the sample, adjust stamping tool position under the microscope and apply glue on the sample.
6.9 You can also perform stamping automatically by creating a Stamping program: Select [D/S] mode on Display Operation Panel and program all parameters the same way as in [P+P] mode of operation. Click ENT.

6.10 Adjust [D/S] parameters: Time (21), Speed (23), Sear D. Height (22d) using [MENU], up (+) and down (-) buttons from Display Operation Panel:
- Click [MENU] and move up (+) and down (-) to next or previous parameter line.
- Press [MENU] to select and highlight the parameter line.
- The value of highlighted parameter line can be changed up (+) or down (-) and accepted by pressing [MENU] again.

21 D/S/P Time
21a D/S/P – Time of stamping tool, contacting glue film on glue mixer.
21b Glue – Glue delivery time on the sample surface.

23 Speed
23a Down – Speed down (from Sear. D. 22d) to delivery glue height.
23b Up – Speed upwards from glue delivery height to Sear. D. 22d level.
23c Clear – Speed upwards to secure clearance height.

6.11 Adjust [D/S] parameters: D/S/P (22a), Glue (22b) and Clear (22c) Height manually using Pick & Place Arm buttons:
- Unlock Pick & Place Arm and move manually stamping tool to contact glue; press (˅) button on Pick & Place Arm to record the D/S/P 21a coordinates on the display.
- Move manually stamping tool to clearance position and press (˄) button. The Clear 22c coordinates will be recorded and shown on the display.
- Move manually stamping tool to glue delivery level and press R/S button. The Glue 22b coordinates will be recorded and shown on the display.

22 D/S/P Height
22a D/S/P – Glue delivery height.
22b Glue – Height of stamping tool, contacting glue film on glue mixer.
22c Clear – Stamping tool moves up to clearance height.
22d Sear. D. – Difference to glue delivery height for final adjustment.
22f Gl. Thicn. – 0 um

Note: D/S/P, Glue and Clear Height can also be set using automatic mode:
- Lock Pick & Place Arm using Z Lock button.
- Highlight the line (D/S/P, Glue and Clear Height) with [MENU] button form Display Operation Panel.
- Move stamping tool using Pick & Place Arm buttons (˅) and (˄) to the desired heights.
- Save the values with the button [M] on Display Operation Panel.
7. Dispensing

7.1 Mount dispensing tool holder on the arm.
7.2 Fill dispensing tool (syringe) with the glue.

7.3 Connect dispensing tool to the bonder.
7.4 Adjust dispensing pressure.
7.5 Create Dispensing program (or modify existing program) by selecting [D/S] mode on Display Operation Panel and selecting Dispensing function. Click ENT.

7.6 Program D/S/P Time 21. and Speed 23. Values using [MENUE] and up (+) and down (-) buttons on Display Operational Panel:
   - Click [MENUE] and move up (+) and down (-) to next or previous parameter line for editing.
   - Press [MENUE] to select and highlight the parameter line.
   - The value of highlighted parameter line can be changed up (+) or down (-) and accepted by pressing [M].

7.7 Program D/S/P Height 22. Values using automatic mode:
   - Lock Pick & Place Arm using Z Lock button.
   - Highlight the line (D/S/P, Clear or Sear. D Height) with [MENUE] button on Display Operational Pane.
   - Move dispensing tool using Pick & Place Arm (˅) and (˄) buttons to the desired heights.
   - Save the values with the button [M] on Display Operation Panel.

21 D/S/P Time
21a D/S/P – Time of glue dispensing.
21c After – A short time at Sear. D. height allowing the placed glue drop to detach.

22 D/S/P Height
22a D/S/P – Level of glue dispensing.
22c Clear – Dispenser moves up to secure clearance height.
22d Sear. D. – Difference to glue dispensing height for final position adjustment.
22f Gl. Thicn. – 0 um

23 Speed
23a Down – Speed down (from level 22d Sear. D.) to glue dispensing height.
23b Up – Speed upwards from delivery height to level 22d Sear. D.
23c Clear – Speed upwards to secure clearance height.
8. TRESKY FORCE CALIBRATION 12/4/2017

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