Advanced Z Calibration

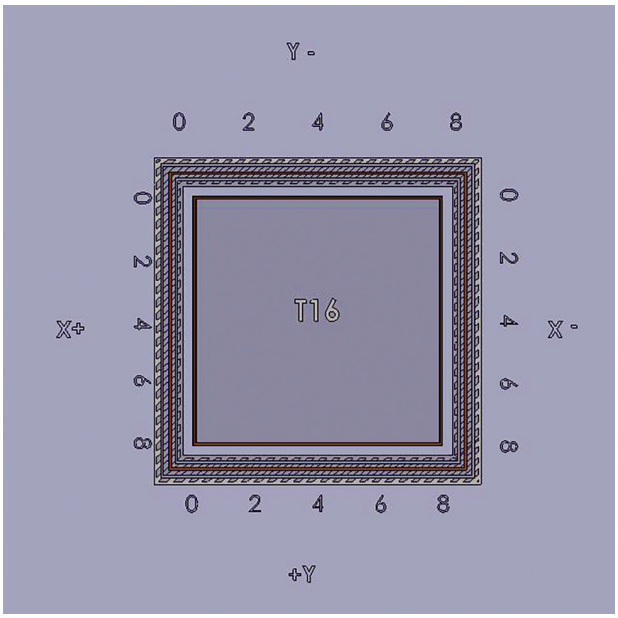

Figure 1: Measure at the center of each leg. (Step 2.A)

It is important to get the Z calibration correct to prevent improperly calibrating or support tip plugging, especially with smaller slices (5 and 7 slice). If the support layer thickness is set too small, the back pressure on the tip increases which can plug the tip and causes the support material to mushroom. This document describes the preferred approach for obtaining the correct Z calibration. This approach uses the smallest reading on the support layer box with a rectangular cross-section.

Step 1: Peel the Support layer from the Z Calibration box.

Step 2: Measure the thickness of the Support layer with a caliper or micrometer:

A. Measure at the center of all 4 sides of the support layer box (figure 1).

B. Take the smallest reading from the measured sides.

C. Using a box knife or Xacto knife, cut the support layer box at the center of the leg with the smallest reading. The cut should be perpendicular to the leg).

D. Using a loop/magnifier, inspect the cross-section from the cut support layer box.

E. Verify that the cross-section is rectangular in shape. If it is too small, increase the calibration by 0.001 inch to 0.002 inch and then repeat the calibration build. Repeat steps 1-5 until you see a rectangular cross-section.

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F. The rectangular Z thickness value from the smallest slice height reading is the current Z thickness (table 1).

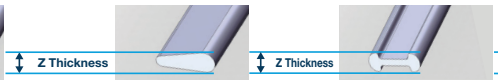
Acceptable (Rectangular)	Not Acceptiable (Too Small)	Not Acceptable (Too Big)
If cross section looks like this, you are done, use this value in step C.	If cross-section looks like one of these, increase Z by 0.001 inch to 0.002 inch and repeat calibration part (See step 5). Note: These cross-sections will measure larger than the actual calibration value and result in high back pressure on tip.	If the cross-section looks like this, the Z offset value needs to be adjusted in the negative Z direction. Step D will explain how to enter this correction.
		

Table 1

Step 3: If the measured value is within ±0.0005” (0.01 mm) of the Model Tip slice height (table 2), no adjustment is necessary. Proceed to step E.

Step 4: If the measured value is outside the ±0.0005” (0.01 mm) value, subtract the measured value from the slice height of the Model Tip being used (table 2).

Model Tip Slice Heights	
T20	0.013” (0.330 mm)
T16	0.010” (0.254 mm)
T12	0.007” (0.178 mm)
T10	0.005” (0.127 mm)

Table 2

- If the Model Tip Slice minus the Measured Support thickness is a positive number, the Z correction is +Z in 0.001 inches.
- If the Model Tip Slice minus the Measured Support thickness is a negative number, the Z correction is -Z in 0.001 inches.
- Example: For a T16 Model Tip - slice height of 0.010” (from table 2); measured thickness of Calibration Box = 0.012”; Calculation 0.010 - 0.012 = - 0.002; Enter 0.002 in the - Z menu option (see 5.D).

Step 5: Enter the Z Adjustment Value from the Tip Offset menu (table 3)

Step 6: If an adjustment entry is required, re-run the calibration model on a clean build sheet.

Step 7: Continue to check for Z Calibration until the Support layer matches the Model Tip slice height ±0.0005”.

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How to Enter XY and Z Tip Offest Adjustment Values

1. From the Main Menu select Operator Control and press Enter.

```
 Build Job..          |*Tips: Model T16
>Operator Control..   |*      Support T16
 Modeler Status..
 Maintenance..
```

2. Select Calibrate and press Enter.

```
 Unlock Door <E>      | Temp Control..
 Load/Unload Mtl..    | Move Head/Stage..
 Change Tips/Mtl..
>Calibrate..
```

3. Select Tip Offset Value and press Enter.

```
 Set Z Stage Zero..  | Calibration Job <E>
 AutoCal Tips <E>
>Tip Offset Value..
 AutoHome XYZ <E>
```

4. Using the arrow keys, select the direction and axis to change.

```
 *Delta  X:0.0000  Y:0.0000  Z:0.0000
 >-X  0.00    <E>  |  +X  0.00<E>
  -Y  0.00    <E>  |  +Y  0.00<E>
  -Z  0.00    <E>  |  +Z  0.00<E>
```

5. Enter the adjustment value and press Enter.
   - The adjustment value will appear on the top line.

Table 3

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