

CHAPTER 4

Alignments

Tutorial

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Alignments Tutorial

This Measurement mode lab is a continuation of the "Measuring Features Tutorial". You are already in the measurement mode with the RefleX demo block clamped down and a single tip TTP qualified. The focus of this lab is to get you comfortable with the alignment function.



Tools

1. Begin by resetting to clear features measured during Measuring Tutorial. Press in succession the softkeys "Tools", "Reset Measurement Mode" and "Done".



Reset Measurement Mode

Line Line Intersect Alignment

It is rarely possible to manually align a part exactly to a machine. However, a part can be aligned by measuring features and assigning datum designations to those features (A, B, C).

Important: It is important to remember the Datum A, B, C sequence which you will use 99% of the time. Datum A, C, B, is also allowable. All other variations of the datum ABC sequence will result in inaccurate measurements!!!



Datum A

2. Measure plane #1 on the top of the demo block as instructed in the Measuring Features Tutorial. Press the "Datum A" softkey. The part is now "leveled"!



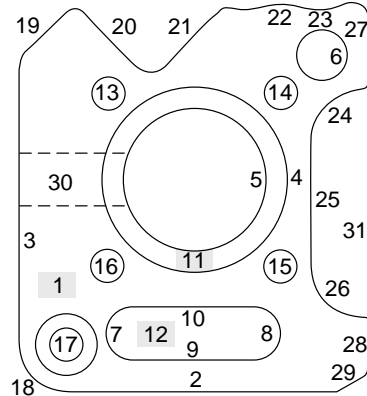
Datum B

3. Measure line #2 on the front of the demo block. Press the "Datum B" softkey. The part is now "clocked"!



Datum C

4. Measure line #3 on the side of the demo block. Press the "Relationships" softkey to display the intersection point. Press the "Datum C" softkey. The origin is now set and the alignment is complete.



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5. With the alignment complete, move the probe tip to the upper, left, front corner of the part. Notice the counters are near 0.000, 0.000, 0.000. If the part had been clamped at an angle, you would see that as you move the probe along the front side of the demo block, the X axis counter would increment while the Y axis would remain unchanged.

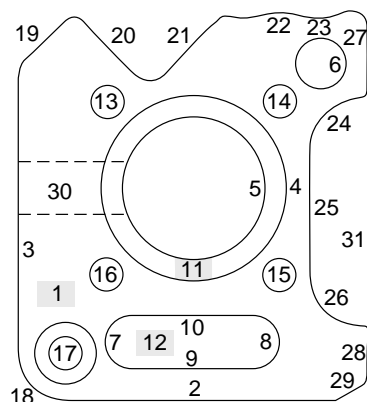
Tip: For more complicated parts, you can use the power of alignments to your advantage. While this part's alignment is easy to visualize, parts with compound angles and odd datum surfaces are not. If the system can measure a part in one orientation, it can also measure it in a different orientation. If you are having trouble writing a program, align the part so it is easy to visualize. When you have the desired results, rewrite the program for the orientation that facilitates part clamping.

Another alignment:

This time align the block by setting datum B on the line between two holes. Set the origin at the center of a bore.

6. Reset the measurement mode as instructed in step 1.
7. Measure the top surface of the demo block again as instructed in step 2.
8. Measure circle #16. Measure circle #15. Press the "Relationships" softkey and scroll to the "Line Through Centers" screen. Press the "Datum B softkey".
9. Measure the center circle #4. Press the "Relationships" softkey to toggle back to single feature mode. Press the "Datum C" softkey. The alignment is complete.

Note: Under normal circumstances, there is no need to save the datum. The current alignment is active until you do another datum operation. Most of the time, the only reason for saving and recalling a datum is to transfer an alignment to another measuring mode, such as the Dial Indicator Mode.



Alignments Tutorial

Note: For more information on how a datums are used with a particular feature, see Chapter 5.



Tools



Construction



Symmetries



Symmetry Point



Datum



Translate

Translating an alignment:

Some part drawings have features dimensioned from a constructed feature, such as a symmetry point. Because this point cannot be measured directly, it must be constructed by measuring two other features. To translate the alignment to this symmetry point, use the "Translate to Last Feature" function where the last feature is the symmetry point.

Other part drawings have features offset from a particular point. For example, 1 mm in from the edge of the part. To translate the alignment to this point, use the "Translate by Offset" function.

10. To construct a symmetry point between the two small circles (#16, #15) just measured, press the "Tools" softkey, the "Construction" softkey, the "Symmetries" softkey, and the "Symmetry Point" softkey. Select features 3 and 4. Press the Done softkey.

11. To translate the alignment to this symmetry point, press the "Tools" softkey, the "Datum" softkey, and the "Translate" softkey. Leave the X, Y, and Z axes set to "Last Feature". Press the Done softkey. The origin has moved to the centerpoint between the two circles.

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Rotating an alignment:

Unlike the demo block, some parts are aligned at specific angles. For example, a part must be aligned 45 degrees from an edge. To do this use the "Rotate by Angle" function. For the example, align the block 45 degrees from the centerline between the two bores (Our old datum B).

12. To rotate the alignment, press the "Tools" softkey, the "Datum" softkey and the "Rotate" softkey. Leave the "Rotate About" axis set to "Z". Enter a rotation angle of 45 degrees and press the Done softkey. Check the alignment. As you move the machine in a 45 degree angle, only the X counters should change while the Y counter remains unchanged.

Note: Instead of a specific angle, such as 45 degrees, some drawings specify two rotation offsets such as 2 mm and 3 mm. In this case you do not have to calculate the angle. The system will do it for you! Leave the rotation angle blank and key in the offsets in the "Value" fields below. After entering the second offset, the system will display the rotation angle.