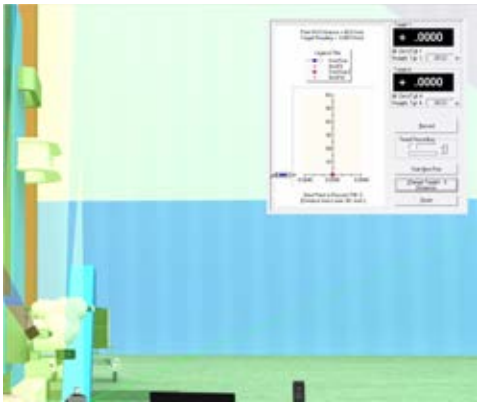
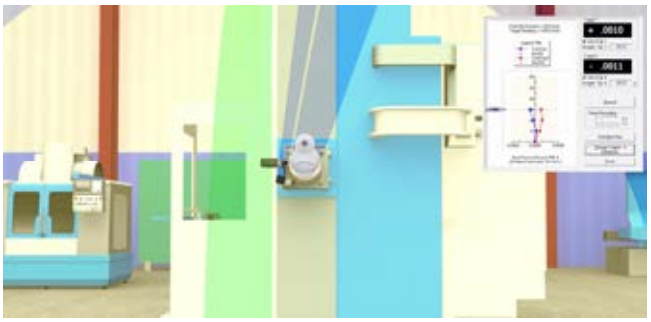
3. Move the column, pause a few seconds, and click **Record**. Repeat for each point.



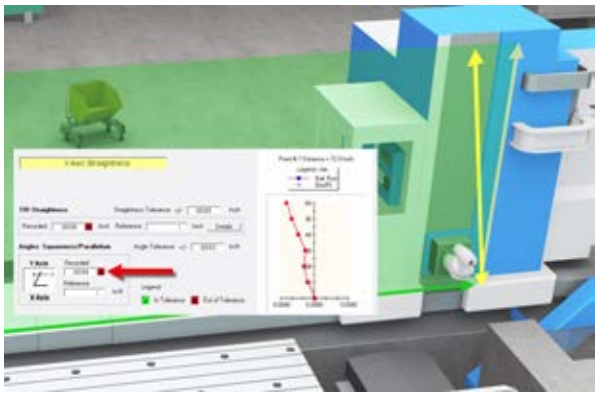
4. The Gold Plane measures the squareness of the Y-Axis to Z and the Green Plane measures Y to X squareness.



5. As before, the Machine Tool Geometry software does the straightness and squareness calculations. The results show .0010" TIR for flatness and .0008" TIR for straightness.



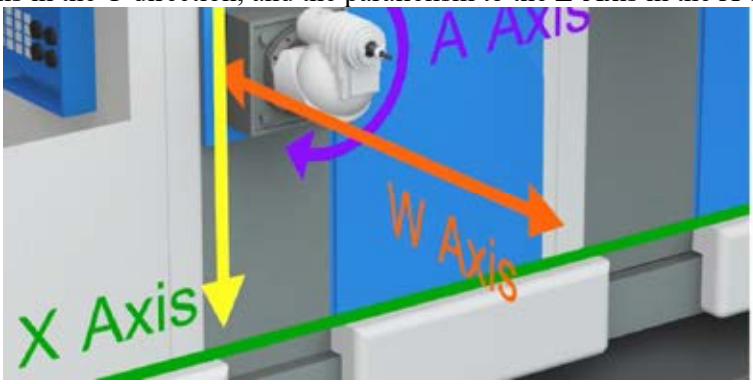
The X-Y Squareness is .0004 in/ft, meaning the column is leaning to the left.



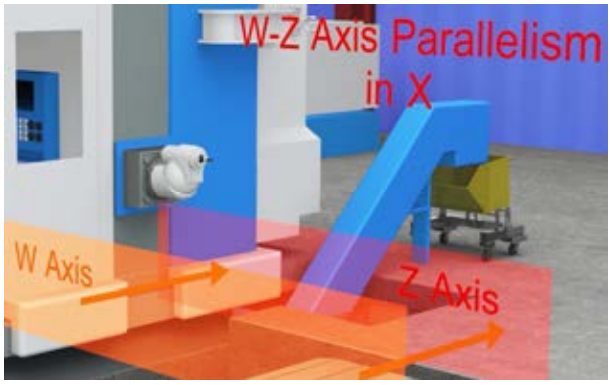
7. The squareness of Y to the tables is .0003 in/ft, meaning the column is leaning back.

## W-Axis Flatness and Straightness, W-Z (in X) Parallelism, W-Z (in Y) Parallelism

Without changing the L-743 setup, the W-Axis can be measured for flatness and straightness and parallelism to the Z-Axis in the Y direction, and the parallelism to the Z-Axis in the X direction.

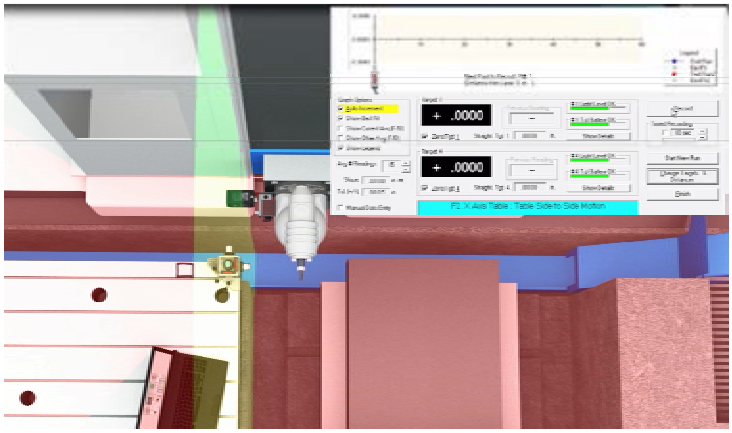




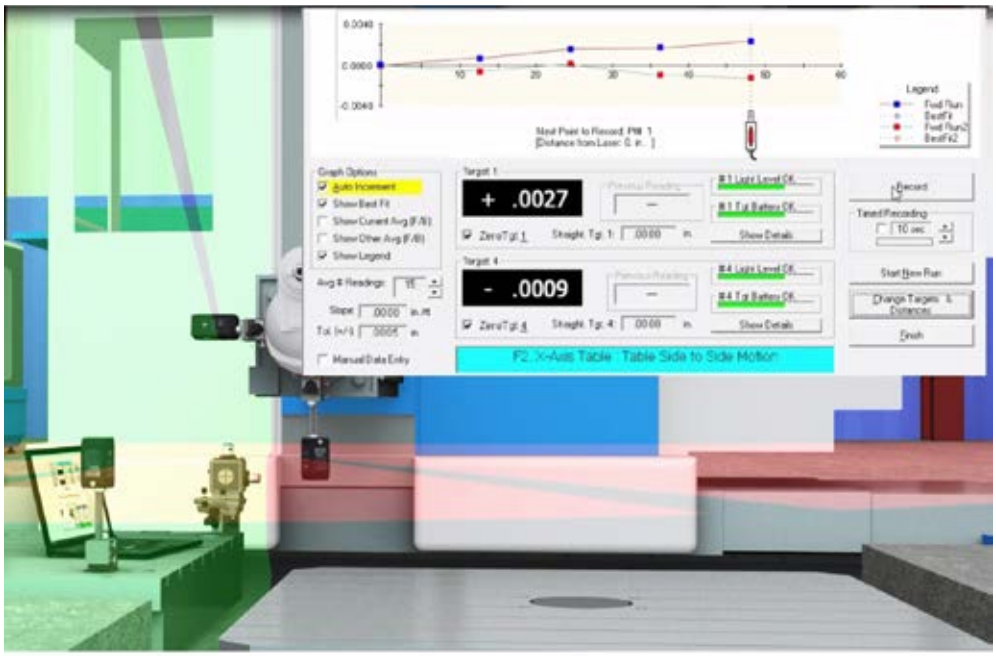



1. To set up for W, change the target position, turn on the laser rotation and adjust the spindle to center the laser.


2. Zero Targets #1 and #4. The green plane measures the straightness of W, W-X squareness and parallelism to Z (in X).



3. The red plane measures the flatness of W, W-Y squareness and parallelism to Z (in Y). The software records the straightness of W and calculates the squareness and parallelism to the other axes. The results show .0003" for straightness and .0011" for flatness.



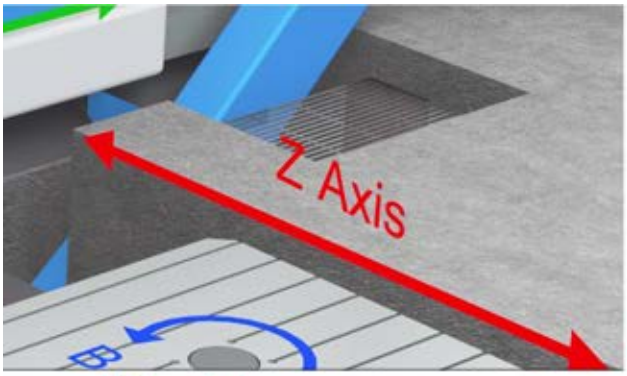


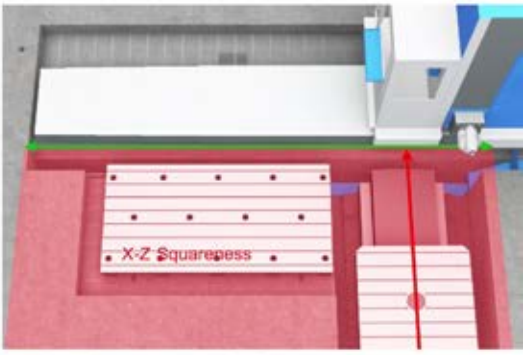

4. The slope of the vertical Best-Fit line is .0003 in/ft, meaning the W-Axis is sloping up from left to right relative to the table.

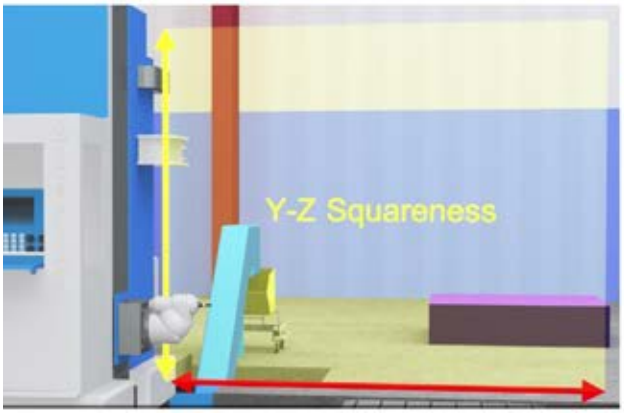
   For Z-W parallelism, Z must be measured first.

## Z-Axis Flatness and Straightness, Z-X and Z-Y Squareness, Z-W (in X) Parallelism, Z-W (in Y) Parallelism

The final axis check is Z-Axis flatness and straightness, which provides the squareness to the X-Axis and the squareness to the Y-Axis. In addition, the parallelism for Z-W (in Y) and Z-W (in X) can be determined.

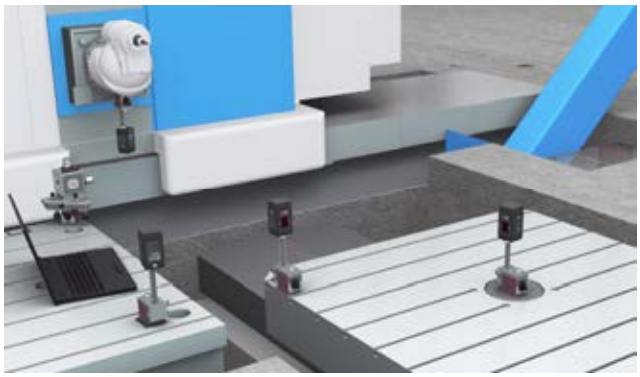


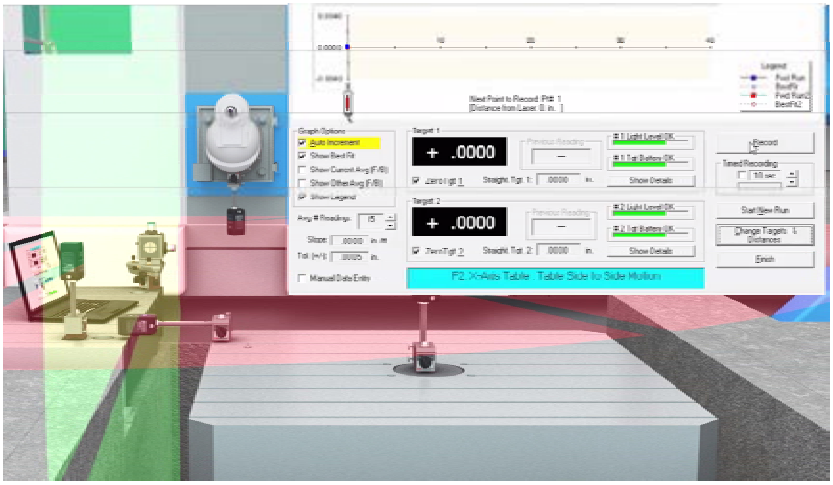


1. Leave the laser in position and re-position the targets. To measure Z-Axis flatness, use the red laser plane with Target #1 on the table.



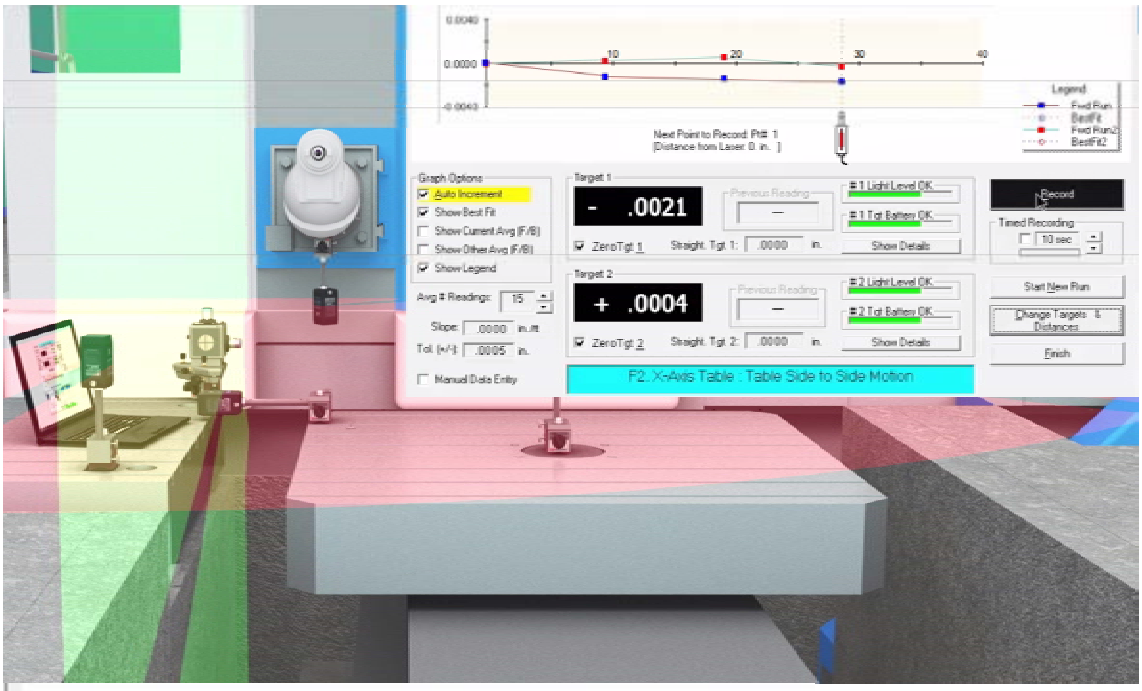
2. For straightness, mount Target #2's post into the side hole in the magnetic base to pick up the green laser plane. Adjust the pole length for Target #2, turn on the green laser and zero the display.

   Repeat for Target #1 and the red laser plane. Now you're ready to measure.

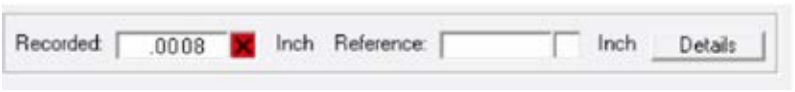


3. Record the data in the Machine Tool Geometry program and the parallelism and squareness are automatically calculated.

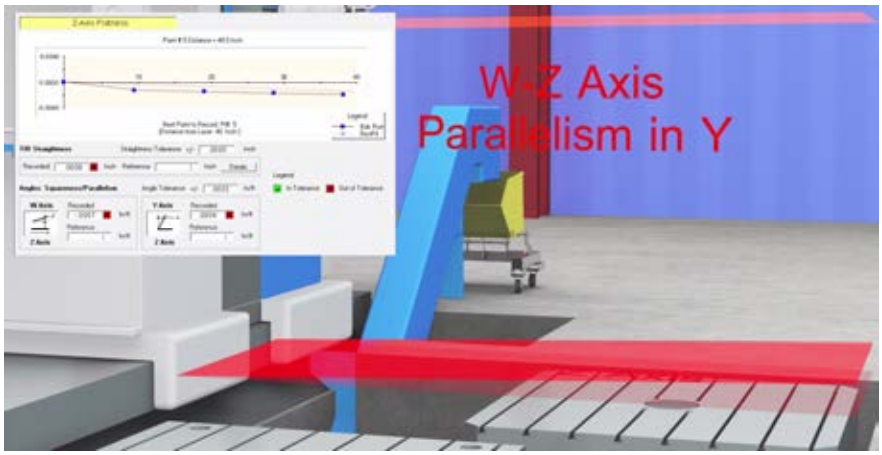
   The Z-Axis results show errors of .0005" for straightness and .0008" for flatness.





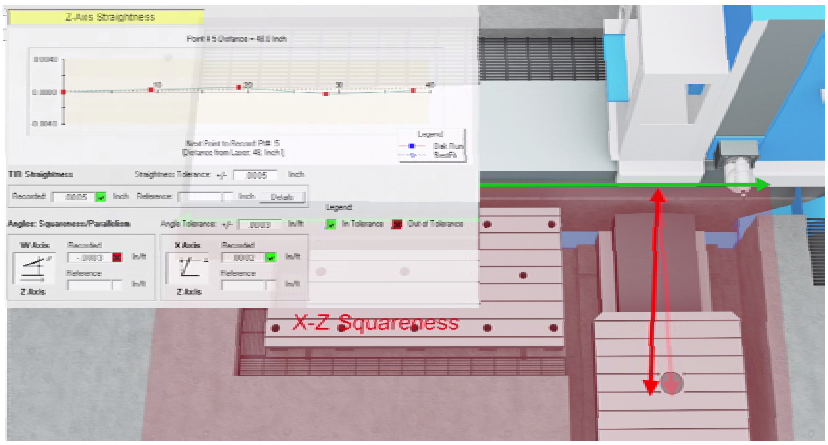



4. The slope of the vertical Best-Fit line is -.0007 in/ft, which means the Z-Axis is sloping up toward Y relative to W.

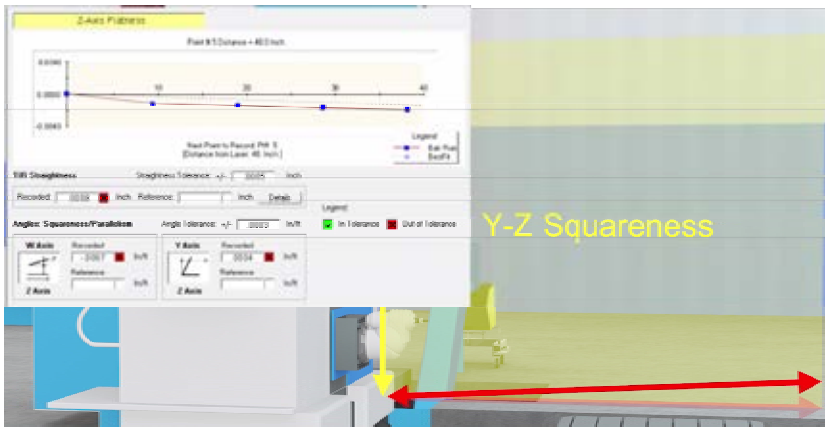



5. The horizontal Best-Fit slope is -.0003 in/ft, which means Z is sloping toward X relative to W.

6. For Z squareness to X and Y, the Machine Tool Geometry program subtracts the Best-Fit slope of Z from the Best-Fit slopes of Y and X and calculates the squareness. Therefore, the result for the squareness of Z to X is .0002 in/ft, which means the Z-Axis is tilting to the left.




7. The squareness of Z to Y is .0004 in/ft, which means the Z-Axis is sloping up relative to Y.




## Additional Capabilities of the L-743 Machine Tool Alignment System (Checking the A and B Rotary Axes and Tramming the Spindle)

- Rotation Flatness of Each Axis
- Squareness and Parallelism to Main Axes
  - A-X (in Z) Parallelism
  - A-Y (in Z) Parallelism
  - B-Z (in Y) Parallelism
  - B-X (in Y) Parallelism
  - Measuring the “tram,” or squareness of A’s spindle axis to X and Y