Application Note – How It Works

Transfer-Line & Rotary-Dial Machines Spindle Alignment

System Recommendations

L-700 Spindle Alignment System

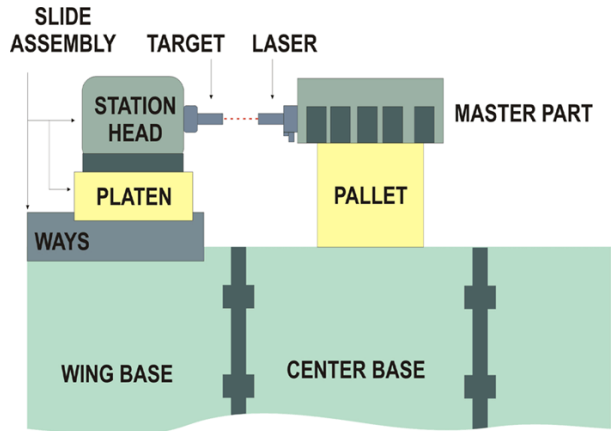
How the Alignment System Works – Rotary-Dial and Transfer-Line Spindles

General Setup – Transfer Line Spindles

The L-700 Spindle Alignment System was designed specifically for transfer-line spindle alignments. Both laser and target have a .500" (12.5mm) mounting stud that is easily adaptable for spindle and master-part fixturing. The 4-axis target displays live readings for horizontal and vertical center and angle measurements. With our new interfaces, the system has a center resolution of 0.5 micron (.00002") and an angular resolution of .00002"/ft.

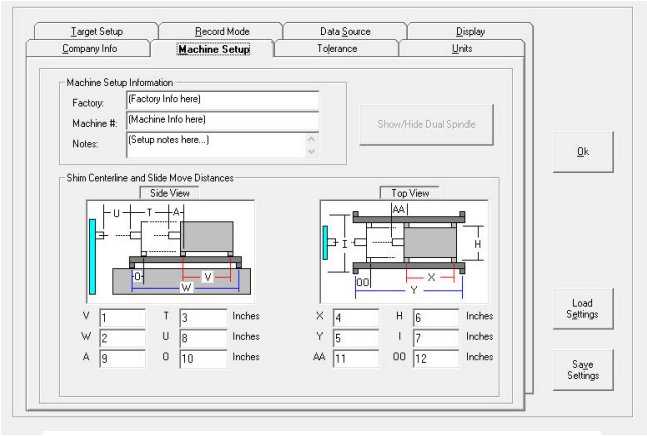
Our Windows based Spindle8 Software eliminates mounting errors, recommends shims and produces alignment reports. The software can also handle dual-spindle alignments simultaneously.

Transfer-line spindle alignment is a very complicated task. It requires 3 steps that must be followed in order to achieve desired tolerances and to speed alignment.



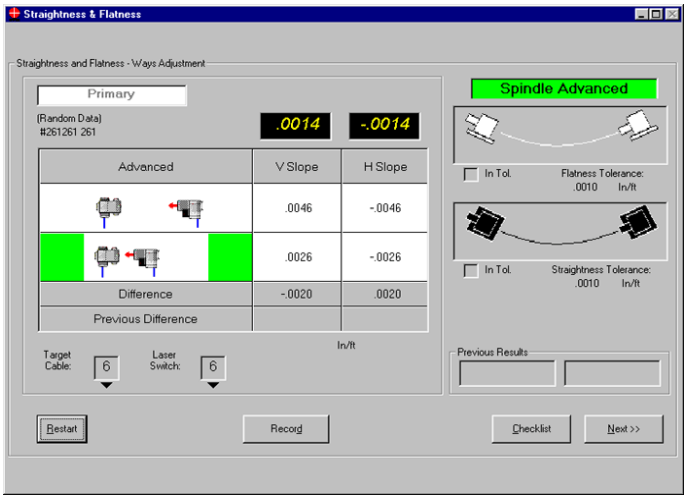
Side View of a Spindle-to-Master-Part Alignment

1. To set up the alignment, various dimensions of the spindle box, such as travel length, spindle length, distance between feet, etc., must be entered into the software. The laser is then mounted in the spindle and the target in the master part or pallet. Next, the laser is qualified or adjusted to the spindle's axis of rotation using the NORMIN procedure. The system is now ready to take data for alignment.



Spindle8 – Setup Screen

2. The alignment procedure starts by checking the spindle-box ways for straightness and flatness. This is achieved by taking 2 readings, a *forward* reading and *retracted* reading. A click of a button and the software shows a display of flatness and straightness and if they are in tolerance. If not, then the system can be left in the spindle during the alignment.



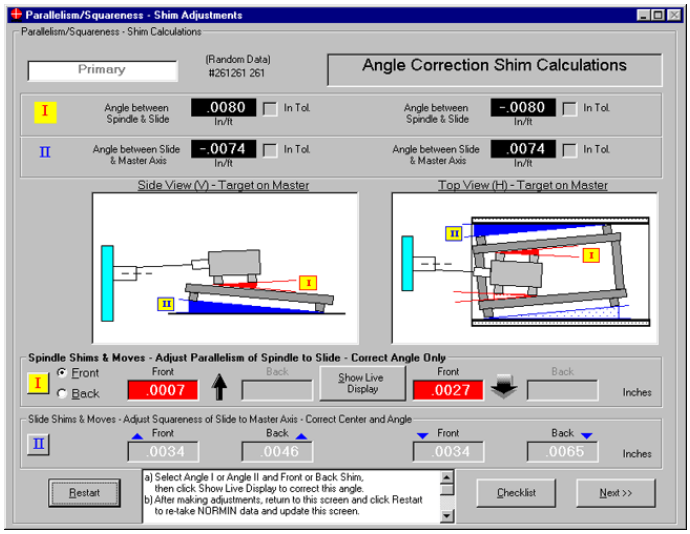
Spindle8 - Way Straightness Screen

3. Once the ways are flat and straight, **Spindle8 Step 2** is performed. This step checks to see if the axis of rotation of the spindle is parallel to the spindle box's forward motion by taking 6 sets of readings, 3 in the *forward* position and 3 in the *retracted* position.

   The 3 readings taken in each position are:

   i. Laser inverted and target normal;
   ii. Laser normal and target inverted; and
   iii. Laser normal target normal.

   The software uses these readings to calculate the mounting errors of the laser and target and then subtracts them from the raw readings. It then displays the out-of-parallel condition of the axis of rotation of the spindle to the ways, recommends shim values to fix the condition and automatically updates the display of the angles as they are aligned. Both the laser and target have bubble levels to help repeat the normal and inverted (12 o'clock and 6 o'clock) positions.

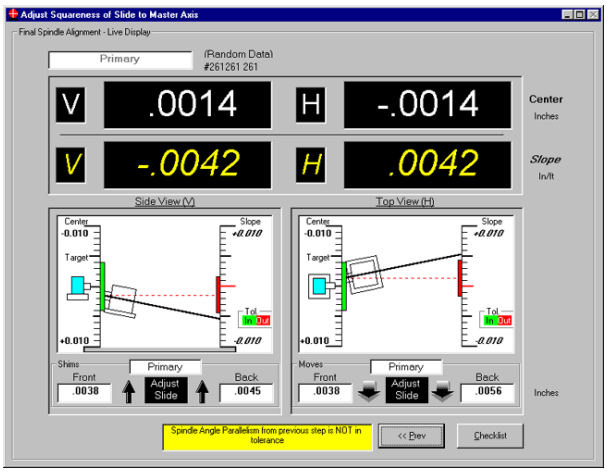


Spindle8 – Parallelism/Squareness Adjustment Screen

4. After the spindle axis of rotation is aligned, **Step 3** measures the angle and center of the whole spindle assembly (i.e., the wing base and spindle box). Since the ways are now flat and straight and the spindle axis is parallel to the spindle-box motion, it is a relatively easy task to put the spindle on center without any angle.

   As before, 6 sets of readings are taken again, 3 for the *forward* and 3 for the *retracted*. The software removes the final mounting errors from the setup, recommends shim values and displays all 4 alignment axes that automatically update in real time when moves are made.

5. After the alignment, Step 3 is repeated to verify the spindle is aligned and a report is generated.



Spindle8 – Live Adjustment and Final Alignment Screen

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Rotary-Dial Machine Spindles

Rotary-dial machine spindles are very similar to transfer line spindles. The main difference is the part holders rotate around a central trundle in a circular pattern instead of a line. The process is nearly identical to that described above. The only different is the fixturing.