Application Note

Spindle Alignment with the L-700 Laser

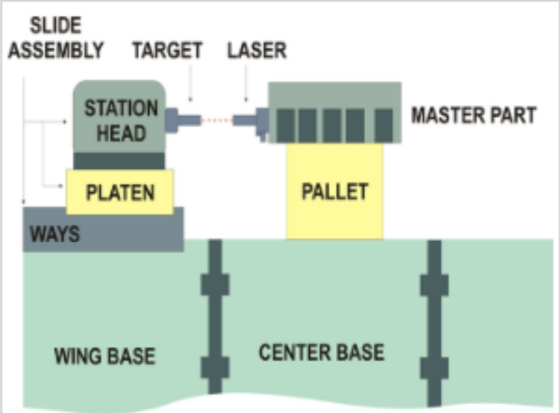
System Recommendations

L-700 Spindle Alignment System

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

General Setup – Transfer Line Spindles

The L-700 was designed specifically for transfer-line spindle alignments. Both laser and target have a .500" (12.5 mm) mounting stud that is easily adaptable for spindle and master-part fixturing. The T-261 4-axis Target displays real-time readings for horizontal and vertical center and angle measurements. The system has a center resolution of .00002 in. (0.0005 mm) and an angular resolution of .00002"/ft.



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

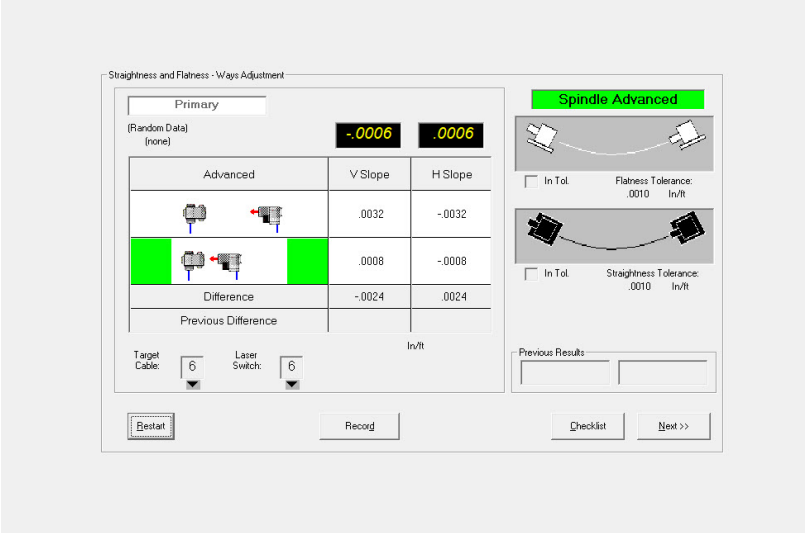
Our Windows-based Spindle8 Software eliminates mounting errors, recommends shims and produces alignment reports. The software can also handle dual-spindle alignments simultaneously.

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.

Step 1.

a) 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 L-700 Laser is then mounted in the spindle and the T-261 Target in the master part or pallet. Next, the L-700 is "qualified" or adjusted to the spindle's axis of rotation using the NORMIN procedure outlined in Spindle8. The system is now ready to take data for alignment.

b) b) The alignment procedure starts by checking the spindle-box ways for straightness and flatness. This is achieved by taking two 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

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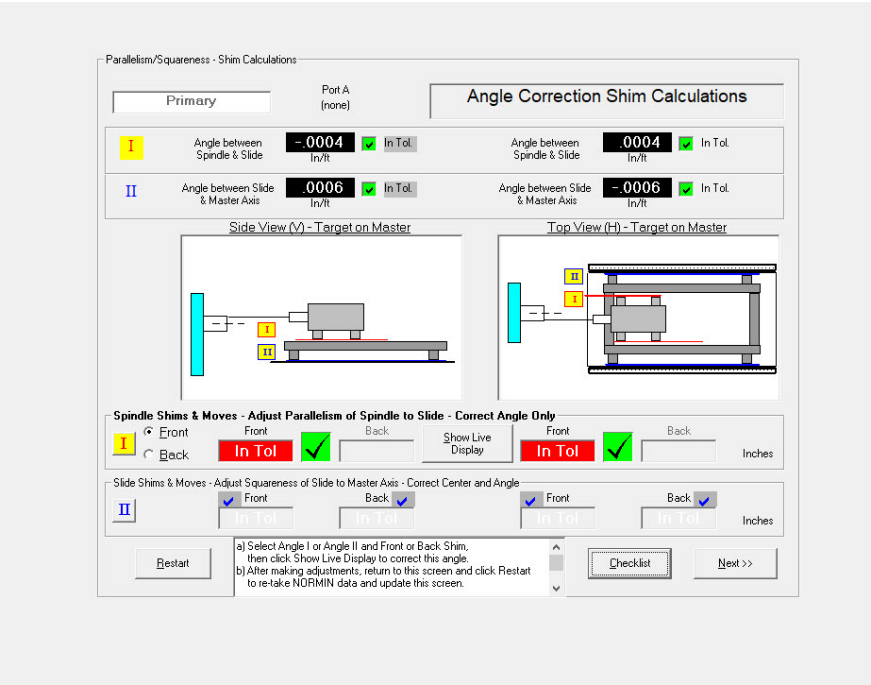
Step 2

Once the ways are flat and straight, we now need to check to see if the spindles axis of rotation (AOR) is parallel to the guideways. We do this by moving the spindle to the forward position and retracted position and taking 6 sets of readings (3 in the forward position and 3 in the retracted position).



Spindle8 - Squareness/Parallelism Misalignment Screen

The 3 readings taken in each position are:

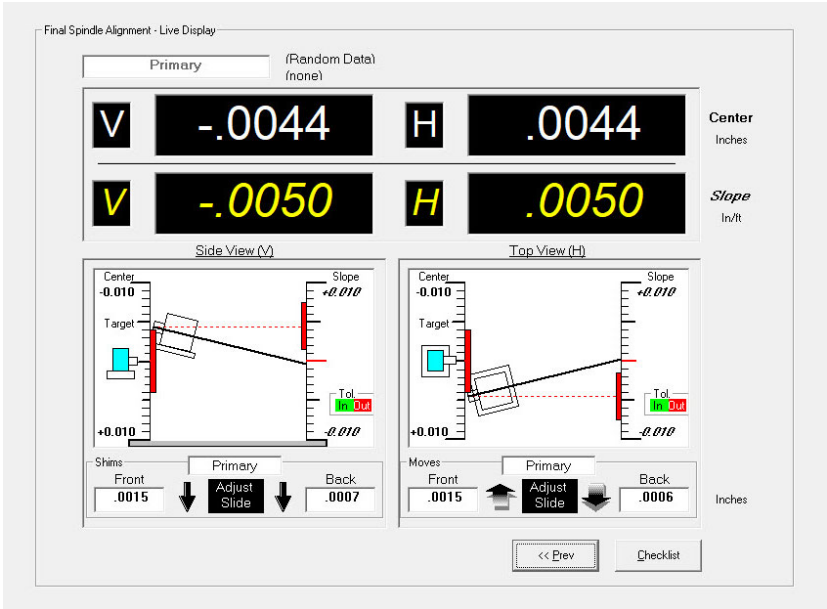
1. Laser inverted and target normal;
2. Laser normal and target inverted; and
3. Laser normal and target normal.

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.

Step 3

After the spindle axis of rotation is aligned, in **Step 3** we measure 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. 6 sets of readings are taken again as described above. The Spindle8 removes the final mounting errors from the setup, recommends shim values and displays all 4 alignment axes that automatically update when moves are made.

First, the angles are aligned. Once those are done, then the center values are aligned. If shims are going to be used for the horizontal moves, they are typically ground on a surface grinder to the exact values shown in the software.



Spindle8 Final Alignment Screen

After alignment, the data from Step 2 is retaken to confirm the alignment. Then the report is generated to show all the data from the alignment.

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.