L-700
Lathe & Turning Center Alignment System

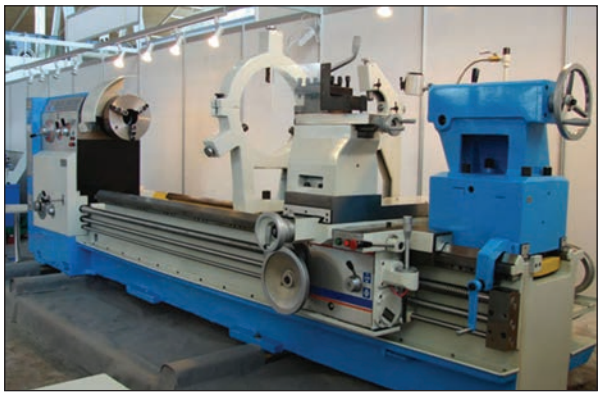
A powerful spindle alignment tool offering high accuracy and fast alignments

HAMAR LASER®
ALIGN WITH THE BEST

Lathe and Turning Center Spindle Alignment

Hamar Laser's patented, 4-axis, L-700 Spindle Alignment System is a powerful alignment tool that offers unparalleled accuracy, easy setup and significant savings in alignment maintenance time. For over 20 years, the L-700 System has been helping companies reduce tooling costs and scrap rates while increasing their productivity and profitability.

It features 4-axis, live data output, so users can align lathes and turning centers quickly and accurately — up to 70% faster than with conventional methods like indicators, alignment bars or interferometers. With a resolution of 0.25 microns (.00001") for center and 0.0008 mm/m (.00001 in/ft) for angular measurements and large color display computer graphics, the L-700 is the ideal solution to all your spindle alignment needs.



Typical applications include:

- Lathes (straight bed and turret), turning centers and cylindrical OD/ID grinders
- Bed and saddle way straightness and flatness
- Parallelism of headstock to bed
- Parallelism of headstock to saddle
- Headstock-to-tailstock 4-axis alignment
- Main spindle to subspindle 4-axis alignment
- With optional P-405 Cross-Slide Squareness

Powerful Lathe Alignment Software

Our Win 7/8 Lathe9 software has been designed specifically to align lathes and turning centers. It features large, easy-to-see alignment displays, live alignment data and spindle graphics and a 6-step procedure that guides you through the alignment with on-screen help instructions.

Lathe9 Step 1 Dimensions and Tolerances

Aligning a Lathe Quick and Easy

First, the L-700 is inserted into the main spindle and the T-261 Target into the tool holder. Then the headstock dimensions, number of measurement points and alignment tolerances are entered into Lathe9. Next, the tailstock (or saddle) bed guide-rails (ways) are measured for straightness and parallelism to the main spindle axis. The straightness is then plotted on a graph with an alignment summary, showing if the data is in or out of tolerance.

If the headstock is parallel to the guide rails, then the 4 alignment axes of the tailstock (or subspindle) to the headstock spindle are measured. If it is out of tolerance, Lathe9 calculates shims and moves to realign it and displays a live, 4-axis move screen. A final color report is then generated, showing a summary of the alignment values and tolerances for the headstock parallelism to the lathe bed, straightness of the bedways and the headstock to tailstock alignment. A graph of the bedway straightness is also included in the report.

Lathe9 Step 2 Laser Qualification

Features

- Simple fixturing for mounting the laser and target.
- Center resolution of 0.25 microns (.00001") and angular resolution of .00001 in/ft (0.0008 mm/m).
- Live measurement data in 4 axes (vertical and horizontal angle and center).
- Windows 7/8 based Lathe9 software with large, color graphics.
- Lathe9 Software corrects mounting errors, calculates shim values and provides an alignment report showing all the alignment parameters of lathe alignment.
- L-700 mounts in the spindle to project its axis of rotation out to 100'.
- Vertical and horizontal controls for both angle and center precisely adjust the laser to spindle's axis of rotation.
- Laser runs for up to 8 hours on a standard, replaceable 9-volt battery.
- Compact and rugged 4Lx2.9Hx1.7W inches (101Lx74Hx45W mm).
- Only needs 10 inches (254 mm) of space between spindle and tailstock or subspindle.

L-700 Lathe Alignment System Components

Reliable Alignments, Quick Results

The L-700 Spindle Alignment System is a flexible, easy to use alignment tool that has become the workhorse of the industry.

L-700 Laser

The L-700 is a Class II solid-state diode laser with a visible beam that is user-adjustable to be concentric to the rotation axis of the spindle in which the unit is mounted. The operating range is up to 100 feet (30 m).

T-261A 4-Axis Spindle Target

The T-261A 4-Axis Spindle Target has the most angular sensitivity of any Hamar Laser target. It reads both center and angle (pitch and yaw) simultaneously, allowing a real-time display of alignment. It has a resolution of .00001" for center and .00001 in/ft. for angle.

R-358 Computer Interface

The R-358 computer interface provides a resolution of .00001 in (0.00025 mm) for downloading live target data into a computer.

Benefits

High Resolution and Accuracy Improves Part Quality

The L-700's ultra-high resolution combined with software to correct mounting errors produces a very accurate alignment, less than .0001" (0.0025 mm) under good environmental conditions. This extremely high level of accuracy can dramatically improve machine performance and reduce scrap rates.

Simultaneous 4-Axis Target

The L-700 Spindle Alignment System's T-261A 4-axis target measures both the horizontal and vertical center and angular readings simultaneously. This combined with Lathe9 Software makes checking and correcting the alignment of the lathe's components much easier and faster.

Live Data Speeds Alignment, Reduces Downtime

The L-700 significantly speeds machine alignment by providing continuously updating 4-axis alignment data, so without changing the setup, headstock and tailstock alignment errors can be quickly fixed, while watching Lathe9 software's 4-axis display update with each adjustment. Lathe9 software also quickly collects the lathe bed's straightness data, analyzes it, recommends shim and moves values for headstock and tailstock alignments. In most cases, alignment times can be reduced by 60-70%.

Alignment Data in 15 Minutes

The L-700 Spindle Alignment System is so easy to set up that you can do a quick alignment check in 15 minutes and the full alignment data in 25–30 minutes on most lathes. Our Lathe9 Software even corrects for mechanical mounting errors to provide the most accurate lathe alignment on the market today!

Lathe9 Built-in 6-Step Alignment Procedure

An easy-to-follow, 6-step alignment procedure is built right into Lathe9, along with popup instructions, that makes what can be a complicated alignment much simplier and easier to learn. Large color graphical displays allow the alignment data to be seen up to 20 feet (6.5 m) away.

Complicated Lathe Alignment Checks Done with Ease

Measure headstock spindle-axis parallelism with the lathe-bed and saddle guide-rails, headstock-to-tailstock alignment and spindle-to-subspindle alignment. Add our P-405 Remote Optical Square and you can even measure the cross slide for squareness! With a measuring range of up to 100 feet, even the longest lathe bed is easy to measure for parallelism to the spindle axis, eliminating the need for expensive and heavy test bars.

How It Works: Lathes and Turning Centers

One of the most important calibration factors for lathes and turning-type machines is the alignment of spindle axis of rotation (AOR) to the tailstock bedways or the saddle bedways. The other critical calibration factor is the alignment of the spindle's AOR to the tailstock, sub-spindle, turret or tool holder. Conventional methods are cumbersome, time consuming and practically useless on large lathes.

The L-700 vastly simplifies the task by inserting the laser right into the spindle chuck and then using the T-261 4-Axis Target mounted in the tailstock, the laser is aligned to the spindle's AOR and is projected out to 100 feet. This becomes the reference from which the bedways, toolholder and tailstock can be measured and aligned, allowing the entire length of even the largest lathes to be quickly and easily aligned without changing setups, replacing cumbersome and impractical alignment test bars.

Lathe Alignment Procedure with L-700

Step 1 - Machine Setup

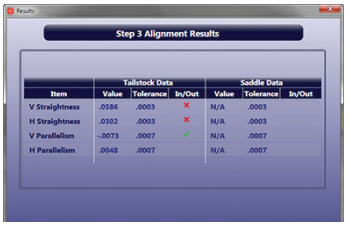
Insert L-700 into headstock chuck, T-261 into tailstock and connect to R-358. Open Lathe9, enter project name, number points, dimensions and tolerances.

Step 2 - Qualify Laser

Rotate spindle/L-700 180 degrees to 6:00. Hit Record. Rotate another 180 degrees back to 12:00 and hit Record again. Using the live displays, align laser in angle and center to spindle's rotation axis.

Step 3 - Record Lathe Bed Straightness

Insert T-261 into tailstock or toolholder and bring it close to the laser in the headstock. Hit record. Move to next point and hit record again and repeat until all the points have been recorded.

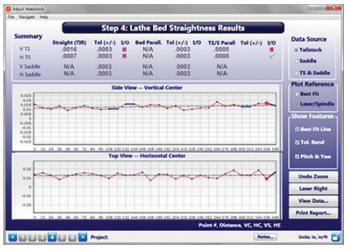


Step 3 - Alignment Results

The vertical and horizontal straightness, spindle AOR parallelism to the main and/or saddle bed ways are displayed and the tolerances are applied. If out of tolerance, the bedway straightness must be fixed and the headstock aligned to the bed before proceeding.

Step 3 - Live Move Screen

To align the headstock to the bed, Lathe9 calculates the shim values and displays a live move screen, which updates the spindle's AOR vertical and horizontal parallelism values as the shims are being added.



Step 4 - Results and Guide-Rail Straightness Graph

Displays a summary of the alignment results and a graph of the guide-rail straightness with several choices to view the graph.

Step 5 - Tailstock/Subspindle Record Screen

Record 3 data points by rotating the spindle/laser and target in the tailstock and Lathe9 will calculate the remaining mounting errors so it can display the alignment results of the tailstock or subspindle to the headstock spindle's AOR.

Step 6 - Tailstock/Subspindle Live Move Screen

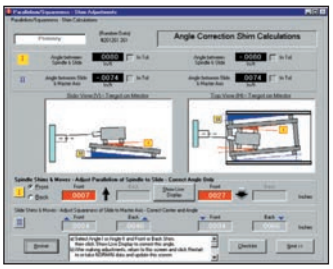
A live display for each of the 4 alignment values of the tailstock or subspindle relative to the headstock spindle AOR with shim and spacer calculations to fix the alignment. The alignment values update as shims and spacers are inserted or removed.

Other Applications

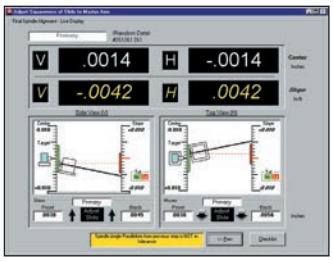
Transfer-Line Spindle Alignment

One of the biggest problems with transfer lines is broken taps, drills and reams which can stop production. A big factor causing broken tools is poor angular alignment, especially for taps. When a tap tries to enter a hole and the angular alignment is poor, it results in premature tool wear and breakage.

The critical alignment of a transfer line machine is the axis of rotation of the spindle to the master part or pallet. A 1/2" stud on the L-700 Laser is inserted into the spindle chuck and the laser beam is aligned to the axis of rotation of the spindle. The spindle axis of rotation is then projected out to the master part or pallet, where the 4-axis target is used to measure the misalignment of the spindle. Our Spindle8 software has been designed specifically for this application to guide the user through this complicated alignment.



Spindle8 – Box/Wing-Base Misalignment Screen *– Select Angle I or II for spindle-axis parallelism alignment.*



Spindle8 – Final Alignment Screen *– Align spindle box or wingbase assembly to master part.*

Large Rotary-Dial Machines

Most rotary dial machines make small, high-tolerance parts and require very accurate alignments. The critical alignment of a rotary-dial machine is the axis of rotation of the spindle to the sub-spindle or part holder.

Similar to transfer line alignment setup, a .4995 (12.687 mm) stud on the laser is inserted into the spindle chuck and the laser beam is aligned to the axis of rotation of the spindle. The spindle axis of rotation can then be projected out to the part holder or sub-spindle, where the 4-axis target measures misalignment of the spindle head for straightness, squareness to the part holder and parallelism to the ways.

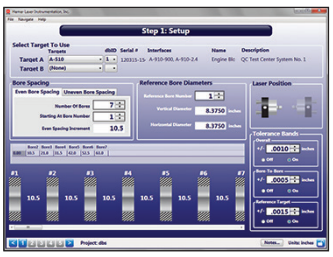
Automaker Saves Millions

A "big three" auto manufacturer's misaligned transfer lines were breaking one tool every 50 parts. After using Hamar's L-700 Spindle Alignment System the breakage rate was reduced to one in every 6,000 parts — an 11,900% improvement! The company was ultimately able to save $1.5 million annually in reduced tooling costs and increased production by 20 engines per day on just one line alone!

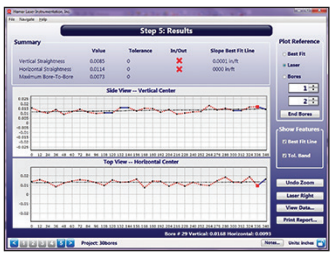
Twin-Barrel Extruders

Using a combination of laser and target from two systems, Hamar Laser has put together a package that works exceptionally well for twin-barrel extruders. It uses the L-700 Spindle Laser and the A-510 2-Axis Self-Centering Target to align twin-barrel extruders to within .0005" in 30 feet.

If the twin-barrel is under construction, the system can be used to align each section of the barrel. If the extruder is already installed, the target can be inserted into the barrel and positioned over adjustment points. The readout displays the misalignment dynamically, or Bore9 records and plots straightness.



Bore9 – Setup Screen *– Enter umber of points, distance between points and alignment tolerance for the alignment results.*



Bore9 - Step 4 Results *– Shows a graph of the vertical and horizontal barrel straightness.*

Specifications

L-700 Spindle Alignment Laser System

L-700 Spindle Alignment Laser

Mounting Stud	.4995 in. (12.687 mm) diameter. Can be customized
Weight	18 oz. (510g)
Dimensions	4"L × 2.9"H × 1.75"W (101.6x73.7x44.5 mm)
Material	Case: Anodized aluminum and 440C stainless steel Mounting Stud: 440C stainless steel, RC54-58 hardness
Laser Power	CLASS II, < 0.9 mw
Operating Range	Up to 100 feet (30 m)
Adjustment Resolution	.0001" (0.0025 mm) Center .0001"/ft (0.008 mm/M) Angle
Beam Adjustment Range	±.010" (+/- 0.25 mm) Center ±0.25 Degrees Angle
Beam Diameter	.24 in (6 mm)
Beam Stability	.0001"/hr/°F (0.002 mm/hr/°C) Centering .0001"/ft/hr/°F (0.005 mm/M/hr/°C) Squareness
Power Supply	9-volt battery, replaceable, 8-hour life

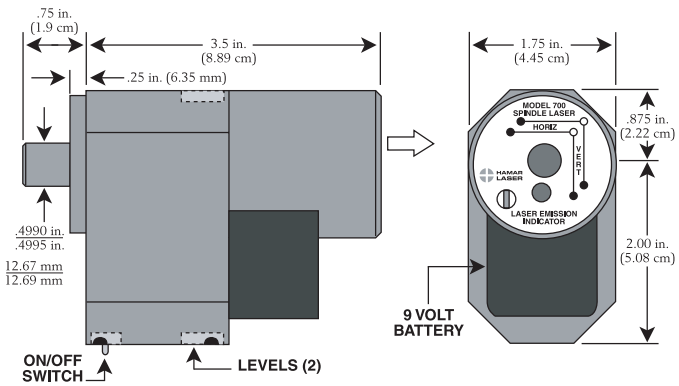
T-261A 4-Axis Spindle Target

Weight	14 oz. (400g)
Material	Mounting Stud: 440C stainless steel, RC54-58 hardness Case: Aluminum
Cable Length	10 feet (3.05 meters)
Target Cell Concentricity	±.0005" (+/- 0.013 mm) mounting stud of target
Lens Axis Squareness	±.0005"/ft. (0.042mm/m) to rear of target
Resolution	Center: .00001" (0.00025 mm) when used with R-358 Angle: .00001"/ft (0.0008 mm/m) when used with R-358
Range	Center: ±.050" (±1.3 mm) Angle: ±0.5°
Accuracy	<2% of reading when within +/- 1 mm of center
Mounting Stud	.4995 in. (12.687 mm) diameter. Can be customized

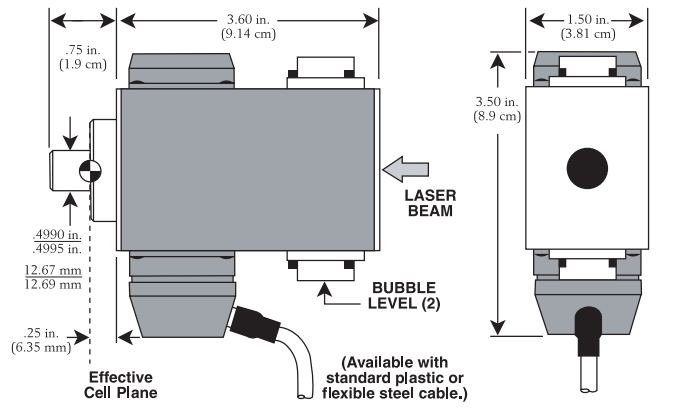
R-358 Computer Interface

Resolution	.00001" (0.00025 mm)
Size	3.33"W × 1.20"H × 5.25"D (84.6mm × 30.5mm × 133.4mm)
Weight	8.8 oz.
Power	3.5V, 1350 mAh lithium ion rechargeable battery
Battery Life	8 hours continuous operation

L-700 Spindle Alignment Laser



T-261 4-Axis Spindle Target



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