Machine Tool Alignment Systems

Laser Alignment Systems for Leveling and Squaring Machinery

HAMAR LASER®

Geometric Alignment Laser Systems

Laser Alignment Systems for Leveling and Squaring Machinery

Hamar leveling and squaring lasers are part of a new generation of affordable, yet highly versatile machine alignment systems. These laser systems are designed to measure and correct machine geometry by:

- Analyzing lines of motion
- Measuring flatness and straightness of bed ways or columns
- Measuring squareness and parallelism between axes

Mounting

Both L-719 and L-720 LEVELSCAN™ Lasers mount on a machine or stable base (such as the L-106 floor stand) and are adjusted in two axes (pitch and roll) so that the plane of light created by the laser is parallel to a line or plane of reference, as defined by a straight edge or flat surface. The lasers may also be mounted at a 90° angle to produce a vertical scan plane. Mounting stability is crucial for accurate measurement as all calculations are made relative to the initial laser reference line or plane.

Computer Upgrade

Specialized software enhancements are available for both L-719 and the L-720 laser systems. With this upgrade, data collection and analysis are streamlined. Data is processed and graphical results show flatness/straightness, squareness and parallelism, all on the same screen. Users can view machine position changes as they occur. All data can be saved, stored, or printed for future use.

L-719 LEVELSCAN™ Machine Leveling System

Model L-719 LEVELSCAN™ Laser

Model L-719 provides an ultra-flat plane of light for quick, easy flatness and levelness measurements.

The L-719 is designed to continuously sweep a laser reference plane. The plane is produced by combining an extremely accurate penta prism that bends the laser beam 90˚ with a continuously rotating turret, which is supported by Barden ABEC 7 precision bearings.

The L-719 has an integral precision leveling base with split-prism level vials (1 arc second accuracy) and micrometers for adjusting pitch and roll. The laser plane is accurate to 0.5 arc second and has an operational range of 100 feet in radius. With one or more A-517 targets, the basic L-719 System is the ideal instrument for measuring flatness or levelness of any surface or machine.

L-720 LEVELSCAN™ Machine Leveling & Squaring System

Model L-720 LEVELSCAN™ Laser

With the addition of a plumb laser beam to the L-719 style laser, the L-720 offers the capability of checking and correcting squareness as well as flatness and straightness. The L-720 can perform these operations separately or simultaneously.

The L-720 can completely check the geometry of most machining centers with only two setups. Since the measurements are live, the geometry can be fixed without changing the setup, saving tremendous amounts of time over interferometry or traditional methods.

Also, with a minor modification, the L-720 (L-720M) can be mounted on a removable base that can be inserted into a lathe spindle to check headstock/tailstock alignment, way parallelism, bed flatness/straightness and cross-slide squareness.

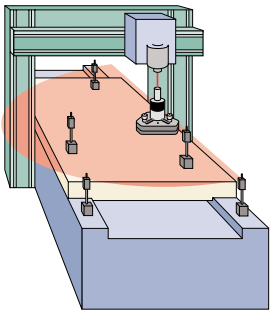
An accuracy of 0.5 arc second, squareness accuracy of 1 arc second and split-prism level vials all mean the L-720 and L-720M are the perfect tools to check any machine tool, especially with the ever tightening tolerance demands in today's marketplace.

Features & Benefits

1. Simultaneously Measure and Correct in 3 Axes
- Real-time correction of geometric errors
- 50% to 60% faster alignment than traditional methods
- Allows checking and correcting multiple points/sections at the same time

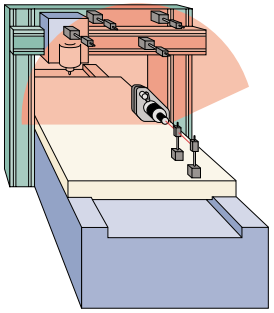
2. Fast, Simple Setup
- Instant “on” — no warm-up
- Get complete set of measurements while Helium Neon (HeNe) based laser systems (Interferometers) are warming up
- Typical setup time 20 minutes or less
- After setup, complete mechanical geometry measurements easily obtained in 60 minutes or less

3. Geometric Alignment Capabilities
- Straightness
- Flatness
- Squareness
- Way Parallelism
- Way Twist
- Interrupted Surfaces
- Coplanarity

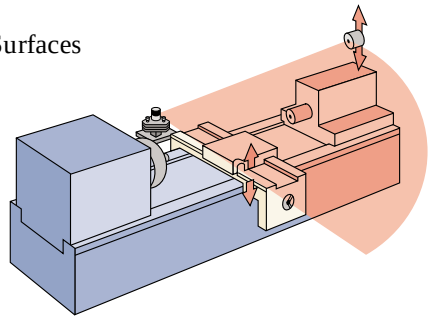


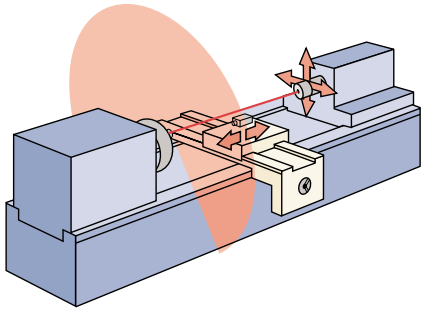
Flatness
- Tables and Surfaces
- Ways and Lines of Motion
- Way Twist

Squareness
- Columns-to-Surface
- X/Y Squareness
- Y/Z Squareness
- Z/X Squareness



Straightness
- Column Twist, Lean, Stagger
- Crossrail Twist and Flatness
- Ways and Lines of Motion





Lathe Alignment
- Way Flatness
- Way Parallelism
- Straightness of Travel
- Headstock to Tailstock
- Cross-Slide Squareness

The Principles of Operation

The L-720 system measures 3-axis machine geometries with an ultra-flat laser plane, combined with a perpendicular straight-line laser (plumb beam). The system comes with laser targets, which record the position of the surface being measured relative to laser plane or beam. The measurement is displayed on a hand held readout or in a computer using laser alignment software.

To measure or align machine geometries in one plane, the operator makes a laser plane parallel to 3 reference points (3 points define a plane). This is referred to as “bucking in.” The pitch and roll of the laser plane is adjusted by using micrometers built into the laser’s base. After bucking in, target is moved to points along the surface where it measures deviation from the laser reference plane. Since the measurement is live or dynamic, the machine can be adjusted using the target as a digital indicator.

If column squareness measurements are required, the laser must be positioned so that plumb beam is approximately 8" from column. After bucking in the laser plane, squareness is measured by affixing a 2-axis target horizontally on the column. The vertical and horizontal axes of the target are then zeroed and the deviation from the square plumb beam is measured as the column travels up or down. The target can be used as a digital indicator to adjust the column. To measure X to Y squareness, laser is repositioned and mounted horizontally and the same procedure is followed.

Specifications

Model L-719 and L-720 LEVELSCAN™ Lasers

Weight	Laser: 1.65 lbs. (0.7 kg) Base: 5.4 lbs. (4.2 kg)
Material	Aluminum and Stainless Steel
Laser Type	Both LEVELSCAN™ Lasers utilize safe, energy-efficient Class I and II diode lasers which have an operating radial or linear distance of up to 100 feet. Visible Diode, 670 nM wavelength Class II (Class I in scanning mode) .160" (4.06 mm) beam diameter
Beam Power	< 0.9 mW
Beam Stability	.0001"/hr/°F (.005 mm/hr/°C) translational 0.2 arc sec./hr/°F (.36 arc sec/hr/°C) angular
Beam/Plane Straightness	10 microinch/ft., ±.0001" air noise
Plane Flatness	30 µin./ft (2.5 µm/M) ± .0001" (2.5 µm) 360° sweep 10 µin./ft (0.8 µm/M) ± .0001" (2.5 µm) 90° sweep
Beam to Plane Squareness	(L-720) Beam and plane perpendicular to within 1 arc second
Operating Mode	Single beam and/or scanning beam
Clip-on or Plug-in Power Supply	Both laser units are powered by a 9V DC external battery pack (2 cells) (6-8 hrs. of continuous operation) or a 115V AC adapter
Split Prism Level Vials	Back-lit (L-719 and L-720), accurate to 1 arc second

The L-719 Basic Machine Leveling System includes:

- L-719 Laser
- A-517 Scan Target
- R-308 Readout

The L-720 Machine Leveling and Squareness System includes:

- L-720 Laser
- A-517 Scan Target
- T-212 4-Axis Target with a T-230 Stand
- R-307 Readout with a T-251 Scanner Pre-Amp

A-517 Scan Target and Base

T-212 4-Axis Target

R-308 Readout

R-307 Readout

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