

Application Notes – How it Works

Bore Alignment with the L-706 Laser

L-706 Applications

- Boring Bar Bearings
- Post-Machining Bore Straightness

A-514 Self-Centering Bore Adapters for the A-512 Target

The A-514 self-centering laser and bore adapters accurately and quickly position the laser and target on the bore centerline. The adapters have adjustable legs that allow them to be used for bore diameters ranging from 3.75" (95 mm) to 40" (1M).

Three sizes are available, as follows:

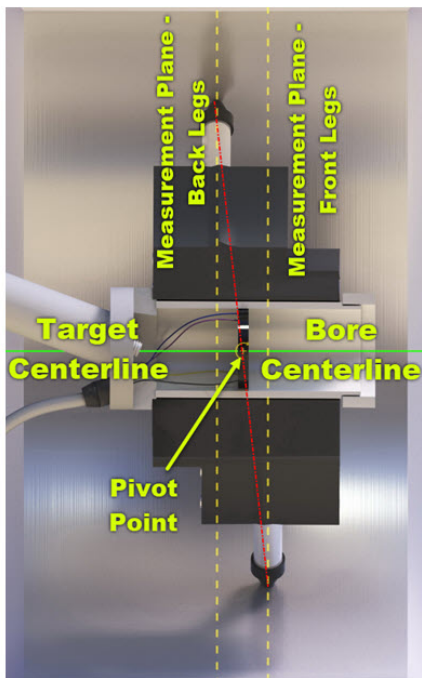
- **A-514A** for bores from 3.75" (95 mm) to 6.75" (172 mm)
- **A-514B** for bores from 6.5" (165 mm) to 17.5" (445 mm)
- **A-514C** for bores from 17.0" (432 mm) to 40.0" (1 M)

How the A-512 Target and A-514 Adapters Work

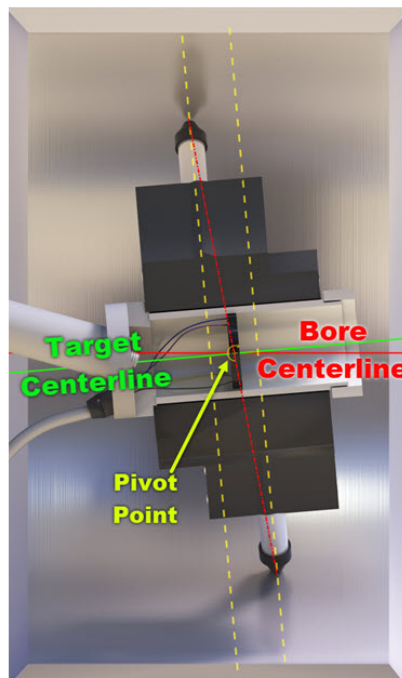
The A-512 Target is designed so that the PSD is centered axially between the 4 feet of the A-514 Adapter, 2 of which are offset axially from the other 2. This, in effect, puts the PSD on the pivot point of the adapter and allows the angle of incidence to the laser beam to vary by up to 45°. This means even if the bore diameter changes, the A-514 will still self-center giving an accurate measurement of the bore's alignment. To insert the target into the bore, attach the handle to the target and tip the target forward, which allows it to easily slide into the bore. Release the handle/insertion pole and the target/adapter "jam" into the bore, finding the center automatically. The weight of the handle keeps the target centered in the bore.



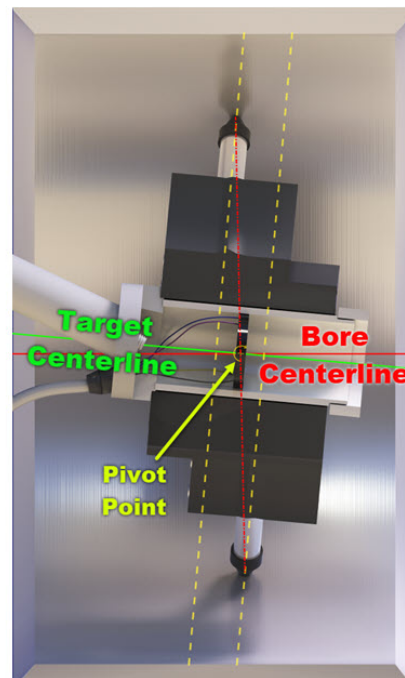
How the A-512/A-514 Self-Centering Bore Adapters Work



Bore ID =
Target Bore Adapter OD



Bore ID >
Target Bore Adapter OD



Bore ID <
Target Bore Adapter OD



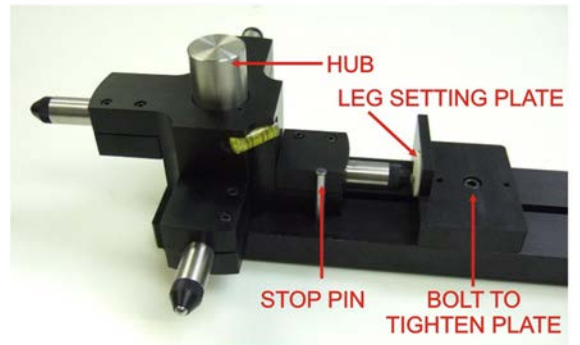
How the Alignment System Works – Line Boring Machinery

Post Machining QC Procedure

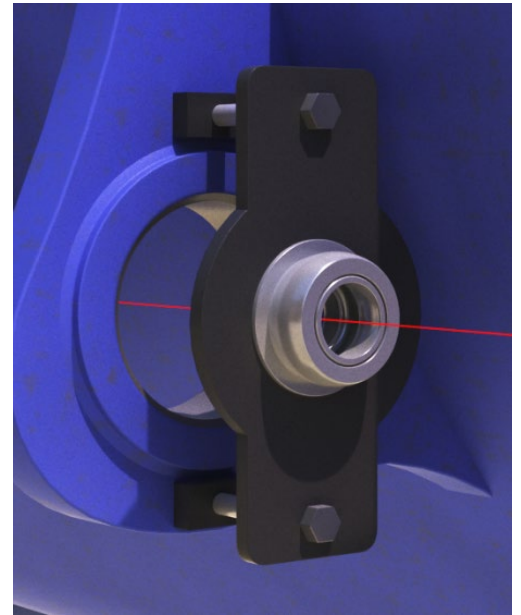
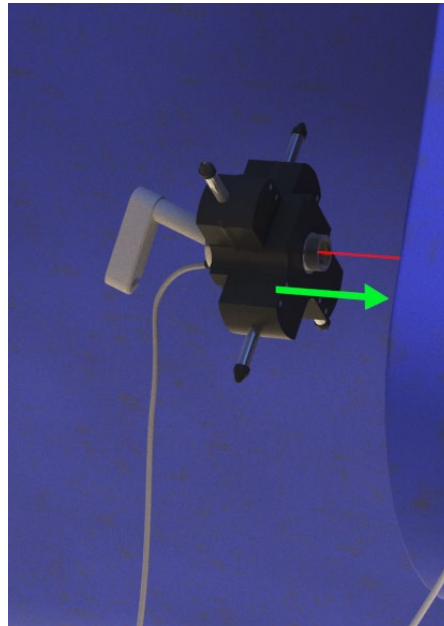
Step 1 Measure Bearing ID and Install Laser & Target into Spherical Bearings

1. Remove the boring bar and install the L-706 Laser into one of the end bearings. If needed use an L-706-SC Self-Centering Fixture if the bearing is bigger than 2.250 in.

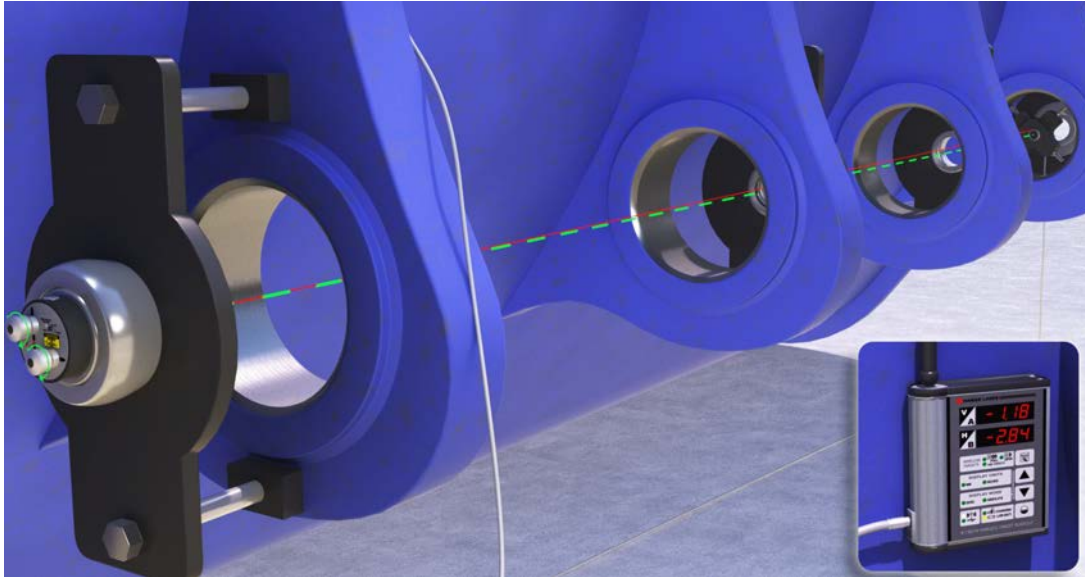
- a. Measure the nominal bore ID. Use the A-514G Leg-Setting Gage to set the legs of the A-514 Bore Adapter to the nominal bore ID.
- b. Attach the A-514 Bore Adapter on the A-514GS gage. Insert a measuring leg and adjust it until they touch the setting plate. Tighten the set screw to hold the leg in place and repeat for other legs.



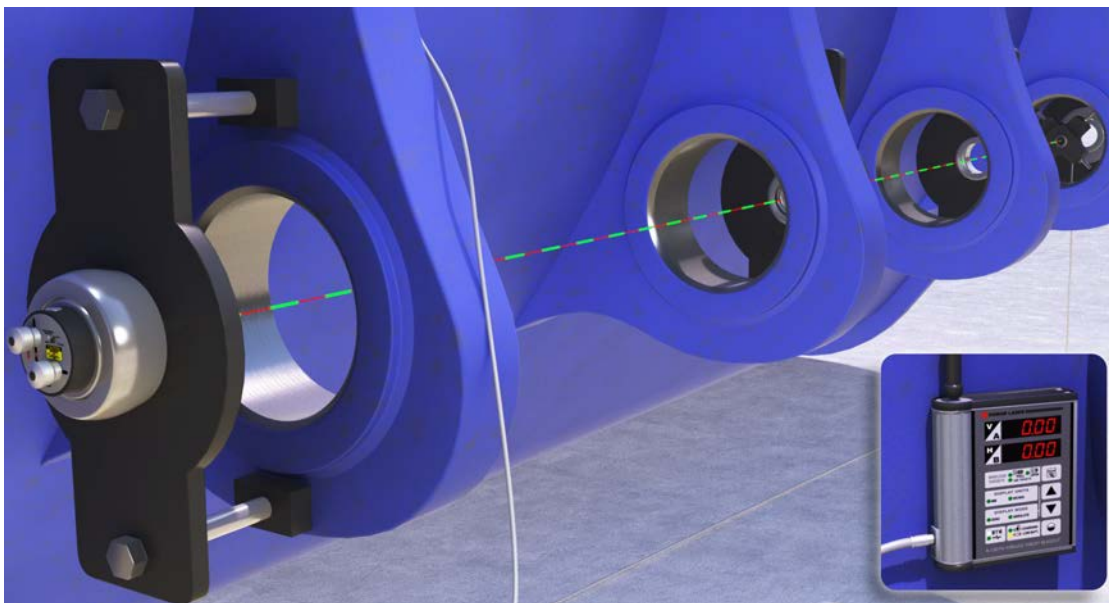
- c. Insert the A-512 Target into the A-514 Adapter and insert them into the far spherical bearing bore, making sure the adapter's level vial is level. Connect the A-512 Target to the R-1307 Readout.



2. Turn on the laser and connect the R-1307 Readout.

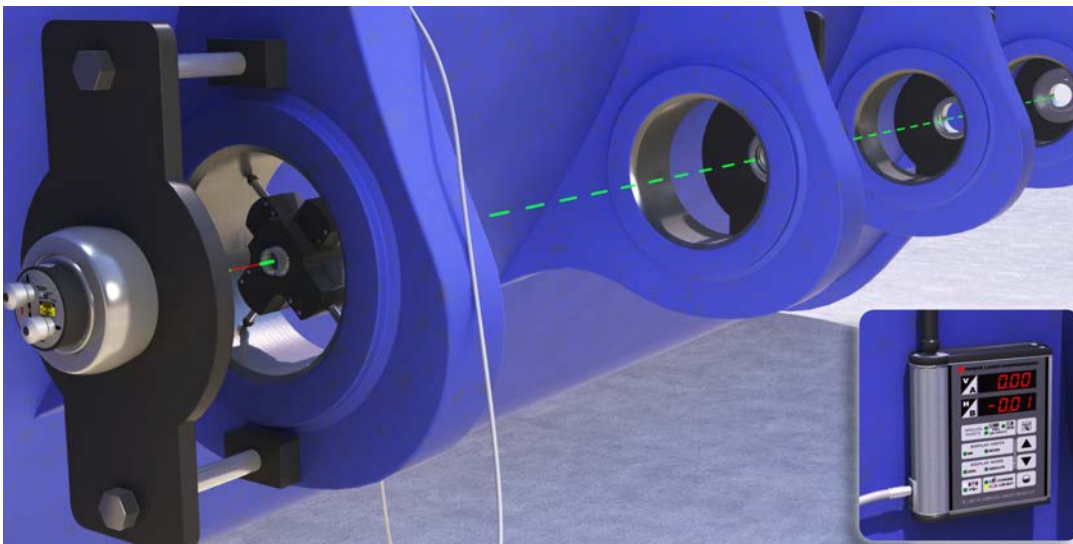
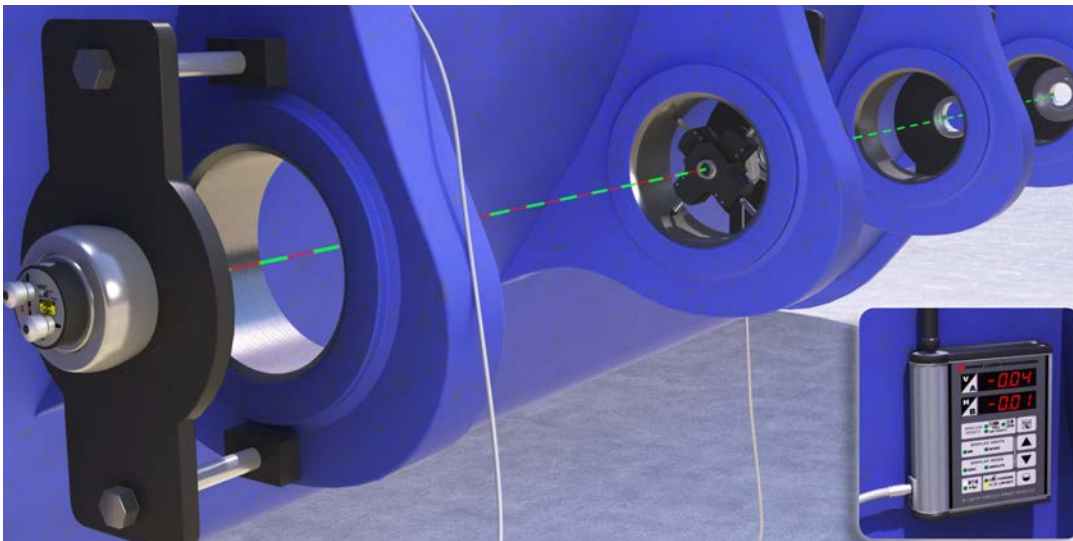
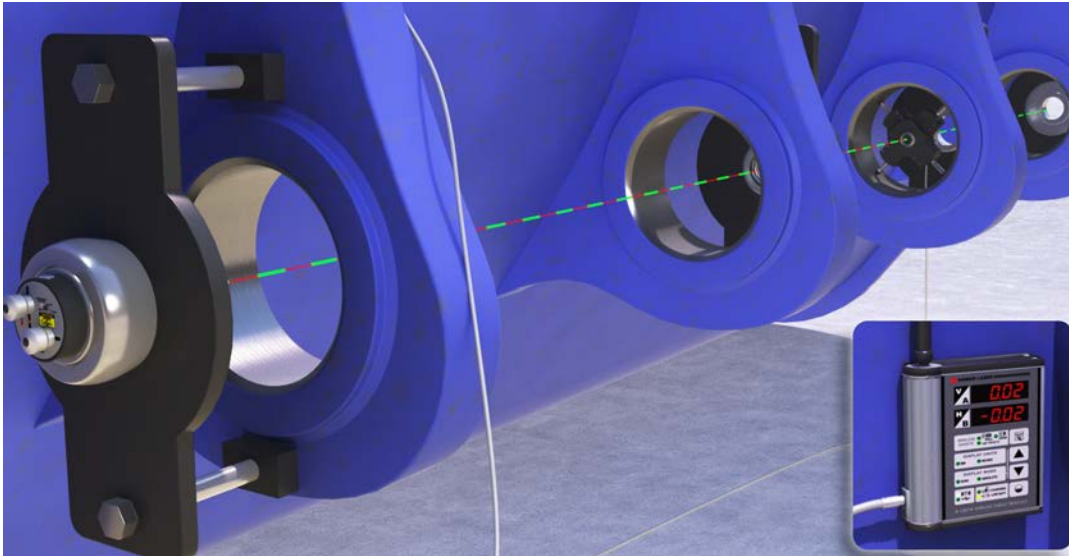


3. Adjust the L-706 micrometers to tilt the laser until it reads zero. The L-706 is now ready to take measurements of the bore alignment of the newly machined bores.



Measure the ID of the newly machined bores. Set the A-514 Adapter legs to the correct ID, insert the A-512 Target and connect the R-1307 Readout

4. Move the A-512/A-514 into the other bores to measure for straightness. Record the data in Bore9 software, which analyzes the data, removes any buckin (laser setup) errors, and provides the best bore straightness results.
 - a. Each measurement takes about 10 seconds.



Bore9 Sample Report

Bore9 Report



Project: 30bores

Report Issued By

Company Name:
Address:
City, State Zip:
Phone/FAX:
Company EMail:

Machine Information

Factory Name:
Machine Information:
Notes:

Alignment Results

Alignment Check	Value	Tolerance (+/-)	BF Slope	Best Fit I/O	Plot I/O
Vertical Straightness (TIR)	.0085	.0051	.0001	✓	✗
Horizontal Straightness (TIR)	.0114	.0051	.0000	✗	✗
Vertical Bore To Bore (Max)	.0061	.0031		✗	N/A
Horizontal Bore To Bore (Max)	.0093	.0031		✗	N/A

Setup Information

Number of Bores: 30
Distance between bores: 12.00
Units: inches
Overall Tolerance: .0051
Bore to Bore Tolerance: .0031
Target / Interface: R-1307-900, R-1307-2.4
Serial Number
Calibration Date: 1/1/0001



Result Graphs



Alignment Data

Bore #	Dist	V Raw	H Raw	V Plot (Raw)	H Plot (Raw)	V Diam	H Diam	Rad	Ang Pos
1	0	.0154	.0137	.0154	.0137	0	0	.0206	228
2	12.0000	.0118	.0155	.0118	.0155	0	0	.0195	217
3	24.0000	.0101	.0129	.0101	.0129	0	0	.0164	218
4	36.0000	.0138	.0083	.0138	.0083	0	0	.0161	239
5	48.0000	.0091	.0124	.0091	.0124	0	0	.0154	216
6	60.0000	.0118	.0144	.0118	.0144	0	0	.0186	219
7	72.0000	.0144	.0156	.0144	.0156	0	0	.0212	223
8	84.0000	.0112	.0146	.0112	.0146	0	0	.0184	217
9	96.0000	.0099	.0127	.0099	.0127	0	0	.0161	218
10	108.0000	.0106	.0095	.0106	.0095	0	0	.0142	228