MEASURING INSTRUMENT COMPARISON

There is a wide variety of methods for measuring the position and diameter of Crankshaft Main Bearing Bores in large diesel engines. All of these methods are being utilized around the world, however some of these methods for measuring are better than others. The chart below shows a comparison between the varieties of measuring methods.

	HELAS	Laser	Granite Table	Visual Scope	Piano Wire	Micrometer	Mandrel	None
ACCURACY	.00005”	.0001”	.001”	.002”	.003”	001”	-----	-----
PRECISION	.0001”	.0007”	.001”	.001”	.002”	.001”	-----	-----
RESOLUTION	.0001”	.0005”	.001”	.001”	-----	.001”	-----	-----
READABILITY	2”	1/4"	1/8”	1/16”	-----	1/32”	-----	-----
AUTOMATIC CALIBRATION	√							
MEASURES BORE POSITION	√	√		√				
MEASURES BORE DIAMETER	√					√		
CASELINE MEASURED	√	√	√	√	√			
CAPLINE MEASURED	√		√					
CENTERLINE MEASURED	√							
MEASURES EGG SHAPE	√					√		
MEASURES TILT	√	√	√	√	√			
MEASURES TAPER	√					√		
HORIZONTAL BOW MEASURED	√	√		√				
VERTICAL BOW MEASURED	√	√	√	√				
CASELINE GRAPHED	√							
CAPLINE GRAPHED	√							
CENTERLINE GRAPHED	√							
STEP DATA CALCULATED	√							
GRAPHS PRINTED	√							
DATA PRINTED	√	√						
AUTOMATIC DATA RECORDING	√	√						
PASS OR FAIL INDICATOR	√						√	
SKILL REQUIRED (1-10)	**2**	**2**	**5**	**3**	**4**	**4**	**1**	**-----**
TIME (MEASURE, RECORD DATA, GRAPH, MOVE CRANKCASE) (MINUTES)	**10**	**35**	**120**	**35**	**35**	**45**	**30**	**-----**

	TOTAL ERROR	STRENGTH	WEAKNESS
HELAS	Probes .00005 Laser .0002 Total .00025	The High Efficiency Laser Alignment System (HELAS) measures the Position and Diameter of Main Bearing Bores with speed and accuracy. The computer calculates and graphs all of the data in easy to read formats. Operators can be trained in ½ of a day. Utilizes laser refraction compensation. No math skills required. No graphing.	1) Requires a Shop Floor Computer.
Laser	Micrometer .002 Laser .0007 Total .0027	Lasers are very accurate measuring tools.	1) A micrometer is required to measure the bore diameters. 2) Lasers are typically set up for Laboratory use and do not take into consideration the following items, ambient light, overhead doors, and vibration.
Granite Table	Table .002 Indicator .001 Total .003	Granite Tables are a tried and true device for measuring Caseline and Capline.	1) A micrometer is required to measure the bore diameters. 2) It is very time consuming moving and possibly rotating the Crankcase to and from the Granite Table. 3) Does not give horizontal bow.
Visual Scope	Micrometer .002 Visual Scope .002 Total .004	Visual Scope is fast and easy to use.	1) A micrometer is required to measure the bore diameters. 2) Different operators get different readings.
Piano Wire	Micrometer .002 Wire Sag .002 Inside mic. .002 Total .007	It is an inexpensive method for measuring.	1) A micrometer is required to measure bore diameters. 2) Requires the fixturing to be precise 3) There is too much room for error.
Micrometer	Micrometer .002	The most common method for measuring bore diameters.	1) Different operators get different readings. 2) Does not show “out of round” location (Top or Bottom). 3) Does not give bore position. 4) Requires additional instrument.
Mandrel	Unlimited Error	It tells you if the crankshaft will turn.	1) A micrometer is required. 2) Does not tell you what you really have. 3) Does not give you any information. 4) There is too much room for error.
None	Unlimited Error		If you do not complete an inspection you are sending engines into service that will fail sooner than engines that are within specifications.