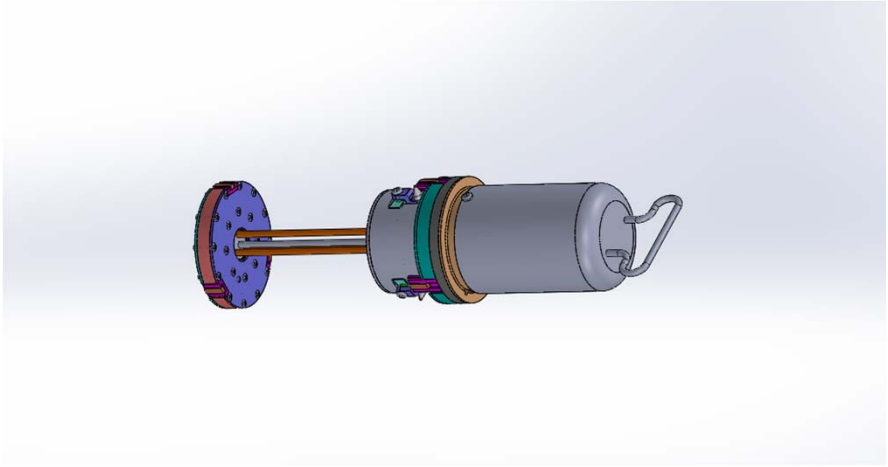
BEE 3-D ®

Bore Evaluation Equipment in 3-D (Model 10 A)

C-K Engineering
Innovative Solutions

The cylinder bore geometry gage quickly checks bores for roundness, cylindricity, and straightness

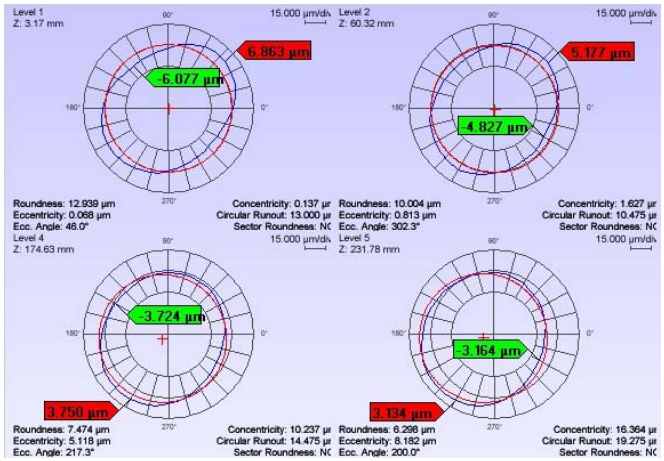
The BEE 3-D® system is computer controlled to give quick, accurate results to 1.0 micron (.000040")



The system is used by engine manufacturers at all stages – initial design and testing, production quality control, wear testing, and torque plate validation.

Features & Benefits:

- Directly calculates ring face-to-cylinder bore void area
- Requires no cylinder head modification
- Measures shape at top ring turn-around
- Top and bottom clamps automatically locate gage in cylinder bore
- Three probes to minimize measurement time
- Precision probes are protected from damage
- Precision probes have replaceable contact tips
- Adjustable clamp height
- Windows-based software
- Cost-effective



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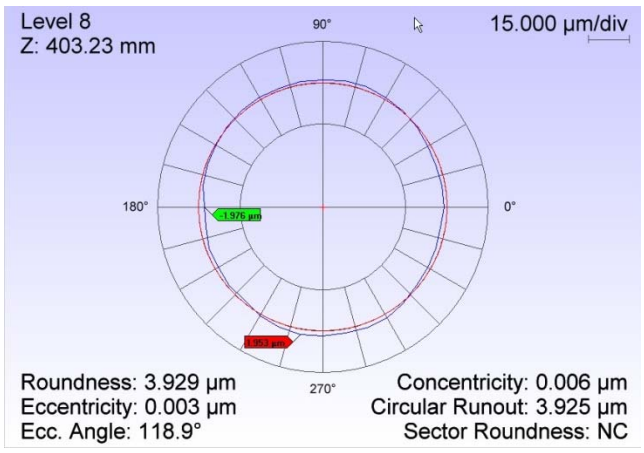
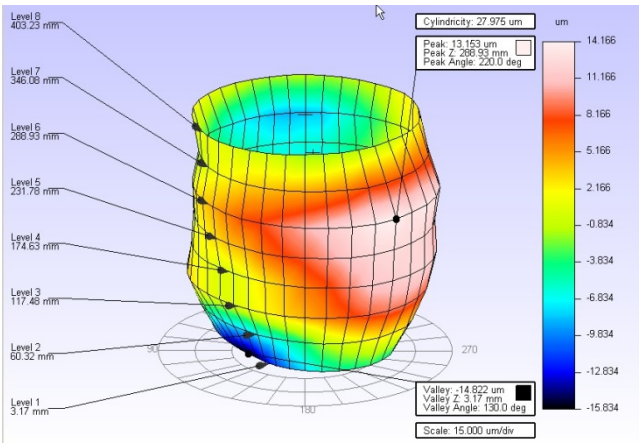
Software Features:

- Calculates void area between the ring and measured bore based on ring tension, material and other parameters
- Easy-to-use Windows based program
- 3-D measured bore can be viewed in a CAD-like environment making it easy to zoom and rotate to focus on any area of the cylinder bore
- Easy-to-read color gradients for displacements of cylinder bore

Hardware Features:

- Measures to 7.6 mm (30”) of top of bore with cylinder head removed
- Clamps at both ends of shaft for effortless centering of gage in bore
- Sliding rear clamp to accommodate different bore length
- Ability to measure with cylinder head attached without modifying head





Range Capability: (for Model 10A)

Diameter 65-110 mm (2.56-4.33”)
Length up to 177.8 mm (7”)

Precision (design objectives):

Roundness < 1.5µm
Cylindricity < 1.5µm
Parallelism < 1.5µm

System Components:

- Mechanical measuring device
- Electrical control/interface module
- TrueRond display software with integrated ring conformability model
- Laptop computer with proprietary Windows-based control software

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Why do I need this gage?

- Poor cylinder bore geometry can increase:
  - blowby
  - Lubricant oil consumption
  - Friction/wear rates
  - Fuel consumption

- Badly distorted bores can cause scuffing, and shorten engine life

When is the BEE 3-D used?

- Design and development (Alpha/Beta testing)
- Production line quality control
- Trouble shoot engine problems

What are the advantages?

- Deliver in spec bore geometry for engine manufacturers
- Ensure decreases in:
  - Blowby
  - Lubricant oil consumption
  - Friction/wear rates
  - Fuel consumption
- Quick setup and ease of use:
  - Automatically centers in the cylinder bore
- Unique ability to measure cylinder port bridge geometry in 2-cycle engines
- Advanced, intuitive software – takes out the guess work

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Bore Evaluation Equipment in 3-D (Model 10A

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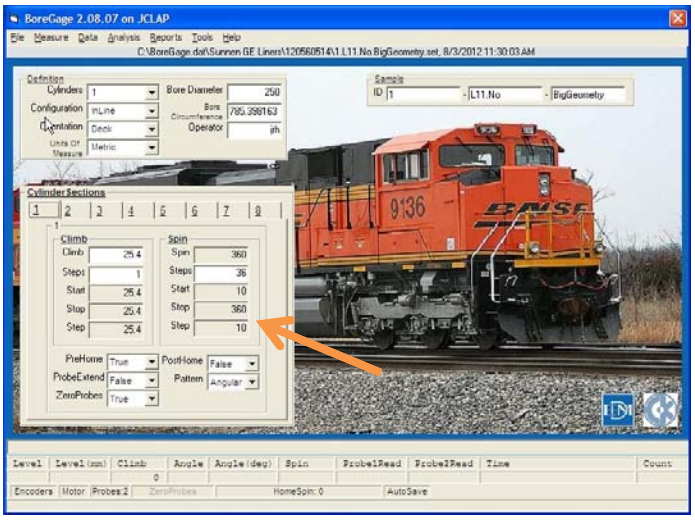
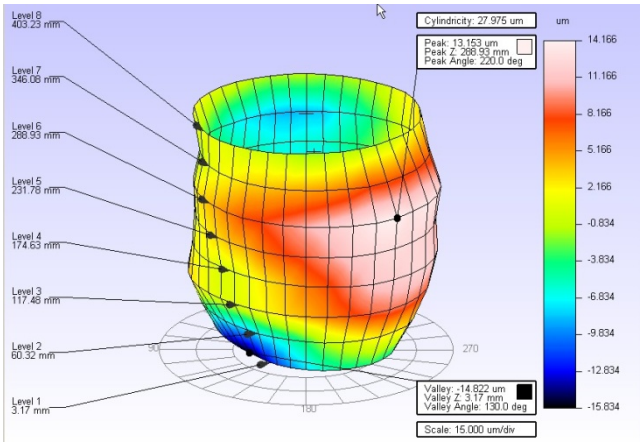
How do I use this gage?



Measurement conditions are entered into the software program

Bottom clamp is inserted and tightened in the bore

BEE 3-D is inserted and the top clamp tightened in the bore



After measurement the results are displayed on the computer