

■ Piston Verification (Type & Orientation): Verification of Pistons Using Laser Scanning

Highlights:

- Defect detection & classification
- One or more pistons undersized
- One or more pistons wrong type dished or flat top
- Pistons inserted 180° rotated
- RFID tag not matching block type
- Extracting profile areas of interest reduces analysis to common set of algorithms
- PLC communication over G.E. Genius™ Bus
- Easy to use menus and graphic interface

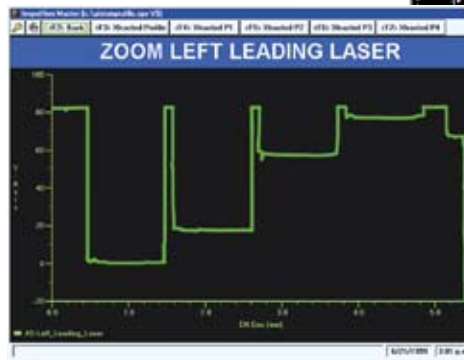
A major automotive assembly line integrator has recently chosen Sciometric's Test and Analysis System combined with InspeXion® operating software to perform a series of PASS/FAIL analyses on any one of four different engine blocks after piston insertion.

A longitudinal profile following the centerline of each piston is acquired using two CCD (Charge Coupled Device) type lasers slightly angled toward each other. Both lasers lie along the same line of travel, one behind the other. The angle ensures that at least one laser will "see" into a bore along the wall while the other is shadowed by the top edge of the bore.

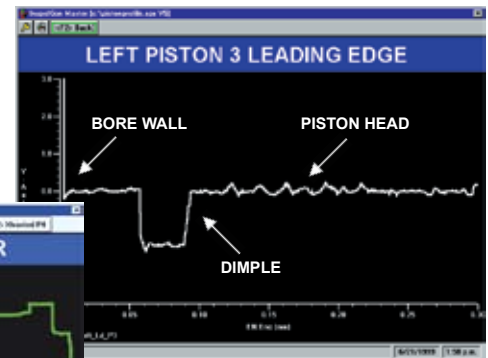
InspeXion® analyses these two traces and first determines if the engine block is actually that indicated by the RFID. If not, the operator is alerted. Next, InspeXion® uses a series of powerful built-in waveform analysis and manipulation functions along with parameters specific to the engine block to create eight individual normalized waveforms windowed around features of interest.

The same set of analysis algorithms are now applied to the newly created waveforms. Piston type is identified as dished or flat top, orientation is established by the location of a "dimple" drilled near the edge of the piston head, and piston-to-bore wall clearance is used to identify undersized pistons. Combining this information, pass/fail results are graphically displayed for the operator on the Sciometric's Test and Analysis System screen, as well as relayed to the PLC via the G.E. Genius™ Bus, all in real-time.

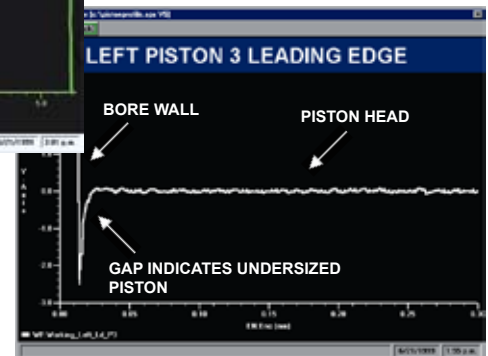
Prior to utilizing the Sciometric's Test and Analysis System on this assembly line just after piston insertion, these defects were only detectable after complete engine assembly and the only way to repair any defects involved costly tear-downs. The impact of this test on cycle time is negligible since testing all pistons in an engine block takes only about twenty seconds. This is just one of the many in-process testing solutions that Sciometric is capable of providing.



InspeXion® Screen showing Piston Profile of 4 Cylinder Head



InspeXion® Screen showing Piston Orientation



InspeXion® Screen showing Undersized Piston