

■ Cylinder Bore Sleeve Assembly: Assembly Verification Using Signature Analysis

Highlights:

- Multiple sleeve rams are monitored simultaneously
- Signature Analysis improves defect detection
- Automatic PASS/FAIL indication
- PLC interface accommodates error proofing accessories
- On-line SPC provides trend analysis
- Detectable defects:
 - Misalignment
 - Missing or damaged o-rings
 - Not pressed to full depth
 - Bore/sleeve pressed to tolerance

An automotive manufacturer uses the Sciometric Test and Analysis System running InspeXion® software to monitor the simultaneous assembly of cylinder bore sleeves and O-rings into a six-cylinder engine block.

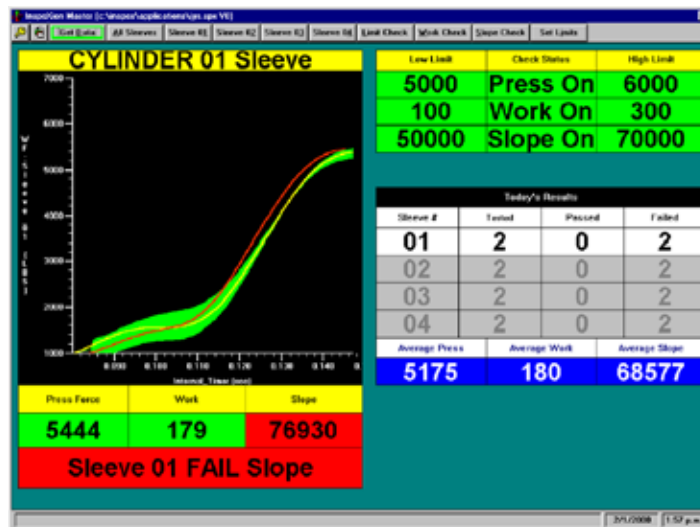
Each of the six rams is fitted with a load cell and a linear distance transducer, which are monitored during the assembly process to provide force versus distance verification. The force/distance relationship for each sleeve forms its individual signature, which is analyzed and stored, and can be displayed by the Sciometric Test and Analysis System in graphical form.



The graph shows the signature of a typical assembly. The initial contact and alignment gives a sharp peak in force over a short distance, which is followed by a steady increase in force as the sleeve is inserted into the block. Ideally the slope should be smooth and straight, but variations in fit and the condition of the O-ring cause irregularities in the profile. The position of the cusp, which is followed by a sharp increase in force, indicates where the sleeve bottoms out.

The InspeXion® software uses Signature Analysis to identify incorrect bore sizes, sleeve misalignment, missing or damaged O-rings and incorrect press depth. Each signature is compared with the signature and limits derived from known, good samples and the Sciometric Test and Analysis System sends a PASS/FAIL indication to the operator.

The Sciometric Test and Analysis System with InspeXion® Software makes reliable 100% on-line testing a practical reality. It speeds up the overall manufacturing operation by integrating quality assurance with production and can provide more detailed information than conventional lot by lot mechanical inspection.



InspeXion® Screen showing Cylinder Sleeve Insertion PASS/FAIL Signatures.

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