

Challenge

During standard combustion engine assembly, connecting rods join pistons to the crankshaft. During this process extremely tight tolerances are required on the crankshaft bearing surfaces for operation at high engine speeds. If the connecting rod is defective this could have detrimental effects on engine performance. A major manufacturer required a system to correctly monitor the crank force to verify the correct range of key parameters to ensure the quality of the connection was not compromised.

Solution

In standard engine designs, the connecting rods are machined and then “cracked” at the crankshaft end with hydraulic equipment. This guarantees the connecting rod will reassemble around the crank journal with exceptional tolerance. Sciometric’s signature analysis system closely monitors the crank force to verify the correct range of key parameters including peak force, area under the curve (i.e. energy) and the falling slope (ensuring a clean crank). The same system also monitors force as a bushing is pressed into the piston end of the connecting rod.

Serial numbers for each rod, which are assigned by the host PLC, are printed on the rod with an ink jet and are also, received the force monitor via Modbus Plus™ (Modicon PLC network). The system software is flexible and provides a single, user-friendly interface across all tests and can easily be configured to save failed and/or good part waveforms (referenced by serial number) in a database included in the program. Only the Sciometric system enables storage of the data contained in the process signatures for additional analysis. As defective or substandard rods are discovered, the signatures can be promptly recalled on day of production and the serial number to allow both failure analysis and quick adjustments to the PASS/FAIL criteria, improving the test system reliability and quality.

PISTON CONNECTING ROD FRACTURE: FORCE MONITORING KEY FEATURES

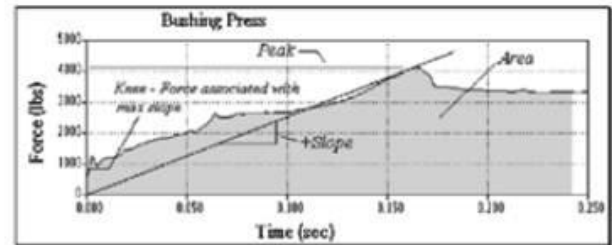
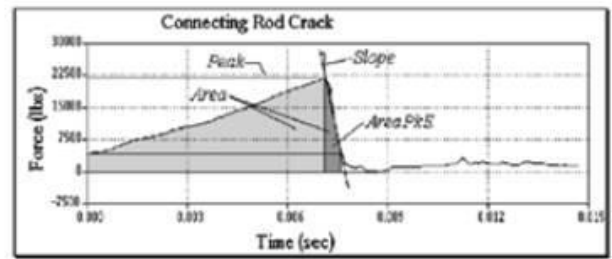
- Complete traceability of all manufactured parts by serial number
- 100% Part testing
- Five second machine cycle time
- Cracking process and bushing press can be monitored simultaneously with one system
- Simplified calibration and setup procedures



the science
of quality

Results

With the installation of Sciometric's solution the engine manufacturer is able to simultaneously monitor both the cranking process and the bushing press forces with a single system as well as have complete traceability records



SCIOMETRIC POWERTRAIN SOLUTIONS

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