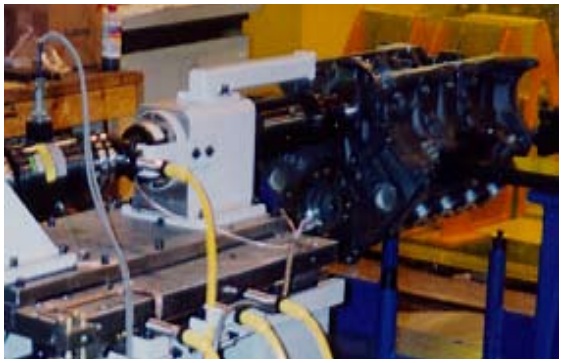
Missing Bearing Test: Advanced Signature Analysis to Verify Bearing Integrity

Highlights:

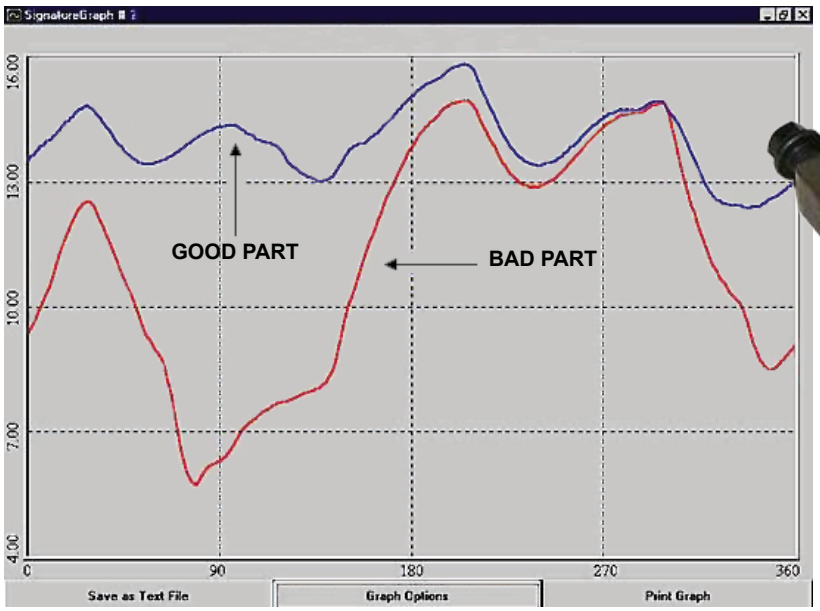
- All test data is saved to disk by engine serial number for 100% traceability
- Sciemetric's Signature Analysis system monitors all predetermined leak profiles
- PLC communication via Allen-Bradley Data Highway Plus™ and Modicon Modbus Plus™
- Easy to use menuing and full graphic displays
- Signature, SPC, reports

Detection of missing connecting rod bearings and/or reversed connecting rod caps has classically been a difficult test for engine manufacturers. Sciemetric has applied Signature Analysis techniques to this problem and has proven its effectiveness many times.

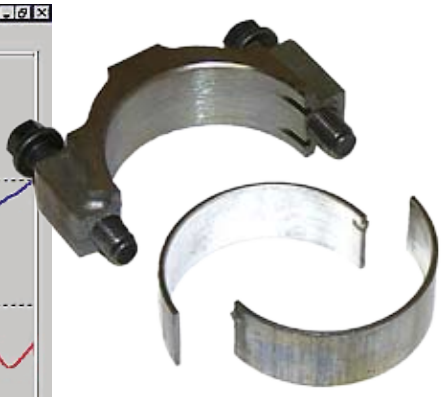


In this example, the engine block assembly contains the crankshaft and bearings and all pistons. All exposed oil holes on the block are plugged with rubber seals except one, and pressurized air is forced into the block at this opening through an orifice restrictor (a "sonic" nozzle or constant velocity orifice). Back pressure from the block is measured as the crank is rotated. A pressure waveform results as depicted below.

If there are any missing conrod bearings, or if any of the connecting rod caps are accidentally reversed, the air pressure curve changes dramatically but repeats consistently as a function of crank angle. A peak-to-peak Signature Analysis is used to detect this condition since absolute pressure levels vary too widely due to part clearances and changes in process oil. The defective piston (or at least a pair due to engine symmetry) can be pinpointed based on the angle at which the waveform changes shape.



InspeXion® Screen showing Backpressure versus Crank Angle



Connecting Rod Cap and Bearings

AN122

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