Short Block Crank Torque to Turn Test

SCIEMETRIC POWERTRAIN SOLUTIONS

Challenge

An engine manufacturer needed to determine ways to improve their first time yield as many defective engines were either being caught only at end-of-line hot testing or through customer warranty claims. In some cases, severe defects resulted in irreparable engines and costly waste. If the manufacturer could detect defects earlier in the process it would reduce the required repair time for each defective engine and would also minimize waste resulting from severe defects.

One of the most detrimental issues found during end-of-line testing was severely defective crankshafts. One primary focus area during the assembly process involved excessive damage to short-blocks caused by crank-shaft defects that were not being detected until later in the assembly process.

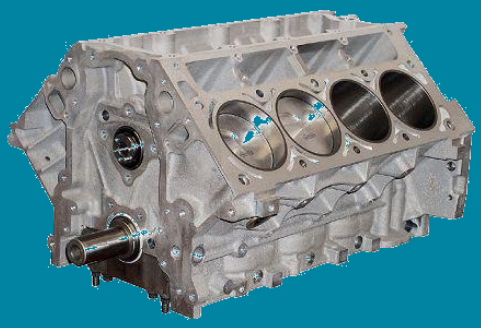
More damaging were the many warranty claims as a result of overheating engines. Analysis of the failed engines determined the root cause was missing bearings in the short block. The missing bearings caused improper oil distribution which starved certain sections of the engine and caused the engine to overheat. The resulting negative customer satisfaction and costly warranty repairs were affecting the manufacturer's reputation and profitability.

Solution

The manufacturer required a test system that would identify defects as early in the assembly process as possible, including virtually any bearing related defect. The Sciemetric Short Block Crank Torque to Turn test measures the torque as the crank is rotated. It also measures air back pressure as pressurized air is forced into the oil gallery while all the other oil holes have been plugged. The system compares the results of these tests to results of known good short blocks to assess quality. Sciemetric's core testing technology uses algorithms designed specifically for engine short block verification. The

SHORT BLOCK CRANK TORQUE TO TURN TEST KEY FEATURES

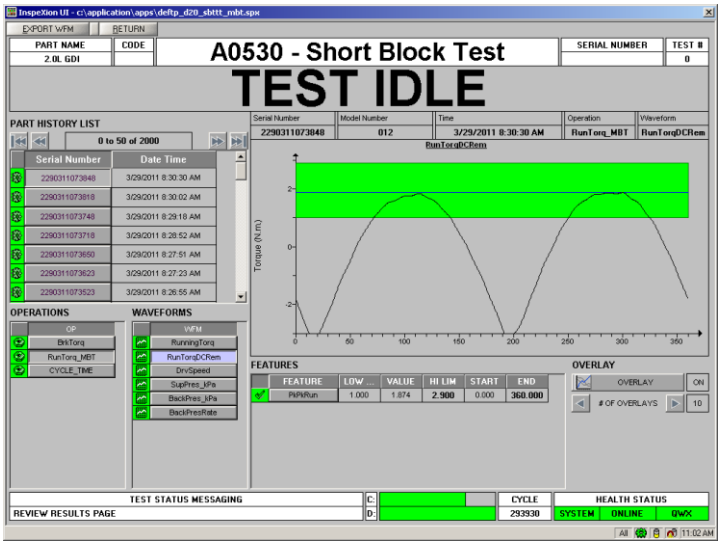
- **Improved quality of shipped engines.**
- **Improved efficiency in repairing defects.**
- **Identify potential machining issues before machines or parts are damaged.**
- **Catch defects that would not be identified using traditional end-of-line hot or cold testing.**
- **Finds defects at the point of introduction to improve quality and reduce both manufacturing costs and repair time.**
- **Uses signature analysis for most accurate verification**



the science of quality

system provides consistent and reliable detection of short block defects such as: contaminated main bearings, debris, incorrect fit and insufficient lubrication, nicked or bent cranks. The short block verification system is ready to install out-of-the-box for fast implementation, immediate quality improvement and minimal disruption to the live production line.

In the complete Engine IN-process Test (IPT) IPT approach, where tests are conducted at crucial processes along the engine assembly production line, data from each test system is stored in a central database where a record of all IPT information is maintained. Only the Sciemetric system enables storage of the data contained in the process signatures. This information can be used to easily generate yield and trend reports with full drill down to the individual part level using simple Windows®-based tools. It can also be used for quick identification of the root cause of issues affecting quality. The data provides the visibility required to enact change to improve yield.



Results

By introducing testing as early as possible in the production cycle, the manufacturer was able to find defects at the point they were introduced during the assembly process. This made it possible for them to detect defects that otherwise would not be caught until the engine was assembled and possibly in the field and resulted in warranty costs and customer dissatisfaction. The test system also identifies when machining issues are starting to cause defects. This enables the engine manufacturer to conduct preventative maintenance on the machines and minimize line down-time.

As a result of implementing the Sciemetric Short Block Crank Torque to Turn test, the manufacturer was able to improve the quality of the engines they shipped, improving customer satisfaction and decreasing warranty costs.

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