

■ Engine Vibration Testing (NVH)

ENGINE DEFECT DETECTION USING NVH TECHNIQUES IN MANUFACTURING

**Overview:**

Traditionally, noise-related engine defects are found by test cell operators, vehicle assembly plants or customers. Defects discovered at this late stage require costly, time-consuming repairs. The proven 3510 Engine NVH Test System replaces inconsistent subjective assessments with accurate scientific measurement.

**Benefits:**

- Reliable, consistent results
- Improved engine quality
- Reduced warranty costs



Sciometric's QualityWorX® Product Quality Intelligence System was also installed to archive all test data, including full signatures against each engine's serial number. This provided the engine manufacturer with full manufacturing traceability and an unparalleled warranty management tool.

**Achievement**

By implementing these two complimentary Sciometric systems, the engine manufacturer was able to objectively identify previously undetectable defects prior to shipping. In addition, the QualityWorX System enabled them to maintain a traceable record of this improved quality. After final commissioning, the engine manufacturer reported an immediate reduction in warranty costs and an invaluable increase in customer satisfaction.

**Challenge**

A major engine manufacturer was very concerned about the inconsistent quality of their shipped engines. Traditional subjective testing failed to identify defects, which were eventually discovered at vehicle assembly plants or by customers. This led to expensive warranty repairs and productivity disruptions. The manufacturer required a solution that would reliably improve engine quality without impacting production and with minimal tooling and fixturing modifications.

**Solution**

Sciometric resolved the problem by installing the proven 3510 Engine NVH Test System. Sciometric's state-of-the-art NVH signature analysis technology identifies defects that often go undetected in Hot or Cold test or other types of conventional testing. The system accurately detects common problems such as missing bearings, valve noise, timing problems, gear noise and loose or rubbing components.

The 3510 Engine NVH Test System was seamlessly integrated into an existing end of line engine test stand. Triggered by control signals, the 3510 measured and analyzed engine noise at multiple stages of the testing process, providing an immediate pass/fail signal to the operator (see Figure 1). By combining statistically derived signature boundaries and user-specified signature characteristic limits, Sciometric's NVH measurement technique eliminated quality deficiencies and delivered an objective and repeatable verdict on engine quality.

The 3510's design makes it a practical, economic and a low risk choice to improve any existing Hot or Cold test installation.

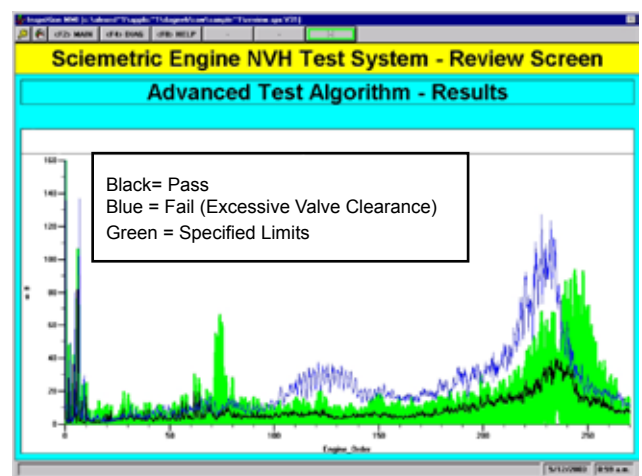


Figure 1 - Note how the waveforms for the good (black) and bad engine (blue) look almost identical at the lower frequencies? It is only at the higher frequencies that the excessive valve clearance is clearly distinguishable. Sciometric's advanced algorithms were able to detect this defect.