Timing Belt Tensioner: Functionality Test Using Signature Analysis

Overview:
A major automotive manufacturer was using a traditional belt tensioner test method that involved the use of a clavis, a solenoid activated hammer designed to strike the belt allowing the harmonic frequency to be measured. This method is limited because the test must be conducted when the engine is not being rotated and it is only capable of detecting the belt tension. Sciemetric® was able to present an alternative method that allowed the belt to be inspected while the engine was being cranked during the cold test.

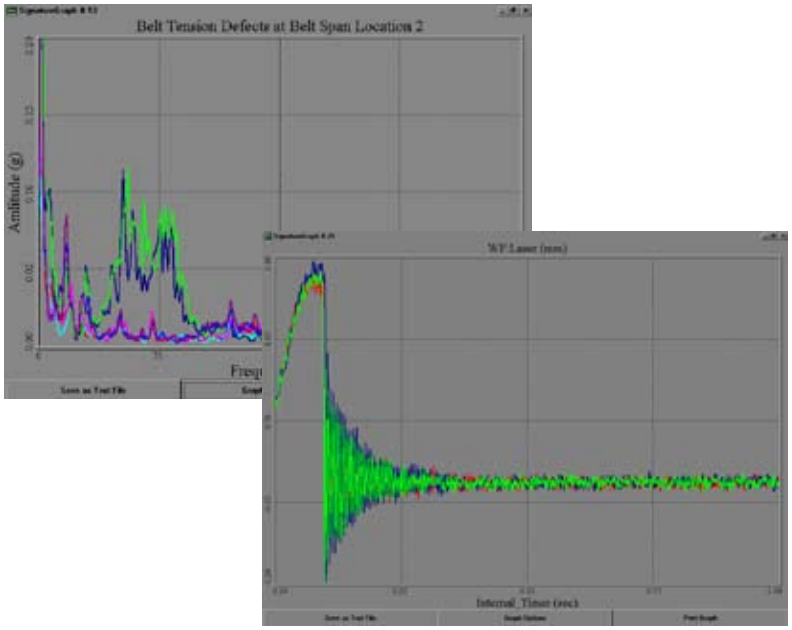
Highlights:
- Defects detectable:
  - Incorrect tension
  - Loose idler pulley
  - Timing belt is too small/large
  - Defective belt tensioner
- Signatures:
  - Vibration
  - Frequency
  - Laser based

Some engine designs are subjected to a cold test at the end of the manufacturing line which basically consists of turning the crank and checking for defects in various assembled components such as the head, crankshaft and pistons. One of the components verified is the timing belt tensioner used to keep tension on the timing belt. Occasionally, defects such as incorrect tension, a loose idler pulley, a timing belt that is too short or too long, or a defective timing belt tensioner become apparent during the cold test. A defective timing belt tensioner poses a serious problem for the manufacturer as it can ultimately result in extensive engine damage.

A non-contact laser was calibrated against Sciemetric®'s Test and Analysis System with InspeXion® Software so that it was able to identify the same frequencies generated by the clavis. The laser was then configured to shine on the timing belt at a precise angle. As the belt was turned, the Sciemetric Test and Analysis System collected the laser signature. The tighter the belt, the higher the vibration frequency. By measuring the frequency, the tension could then be determined, graphed and presented. The operator was then able to compare the data against pre-determined acceptable limits and issue a PASS/FAIL.

This solution is just one more example of how Sciemetric® systems can offer unmatched flexibility, often providing many additional features that traditional methods cannot.

Timing Belt Tensioner



Timing Belt Vibration Waveforms showing the Use of Signature Analysis to Detect Timing Belt Defects

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Rev. 1. August 2007