

MTS 4100 – The New NVH Analyzer

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Identification of the vehicle's potential source of noise or vibration

Chances are good that if you work in a service garage or an OEM Warranty Department, the acronyms "NVH" and "NTF" keep you up at night. These two acronyms account for lower customer satisfaction ratings, large expenses, and, often, buying a vehicle back from a customer. But what exactly are "NVH" and "NTF" and why are they causing all these problems?

The problem

NVH stands for Noise, Vibration, and Harshness. At one OEM, NVH-related expenses totaled over \$60M for one year alone, with over 90 % coming from NVH-related repairs performed under warranty. Traditionally, NVH problems often lead to the second acronym, NTF, or No Trouble Found. When a technician cannot locate the cause of a particular customer complaint, such as noise or vibration, the resulting diagnosis is "No Trouble Found." Obviously, this is frustrating for the customer, irritating for the technician, and a financial nightmare for the Service Center and the OEM. Solving NTF problems has the highest attention at all the OEMs worldwide, and, since NVH is a major contributor of NTF problems, NVH is where many OEMs are focusing their efforts.

At many OEMs, current NVH diagnostic procedures depend heavily on customer input and only direct the service technician through a sequence of verification, analysis, testing, repair, and retesting actions to identify the vehicle's potential source of noise or vibration. This process usually involves several iterations, is largely dependent on the quality of the information obtained from the customer, and on the technician's training and skill.

The solution

Vetronix, member of the ETAS Group, has developed a tool to help OEMs solve these problems. The MTS 4100 NVH Analyzer is a tool that is intended for use by professional automotive service technicians to aid in the identification, isolation, and repair of NVH faults in vehicles. It integrates data measured from noise and vibration sensors with data obtained from the vehicle's engine and transmission controllers in order to correlate the vibrations or noise with possible sources. The MTS 4100 NVH Analyzer also includes a Driveshaft Balancing function to assist in the repair phase of affected vehicles.

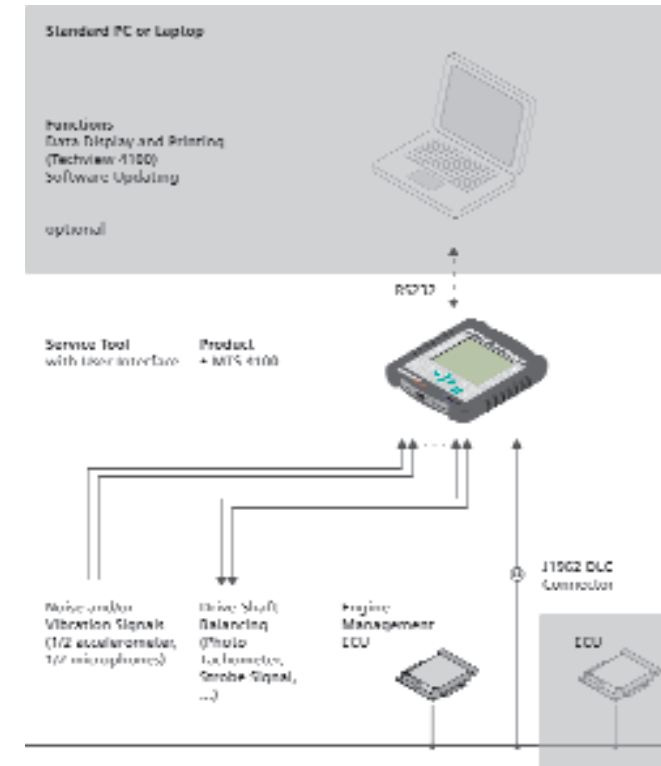
With this tool, the service technician is able to pinpoint whether the noise or vibration is originating from the engine, the driveline, the wheels, or some other rotating component, such as belts in the engine compartment. The tool moves beyond diagnosis and into repair. Traditionally, driveshafts have been very difficult to balance, requiring the technician to remove the shaft, send it off to an independent balancing house, and hope for the best when it is reinstalled in the vehicle. With the MTS 4100 NVH Analyzer, the technician is able to balance the driveshaft without removing it from the vehicle, resulting in significant time savings, as well as a better overall system balance.

The process begins with a straightforward method of measuring the frequency of the fault and comparing it with frequencies of several potential sources. The three basic fault sources are wheels, engine, and driveline; however, there are many additional sources that can be identified, depending on the amount of vehicle information available, including alternator, air conditioning compressor, power steering pump or water pump frequencies, or even the frequencies of each transmission gear selection.

The results

The MTS 4100 NVH Analyzer has been used successfully at several OEMs over the past six years. Indeed, the technology in the MTS 4100 NVH Analyzer is based on an NVH add-on to the MTS 3100, the Vetronix award-winning scan tool that has been used within North American Toyota dealerships since 1993, enjoying significant success. As a result, Gary Smith, National Service Technology Manager for Toyota Motor Sales in the United States, said, "Taking the math challenge away from the technicians was a cornerstone of the unit's success at Toyota."

The MTS 4100 NVH Analyzer.



In one pilot study at DaimlerChrysler, data showed a 38 % decrease of warranty costs due to NVH concerns when the MTS 4100 NVH Analyzer was used. "The tool is most effective in saving the corporation money regarding warranty costs when dealer technicians can't find the cause of the problem," said Dave Sanders of DaimlerChrysler's Quality Engineering Center in Auburn Hills, Michigan. Continued Mr. Sanders "The pilot dealers overwhelmingly agreed the tool reduced diagnostic time and helped them fix the vehicle right the first time." One participant in DaimlerChrysler's pilot study stated, "I recommend this tool to everyone I know. We have had vehicles here where the technician used the other standard diagnostic tools and replaced the wrong parts. The MTS 4100 NVH Analyzer was then used to properly diagnose and fix the vehicle."

Another participant at a DaimlerChrysler Training Center said, "Recently, we had a situation where a dealer's demo car had an engine noise and intermittent no start. The dealer was asking us to buy the car back, or at least get him a new engine. After our technician, equipped with an MTS 4100 NVH Analyzer worked with the vehicle, he identified the noise and was able to help a technician fix the vehicle without replacing the engine or buying back the vehicle." During a pilot study with another OEM, the findings were equally overwhelming. One report stated, "Initial feedback from the current dealer trial and prior usage of the tool by field personnel has been very positive. In the first report received in this context, the technician stated that he successfully identified the cause of a customer complaint using this tool. (This vehicle had been in their service department twice prior to this visit for this NVH issue.) The customer confirmed that the technician was able to repair the vehicle to the customer's satisfaction."

A derivative of the MTS 4100 NVH Analyzer was used at Ford Motor Company in many of their factories as an End-Of-Line (EOL) Vibration Analysis System. In fact, in 2001, Vetronix was awarded the highest and most prestigious honor the Ford Motor Company awards its technical community, the Henry Ford Technology Award.

Perhaps one technician said it best: "The tool located vibrations in minutes that the technician had spent the previous hour looking for. For the professional technician, the MTS 4100 NVH Analyzer is the tool of choice."

The connections of the MTS 4100 NVH Analyzer.