PRODUCT NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

eLearning courses designed to increase productivity and profits

Insulating Foam   Absorptive Material

Learning made Simple, Visual, and Interactive

The THORS *Product Noise, Vibration, and Harshness (NVH) Troubleshooting* course explores understanding the source-path-receiver network for noise and vibration problems in products and vehicles. Common measuring devices are examined along with the frequency analysis that is performed to distinguish component sounds from one another. The course applies concepts learned and goes through a series of case studies to bring everything together in a highly engaging manner.

Credit Hours **3**

Learning Objectives

- Understand the motivation for product NVH problem-solving or refinement.
- Describe the source-path-receiver concept.
- Know the difference between airborne, fluidborne, and structureborne paths and receivers.
- Explain the human response and sound quality and what role it has on objective and subjective measurements.
- Identify different sensors and devices used to measure noise and vibration.
- Understand the examples and illustrative case studies related to product NVH.

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I. NVH Problem-Solving Steps

- **Motivation for Product NVH Improvements**
- **Identification of NVH**
  - ◘ Sources
  - ◘ Paths
  - ◘ Receivers
- **Diagnosis of Noise and Vibration Problems**
  - ◘ Source-Path-Receiver Network
  - ◘ Product Constraints
  - ◘ Frequency Identification
- **Countermeasures**
  - ◘ Source NVH Control Solutions
  - ◘ Path NVH Control Solutions
  - ◘ Receiver NVH Control Solutions

II. Metrics, Measurements, and Analysis

- **Objective Metrics**
  - ◘ Sound Pressure
  - ◘ Acceleration
- **Subjective Metrics**
  - ◘ Rating Scale
  - ◘ Jury Pool
  - ◘ Vibration Quality
  - ◘ Ride Quality
- **Measurement Devices**
  - ◘ Sound Measuring Devices
  - ◘ Accelerometers
  - ◘ Dynamic Pressure Sensors

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II. Metrics, Measurements, and Analysis *(continued)*

- **Frequency Analysis**
  - ◘ Time-Frequency Representation
  - ◘ Fourier Transform
  - ◘ FFT Analysis Selection Parameters
- **Benchmarking and Competitive Analysis**
  - ◘ Voice of the Customer
  - ◘ Consumer Ratings
  - ◘ NVH Marketing

III. NVH Case Studies
- **Exhaust Noise**
- **Vehicle Cabin Noise**
- **Electric Vehicle Noise**

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