

NVH Analysis Dashboard Report

Overview of Approach:

1. Data Source:

- Generated synthetic data to perform a real-world NVH condition test on several vehicle models and road surfaces.
- The data included noise levels, vibration readings, (harshness), vehicle IDs, road surfaces, timestamps, and additional vehicle metadata.

2. Data Preparation:

The data was cleaned and prepared in Power BI using Power Query.

- Deletion of duplicate rows.
- Column splitting for date and time for better performance.
- Checking for null or missing values.
- Adjusting data types and removing unnecessary columns.

3. Defining KPIs:

- Common metrics include averages, medians, and standard deviation for Noise, Vibration, and Harshness calculated via DAX functions.
- Trends were analysed and compared across road surfaces and vehicle models.

4. Dashboard Creation:

- A scorecard displaying key KPIs (mean, median, standard deviation) for each NVH metric was created using gauge charts.
- Conditional formatting is applied (red/green) to indicate whether the data met target thresholds.
- Line charts were used to visualize NVH metric trends over time, and stacked bar charts displayed NVH performance by vehicle model and road surface.
- Slicers enabled dynamic filtering by vehicle ID, model, and road surface.

Charts Added in the Dashboard:

1. Gauge Charts (Page 1 - Scorecard):

- Display mean, median, and standard deviation for noise, vibration, and harshness, with conditional formatting indicating performance within target ranges.

2. Line Charts (Page 2 - Trend Analysis):

- Used to visualize trends over 20 days for all three metrics (noise, vibration, and harshness).

3. Stacked Bar Charts (Page 3 - NVH Analysis by Vehicle Model and Road Surface):

- Show NVH behaviour by vehicle model and road surface, allowing for comparison of performance across different surfaces (smooth, gravel, rough).

Key Insights and Recommendations:

1. Harshness:

- **Mean score:** 5.5 (approaching the upper limit of 6.0), indicating rough ride quality.
- **Recommendation:** Investigate the suspension system and tire quality to reduce harshness and improve ride comfort.

2. Noise:

- **Mean noise level:** 79.9 dB (close to the upper limit of 85 dB), suggesting high noise levels.
- **Recommendation:** Enhance sound insulation and investigate noise sources such as the engine and exhaust.

3. Vibration:

- **Mean vibration level:** 2.5, near the upper limit of 3.5.
- **Recommendation:** Check for imbalances in wheels, drivetrain, and engine mounts.

4. Trend Analysis:

- **Harshness:** Fluctuations over 20 days indicate potential rough ride experiences.
- **Noise:** Consistent noise levels near the upper limit.
- **Vibration:** Slight downward trend but still showing fluctuations.

Assumptions and Limitations:

• Assumptions:

- Synthetic data mimics real-world NVH patterns.

• Limitations:

- Synthetic data may not fully capture real-world outliers.
- The analysis only included noise, vibration, and harshness, excluding factors such as tire wear or weather conditions.
- Recommendations are based on generalized assumptions from synthetic data and may not account for model-specific issues.