Case Study: Window Regulator Assembly Line

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Performance & NVH Test Station
Accelerometer Actuators

Rail Bracket

Motor
Example Data & Test Criteria

**Results**

**Cable-Rail**
- Rail spike / fixture bump PASS (0.301 G)
- Rail spike / fixture bump PASS (-0.455 G)
- Rail spectrum overall PASS (0.118 G)
- Ratchet envelope PASS (0.001)

**Motor**
- Mtr spike / fixture bump PASS (1.191 G)

**Information for Motor**
- QA: 0.388 G
- Mean: 0.065, Sigma: 0.366, Skew: -0.296, Kurtosis: 3.053
- RPM1: 6,220

PASS
Rail Vibration Data for Cable Grinding Issue

The image shows a graph with time on the x-axis ranging from 1.4 to 1.6 seconds and acceleration in G on the y-axis. The graph compares vibration data for different cable pass periods:

- **Good Unit**: The acceleration readings are relatively low and consistent throughout the time period.
- **Moderate Cable Grinding**: The acceleration readings show a noticeable increase but are still within a moderate range.
- **Severe Cable Grinding**: The acceleration readings significantly increase, indicating severe grinding issues.

The cable pass period is marked on the graph, showing the timing of the grinding events.
Rail Vibration Spectrums

- Cable Grinding
- No Cable Grinding

Band of Consistent Difference
Filtered & Enveloped Rail Vibration Data

- Good Unit
- Moderate Cable Grinding
- Severe Cable Grinding

Spectrums of Enveloped Data

- Good Unit
- Moderate Cable Grinding
- Severe Cable Grinding

Cable Coil Pass Frequency
Statistical Analysis of Envelope Criteria for Cable Grinding Issue

- "Good" Units (±3σ)
- "Bad" Units

Number of Units

Envelope Magnitude @ Cable Pass Frequency

- Moderate Cable Grinding
- Severe Cable Grinding

Units:
- Good Units (3)
- Bad Units

Frequency: 0 0.02 0.04 0.06
Statistical Analysis of Kurtosis Criteria for Cable Grinding Issue

![Graph showing the distribution of units based on kurtosis criteria. The graph includes a histogram and a curve with marked "Good" and "Bad" units.](Image)
Acoustic Spectrum Comparison for Motor Noise Issue

![Acoustic Spectrum Comparison]

- **Quiet Motor**
- **Loud Motor**
- **High Frequency Content**
Statistical Analysis of High Frequency Energy Band Criteria for Motor Noise Issue

![Graph showing frequency band energy distribution with categories for "Good" and "Bad" units.](image-url)