

Challenge

Evaluating the mechanical performance of power steering rack and pinion assemblies is critical to assure safety and control in any driving situation. This can be challenging as it requires multiple audits. First is the ability to translate the steering wheel rotational input to a resultant tie rod end force and position capable of safely and reliably moving the appropriate wheel and hub assembly.

Relational characteristics between input variables, such as steering wheel position and torque (applied effort) against time or other physical parameters, must also be monitored to verify performance against design criteria. For example, symmetry of the rack is very important to ensure an equivalent “feel” when turning the steering wheel left or right.

Equally important is the variation of certain monitored variables as the rack is moved in either direction. In the case of one manufacturer, such variations typically evolved as subjective customer complaints. These subjective defects are often subtle, and these returns provide the biggest challenge in production assembly and associated costs.

The automotive manufacturer therefore required a cost-effective solution to reliably monitor, analyze and test this assembly operation to ensure customer safety and satisfaction.

Solution

The Sciometric test system was chosen as it could capture and analyze the parameters for the multiple checks required to determine pass/fail. It was able to statistically learn both time and frequency boundaries of subjectively approved good parts. Multiple advanced analysis tools subsequently process

KEY FEATURES

- Uses signature analysis for most accurate defect detection
- Allows for multiple audits: inlet psig vs. Torque, inlet psig vs. input angle, Tie Rod load vs. time, Torque vs. input angle, symmetry of rack left to right, NVH (smoothness, noise), fluid temperature and accelerometer vibration
- Complete traceability: data, including signatures are automatically stored in a central database and cross-referenced by serial numbers
- Finds even subtle NVH issues at the source reducing costs and improving customer satisfaction rates



the waveforms to provide a stable go-no-go production test environment while at the same time reducing the number of false rejects.

The part information, including attribute data and full waveforms for each part, was collected during the process and stored in Sciometric's QualityWorX® data management database, providing complete traceability. It also enables the thorough analysis and rerun of hundreds of parts to identify and address any issues affecting the process, quality or yield.

SCIOMETRIC SOLUTIONS

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