

Customer correlation

Map real customer vehicle usage to set accurate durability targets with LMS Engineering services

Benefits

- Understand emerging markets with different road and environmental conditions and driving styles
- Generate a high level of statistical evidence
- Reduce load data measurement efforts
- Avoid over-dimensioning to meet lightweight design targets
- Design durability test requirements that meet safety, weight and cost targets
- Deploy application knowledge and technical know-how with technology transfer

Summary

LMS™ Engineering services offer a systematic approach to load data synthesis by mapping customer usage to condense durability test scenarios. Measuring only a limited number of influential parameters, customer correlation helps durability engineers determine the correct road loads to set accurate durability targets for next-generation vehicles.

Understanding the loads that products withstand during their anticipated lifetimes is a critical factor for successful durability engineering. Realistic load

data is essential for virtual and physical product validation and optimization. However, traditional full-fledged durability instrumentation and measurement campaigns, including on-the-track hardware testing, are too expensive and too time-consuming to remain competitive.

Rather than measuring a multitude of output load responses individually, LMS Engineering experts compute a limited number of influential parameters to generate the load responses from a system point of view and, after statistical analysis, characterize the input.

Using the LMS customer correlation methodology, LMS Engineering experts can re-balance the measurement effort according to the allotted observation time. Statistical relevance enables optimization of the observation time, which in turn allows for a reduced overall measurement effort per vehicle.



LMS Engineering services

Customer correlation

A typical customer correlation project is comprised of the following four phases:

Base data collection on the proving ground

Working from a single vehicle, basic data is collected on the test track. Input data acquisition reflects a limited number of influential parameters, whereas output quantities represent typical durability responses, mainly wheel forces. This data is the basis for subsequent correlation modeling.

Correlation modeling

The next step is to create a mathematical correlation model. Based on the

collected road load data from step one, mathematical modeling is conducted to establish a correlation model that maps input quantities to output quantities.

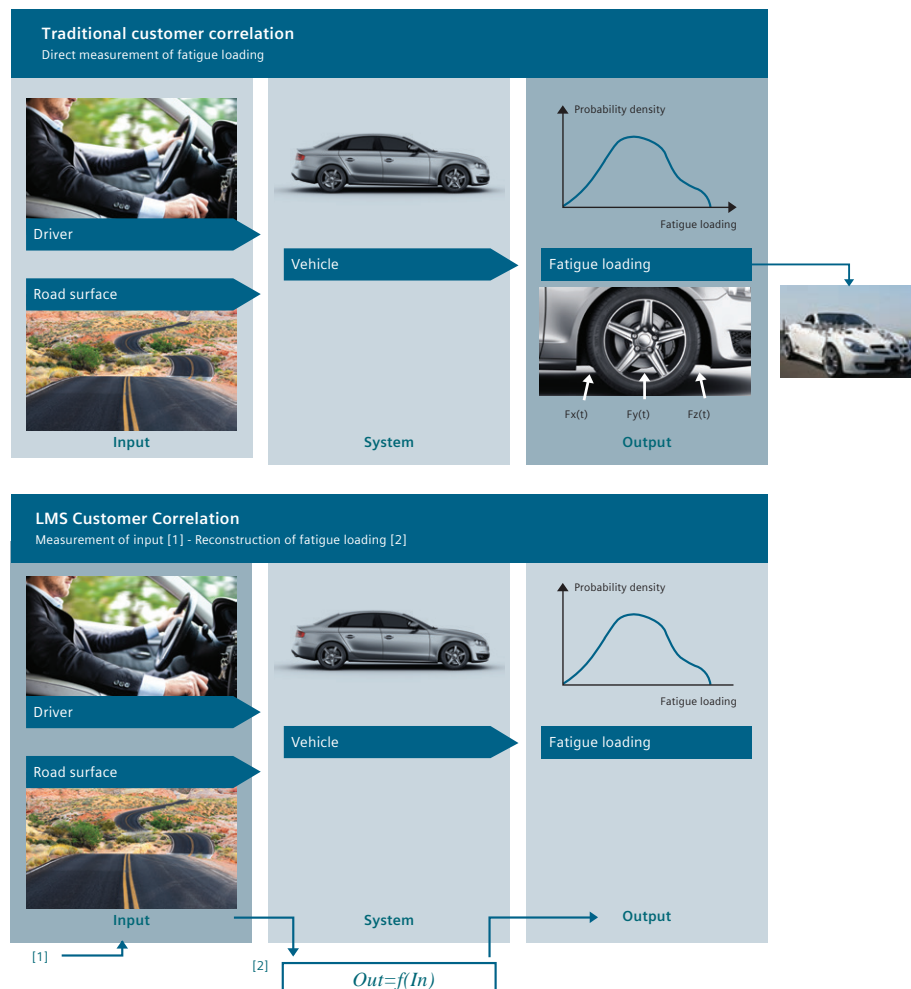
Fleet measurements

Working with a streamlined measurement setup frees up time and resources for more extensive fleet measurements. These are conducted with multiple vehicles and/or drivers over a longer period of time, significantly extending the observation data pool. Depending on the scale of the project, engineers can increase the number of instrumented vehicles, drivers, accumulated mileage, regions, weather conditions

and traffic patterns. This is a much more flexible solution compared to traditional "snapshot" measurements. Secondary information such as statistical inquiries on vehicle usage can be taken into account as well.

Interpreting the results

During the final analysis, the acquired input quantities database, generated from the fleet measurements, is translated to durability load responses via the established correlation model. Statistical analysis of the database allows insight into the statistical distribution of customer-correlated durability load responses per vehicle; statistical load targets (typically 1 percent quantile) used as a reference to design load assumptions and requirements for accelerated durability testing; the correlation of reference-customer load targets with current accelerated test procedures in place; and individual reference-customer load targets for certain customers or specific regions or markets.



Traditional customer correlation process versus the LMS customer correlation methodology.

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