Making Virtual Road Load Data a Reality at Jaguar Land Rover

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What customers do with our vehicles
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What customers do with our vehicles
Demand-Capacity Model: with lifetime noise dose for durability vehicle life

- **Durability Vehicle Life**: Extending the worst case market customer usage distribution for failure modes.
- **Robustness & Strength**: Extending the demand-capacity model with lifetime noise dose for durability vehicle life.
- **Extreme Demand**: Measure of robustness.
- **First Failure Mode of Weakest Component**: Outlier & Abuse Strength events Safe Chain of Failure.
- **Noise Dose Metric**: (e.g., Cycles @ Load).
- **Extreme Strength Events**: (e.g., Peak Load kN).
What Jaguar Land Rover does to design vehicles to meet those demands
Distorted ‘V’ is a challenge every OEM is facing today to design robust vehicles.
Virtual engineering can help us solve many of those challenges.
Cutting edge simulation techniques developed by durability & reliability team
Status quo for wheel based durability & loads at Jaguar Land Rover
MoSES - Kinematic Road Mapping System

Courtesy: 3D Mapping Solutions GmbH
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Which tyre model for durability and extreme event loads?
Use of SIMPACK, F-tire, and high resolution 3D scans of durability surfaces to predict loads
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Custom Database
Virtual Road Load Data generation process
VRLD simulation on a typical durability surface
Simulation results at the wheel hub correlate with RLD
We have better understanding of the tyre and surface interaction as a transfer function.

Surface / Tyre interaction for fatigue loads
Extreme strength event simulation and prediction for some failure modes is possible
Extreme strength event simulation and prediction for some failure modes is possible.
We need to improve modelling methods at component level with robust correlation.
Our vision and roadblocks for strength and durability load prediction using CAE

VRLD

- loads management
- component modeling
- robust correlation
- driver profiles
- active systems
- HiL