



HBM Prenscia Technology Day

Virtual Seminar Series



Structural Challenges for Battery Durability and Reliability

Presented by Dr. Andrew Halfpenny
Chief Technologist, HBM Prenscia
HBK

Session #1: Electric Vehicle Battery Testing

Structural Challenges for Battery Durability and Reliability

▲ Abstract

Mechanical and durability aspects

Like their thermal-engine counterparts, electric vehicles are susceptible to structural fatigue failures. The mechanical complexity of the battery structure and its mountings also give rise to significant additional fatigue failure issues. Insights into these structural and vibration-induced failures enable engineers to eliminate the risk of fatigue failure, improve the durability of electric-engines, and increase vehicle reliability. In this presentation we consider: Fatigue design of battery packs, accelerated vibration testing of battery packs, and fatigue analysis of electric vehicle structures.

Statistical and reliability aspects

All electric vehicle batteries degrade overtime. Their performance, however, varies by model and external conditions such as usage, temperature, and charging methods. In order to improve the overall reliability of the battery system and avoid excessive warranty exposure, it is important to understand both the mean life and the statistical distribution of lives for the battery. Furthermore, understanding how the battery degrades over time will lead to significant improvements in battery design, reliability and vehicle efficiency. In this presentation we consider: Battery life analysis, battery performance degradation modelling and analysis, and FMEA for new failure modes.

▲ About the presenter, Dr. Andrew Halfpenny

Dr. Halfpenny has a PhD in Mechanical Engineering from University College London (UCL) and a Masters in Civil and Structural Engineering. With over 25 years of experience in structural dynamics, vibration, fatigue and fracture, he has introduced many new technologies to the industry including: FE-based vibration fatigue analysis, crack growth simulation and accelerated vibration testing. He holds a European patent for the 'Damage monitoring tag' and developed the new vibration standard used for qualifying UK military helicopters. He has worked in consultancy with customers across the UK, Europe, Americas and the Far East, and has written publications on Fatigue, Digital Signal Processing and Structural Health Monitoring. He sits on the NAFEMS committee for Dynamic Testing and is a guest lecturer on structural dynamics with The University of Sheffield.

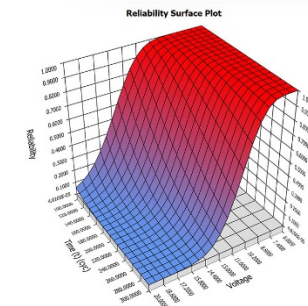
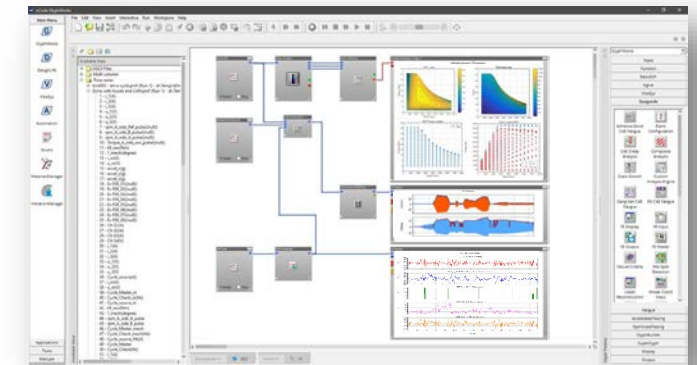
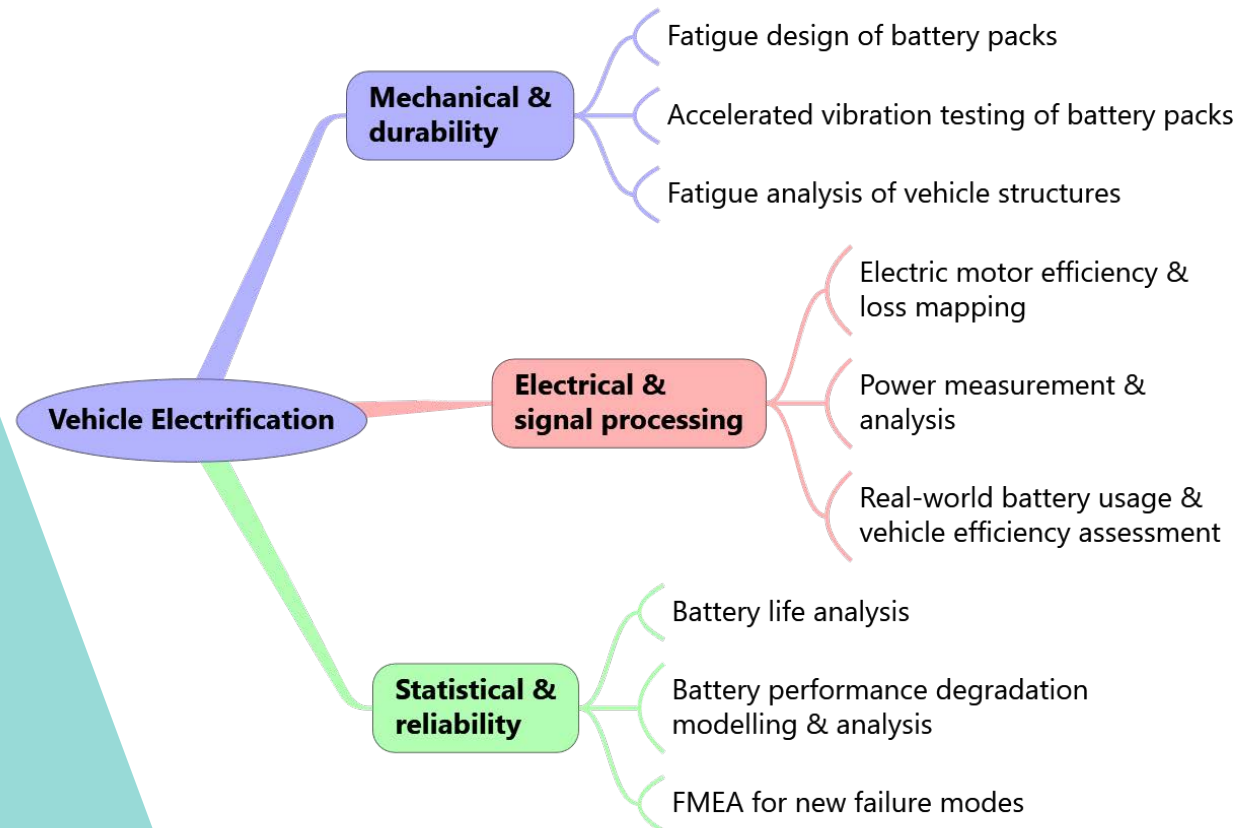
Structural Challenges for Battery Durability & Reliability



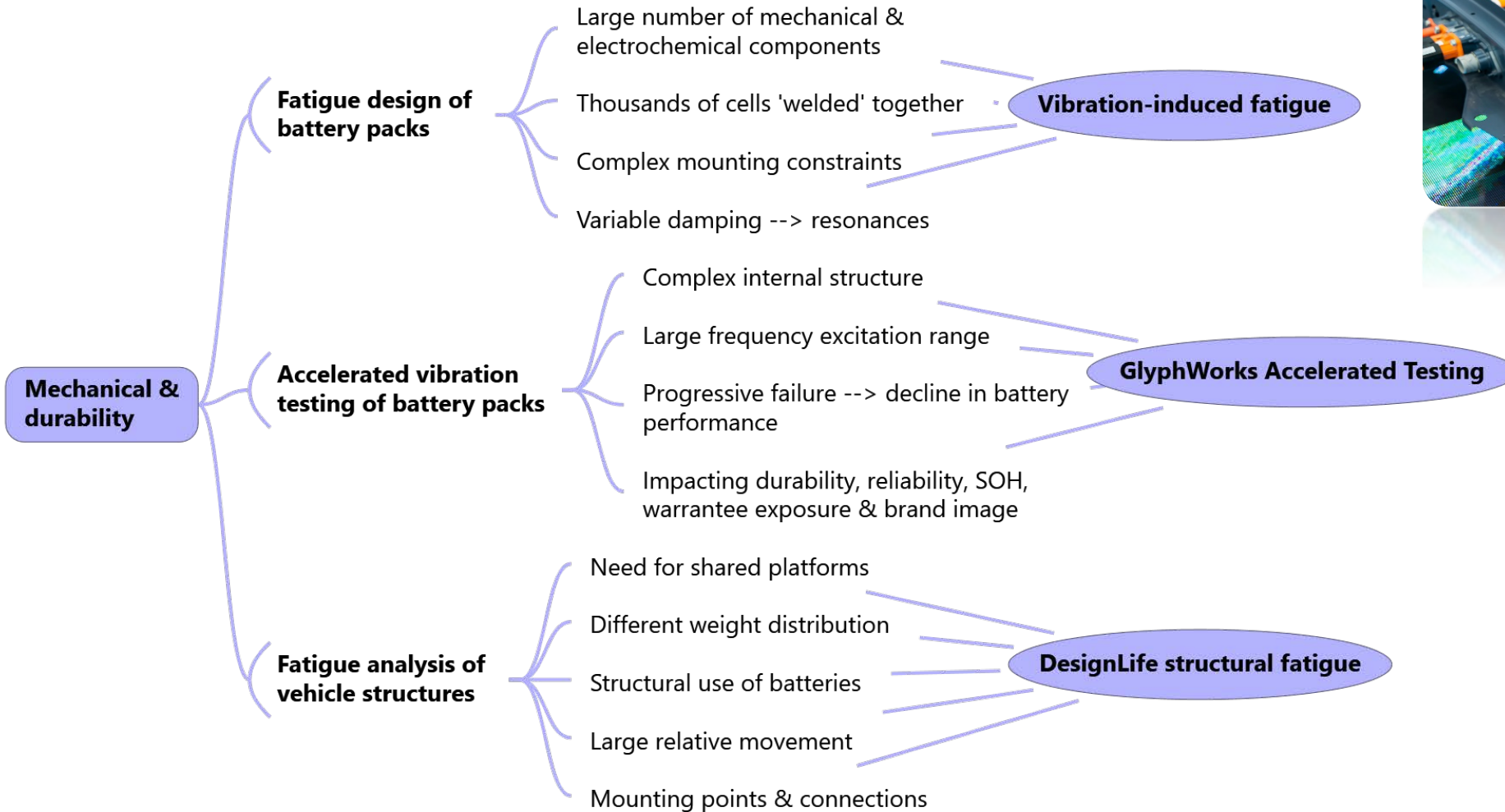
Dr. Andrew Halfpenny
Director of Technology – nCode Products

What are EV customers doing with our software?

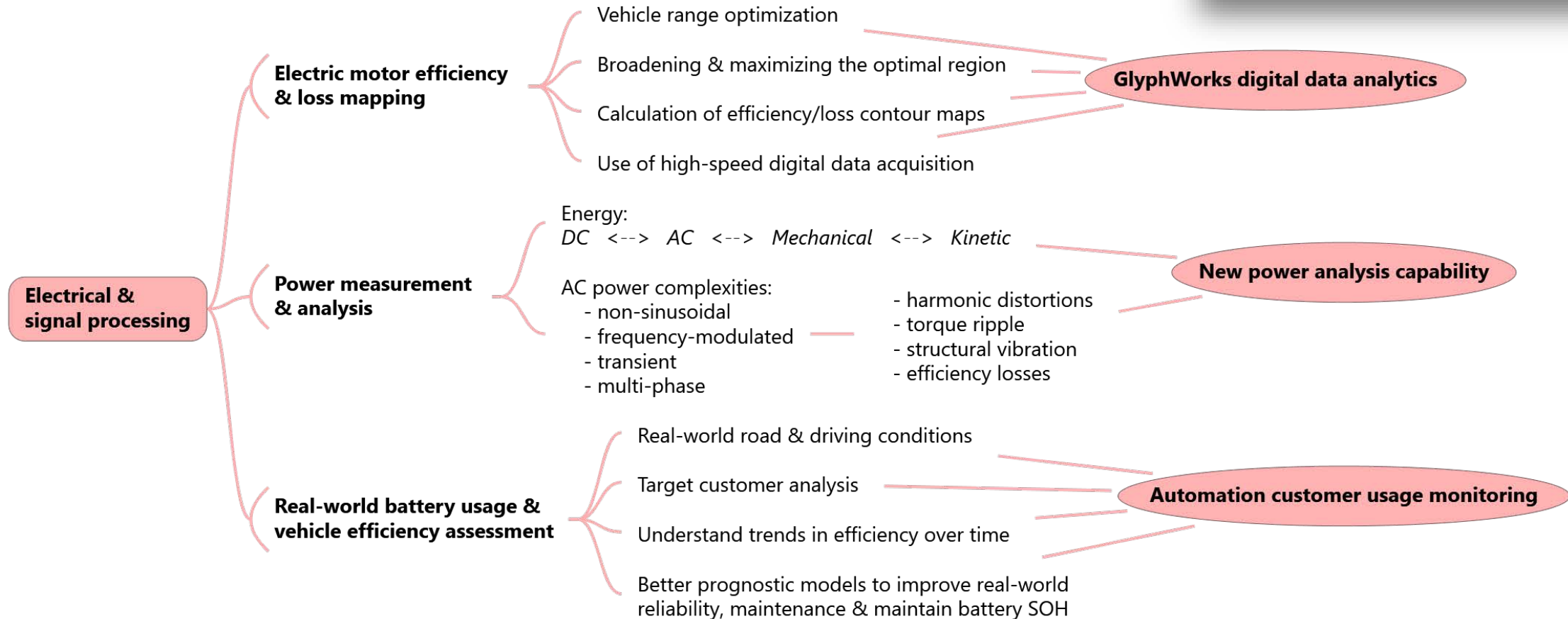
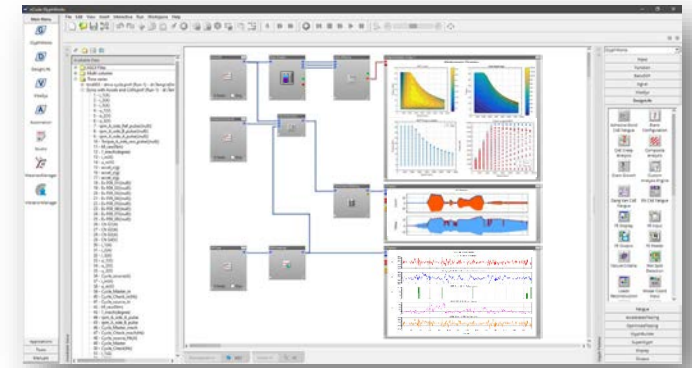
1. How do they use software today?
2. What are their challenges?
3. How can we help them?



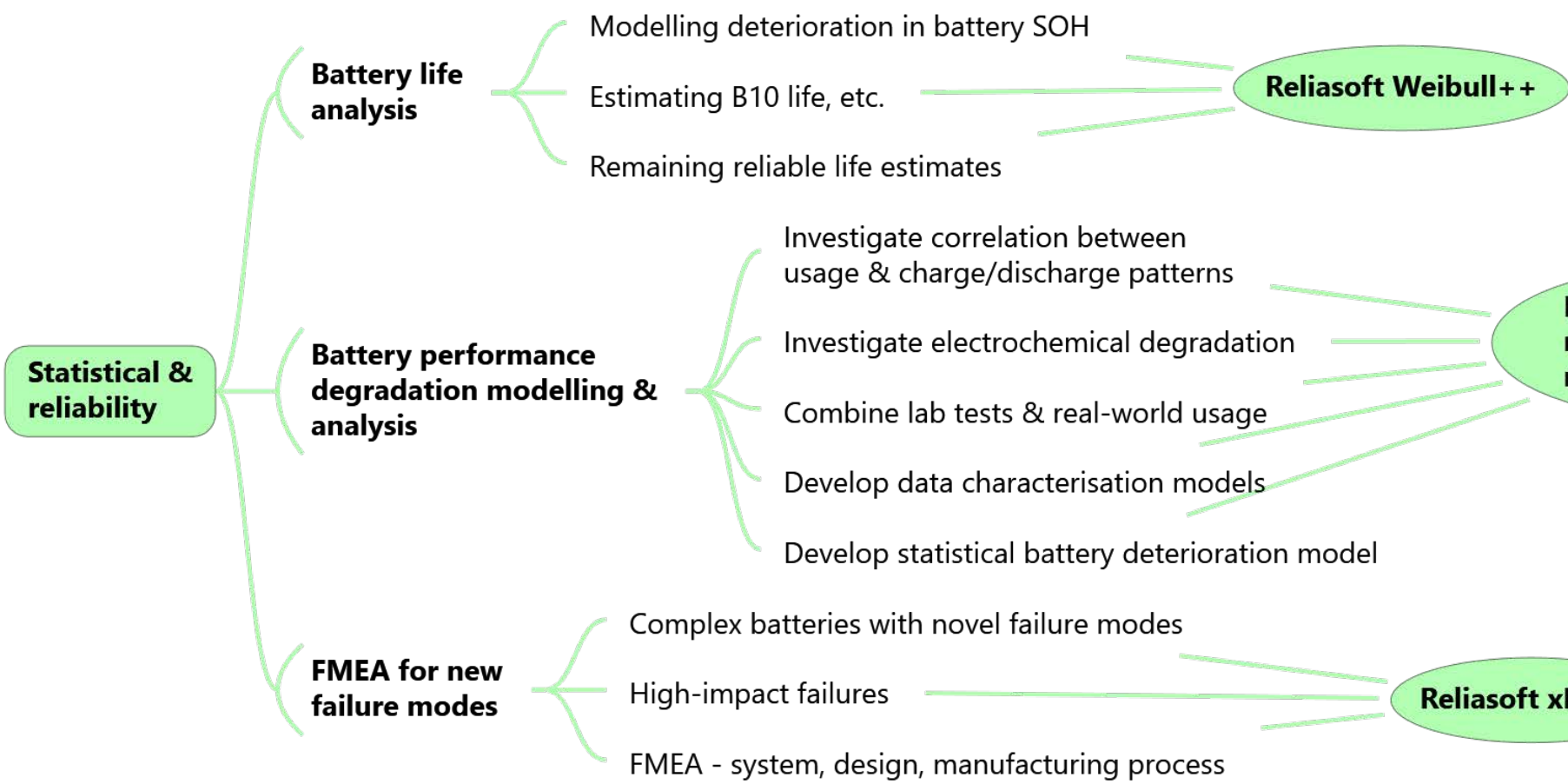
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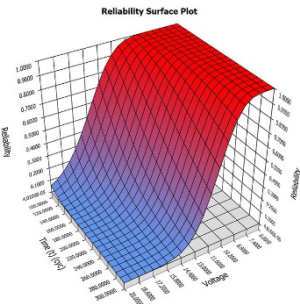
What are EV customers doing with our software?



What are EV customers doing with our software?



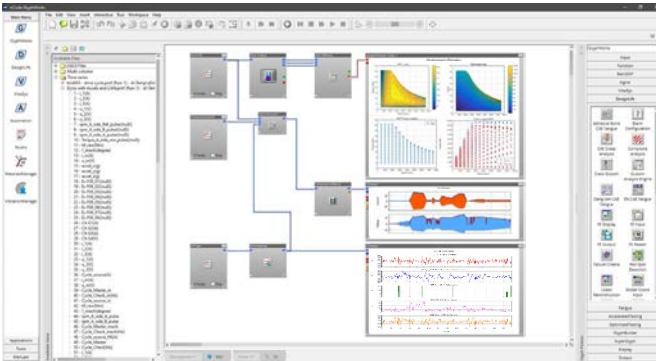
Initial Occurrence	1 - No Effect	2 - Annoyance	3 - Annoyance	4 - Annoyance	5 - Degradation of Secondary Function	6 - Loss of Secondary Function	7 - Degradation of Primary Function	8 - Loss of Primary Function	9 - Safety and/or Regulatory Compliance	10 - Safety and/or Regulatory Compliance
10 - Very High										
9 - High										
8 - High										
7 - High										
6 - Moderate										
5 - Moderate										
4 - Moderate										
3 - Low										
2 - Low										
1 - Very Low										





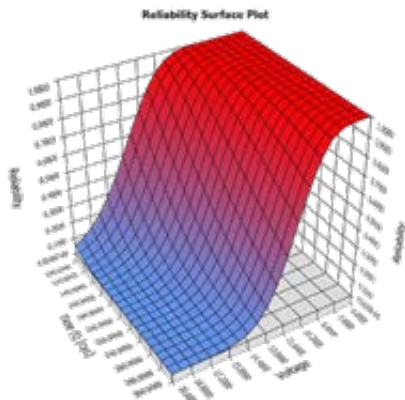
November 12 – 10 AM ET / 4 PM CET

Designing and Testing Endurance of Structural Components for Electric Vehicles



November 18 – 10 AM ET / 4 PM CET

Electrical and Signal Post-Processing Techniques for AC Power Analysis in Electric Vehicles



December 2 – 10 AM ET / 4 PM CET

Applying Statistical and Reliability Techniques for Determining Battery Life in Electric Vehicles

Thank You

<https://www.hbmprenscia.com/products/vehicle-electrification>

<https://www.hbmprenscia.com/webinars>



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Q&A

▲ (no questions)



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