

Electric Drive Unit Housing Durability Simulation

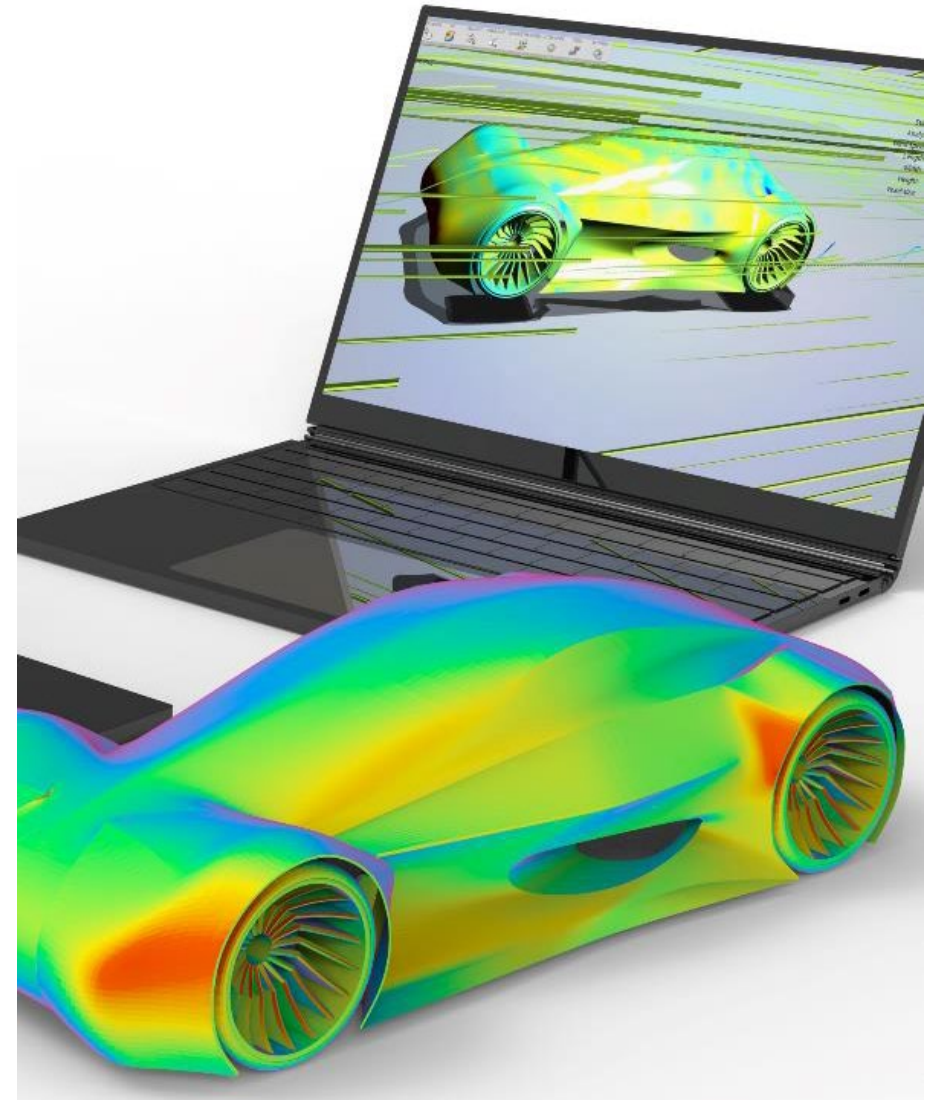
BACKGROUND AND CHALLENGE

The electric drive unit, which houses the e-motor, drive train, cooling system, park lock, and other sub-systems, is subjected to different kinds of loads during operation. So, its design needs to meet the required functional criteria in terms of durability.

- Test bench / physical test validation for each design concept increases cost and development time. Virtual validation is preferred in such scenarios
- Virtual validation helps to evaluate and optimize the design concepts at an early stage and at a lower development time and cost

SCOPE OF WORK

- Develop methodologies to validate the electric drive unit housing for durability through virtual simulation.
- Validate the housing for various load cases, such as clamping, torque loads, bearing loads, and e-motor, among others
- Ensure the drive unit meets the functional criteria for all the load cases



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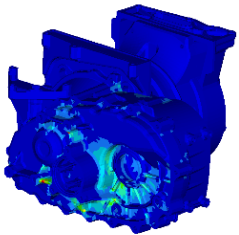
SOLUTION

TATA ELXSI developed a comprehensive design simulation solution for the EDU. The solution included –

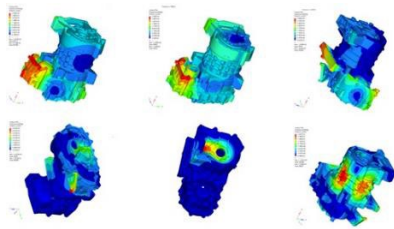
- Establishing methodologies to virtually validate the EDU housing
- Studying the stress hot spots, displacement, stiffness, and other functional parameters of the drive unit housing under the influence of various loads
- Identifying the regions with high stress/displacement
- Offering improvement recommendations of the design parameters that did not meet the target

TOOLS USED

- Hypermesh, Abaqus, Ansys



EDU Assembly



Contour Plots – Mode Shapes

IMPACT

- Identified solutions to optimize the EDU's housing design and meet the functional requirements in terms of the durability acceptance criteria
- Enhanced the stiffness by 15% based on the simulation results
- Reduced development time and cost

