

FEMFAT Technical Seminar India - 2021



Title: EV Powertrain Cradle development using FEMFAT

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Company:

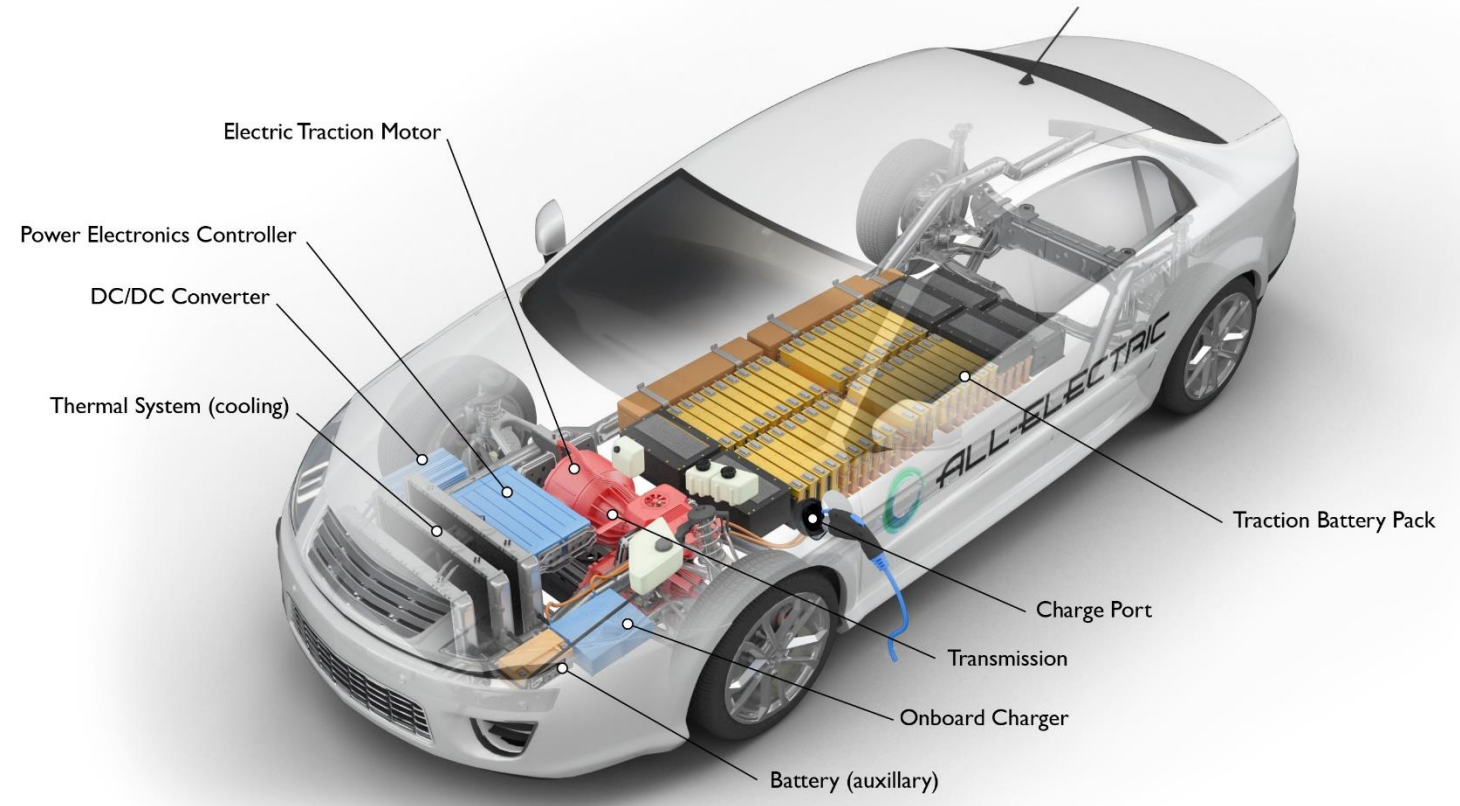
TATA MOTORS LTD.

Outline

- Introduction
- Need for Cradle development
- CAE Model Setup and Process Flow
- CAE co-relation with test results
- Summary
- Acknowledgements

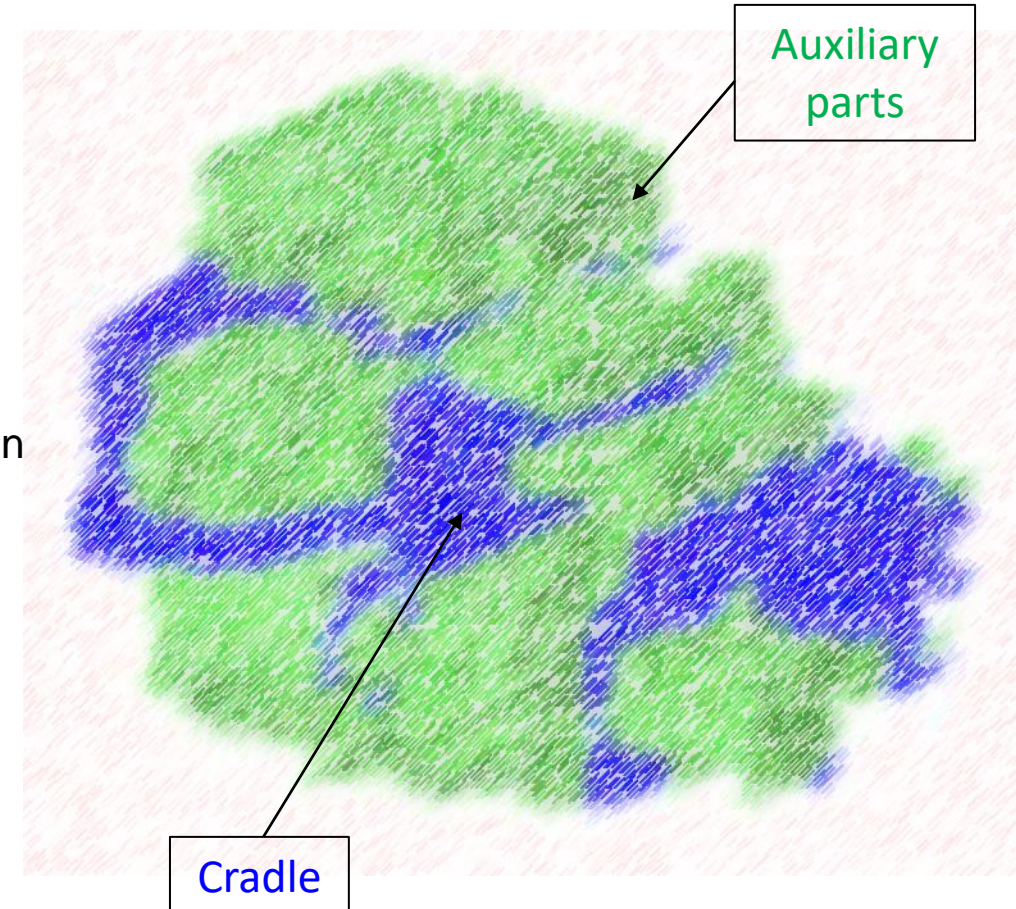
Introduction

- Powertrain of an electric vehicle
- Conversion of a fuel car into electric car
- Power train packaging space

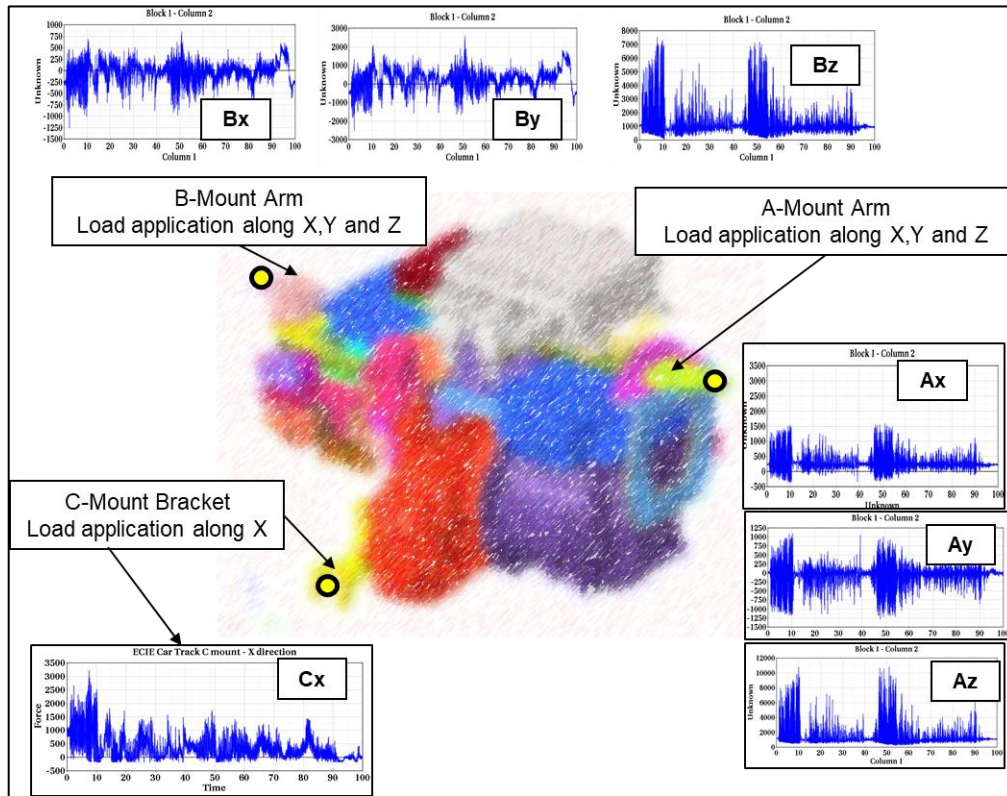


Need for Cradle development

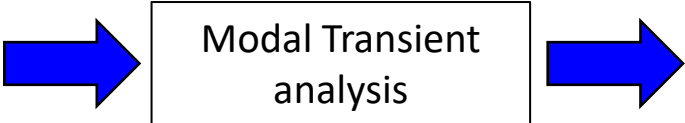
- Packaging space constraints
- Accommodating auxiliary components – a part of the EV powertrain
- A cradle design sustaining dynamic behavior of the system



CAE Model Setup and Process Flow



Power train mount forces from 4-poster



FEMFAT 5.3a - femfat*

File View Analysis Options Templates Help

Current Working Directory: C:/Users/kkd520330

ChannelMAX

- FE Entities
- Groups
- Channels
- Material Data
- Node Characteristics
- Influence Factors
- Strain Gage Data
- Analysis Parameters
- Scratch Setting
- Output
- Report
- Analyze
- Visualization

Memory Settings in femfat.ini File:

Maximum number of nodes:	300000
Maximum number of elements:	300000
Highest allowable node label:	1000000
Highest allowable element label:	1000000
Average number of nodes per element:	10
Maximum number of channels (MAX):	300
Maximum number of samples per channel (MAX):	300000
Maximum number of samples over all channels (MAX):	3000000
Maximum number of cutting planes:	1000
Maximum number of strain gages (STRAIN):	1000
Maximum number of FE groups:	300
Maximum number of coordinate systems:	500
Maximum number of physical properties:	2000

BASIC

ChannelMAX

TransMAX

HEAT Sehitoglu

SPECTRAL

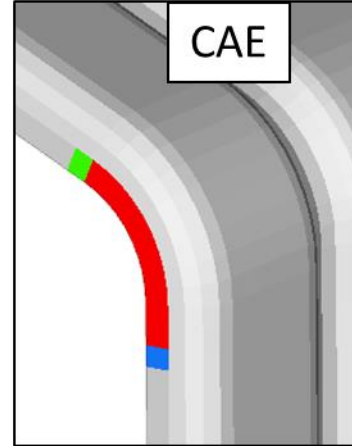
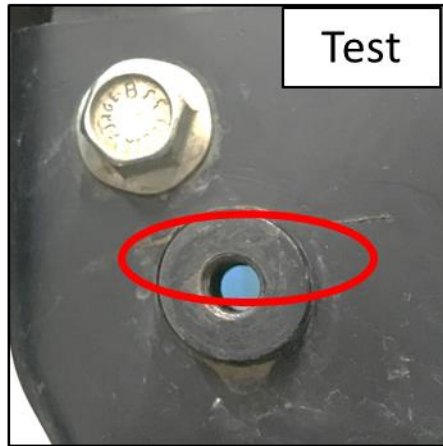
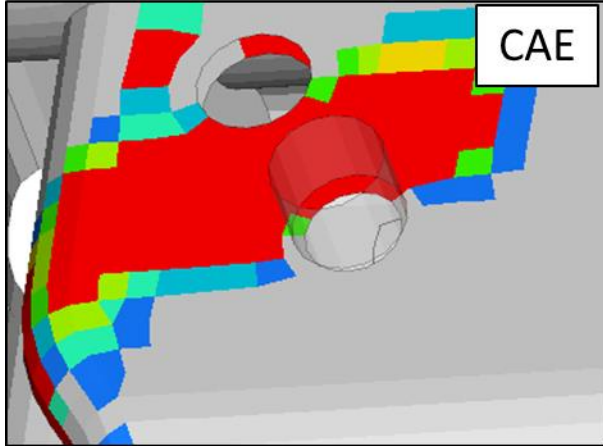
SPOT Remeshing

STRAIN Calc

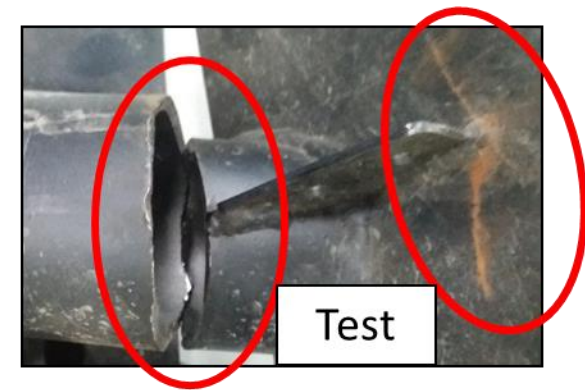
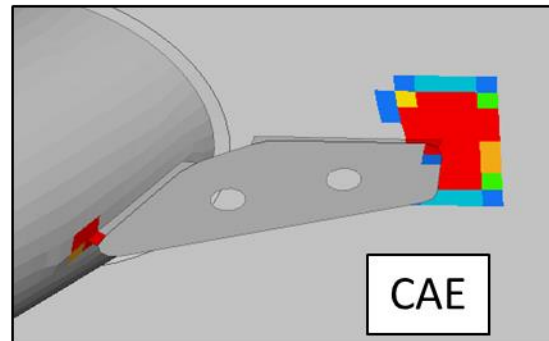
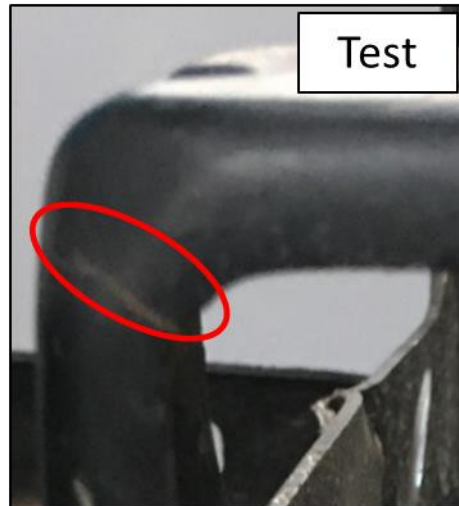
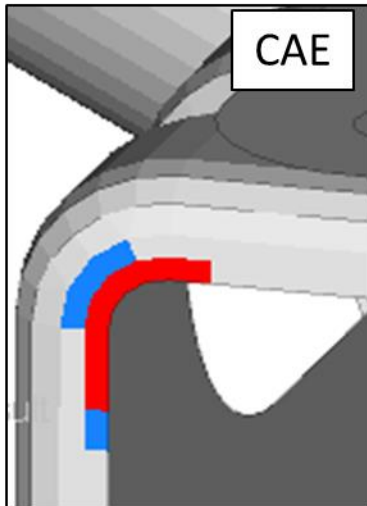
Results Manager

FEMFAT channel max module

CAE co-relation with test results



CAE results co-relation with internal test results



Summary

- Early prediction of the design weaknesses.
- Quick iterations possible to bring maturity in the development of the design
- Benefits on vehicle program timelines
- Good test CAE co-relation.

Acknowledgments

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- Mr. Amol Apte – General Manager, Digital Solutions [CAE], Tata Motors
- FEMFAT team

Thank You!