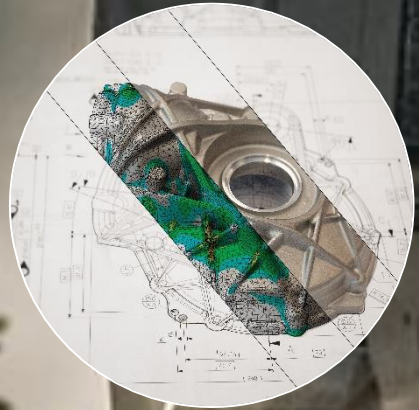# Simulation Services & Software

MAGNA

Simulation & Software from One Source
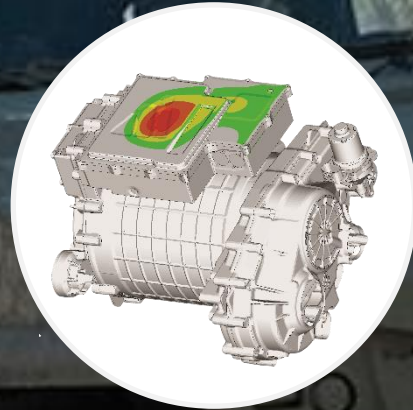### by Magna Powertrain Engineering Center Steyr

CFD Simulation

- Virtual Product Development
- Full Vehicle System Simulation
- Full Vehicle Design Improvement

Strength & Durability

- Component Optimization and Weight Reduction
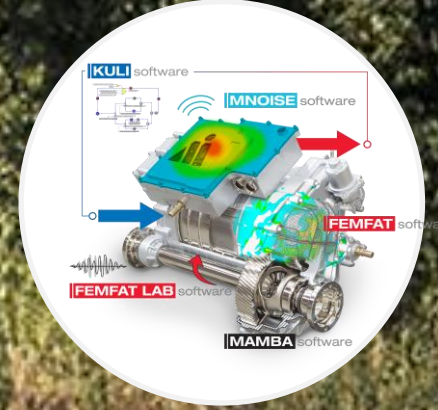- Joint Assessment
- Crash Simulation for Truck Cabs

NVH and Vibration Fatigue

- New Mobility
- Electronics
- Structural Analysis
- Combustion Engine and Gearbox
- Truck Cabin and Car Body

Vehicle Dynamics

- Ride and Handling Analysis
- Road and Powertrain Vibration Analysis
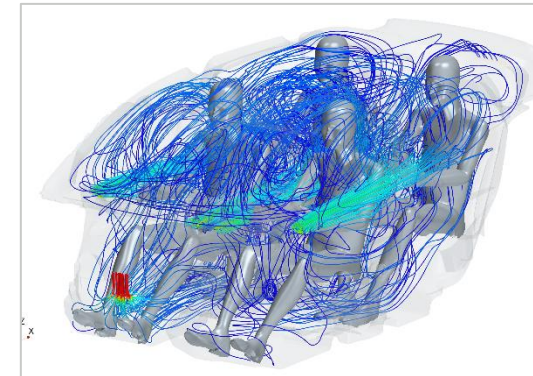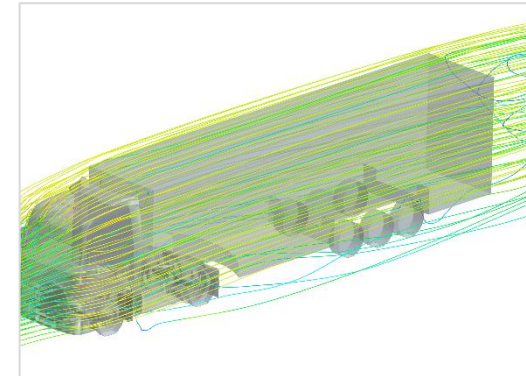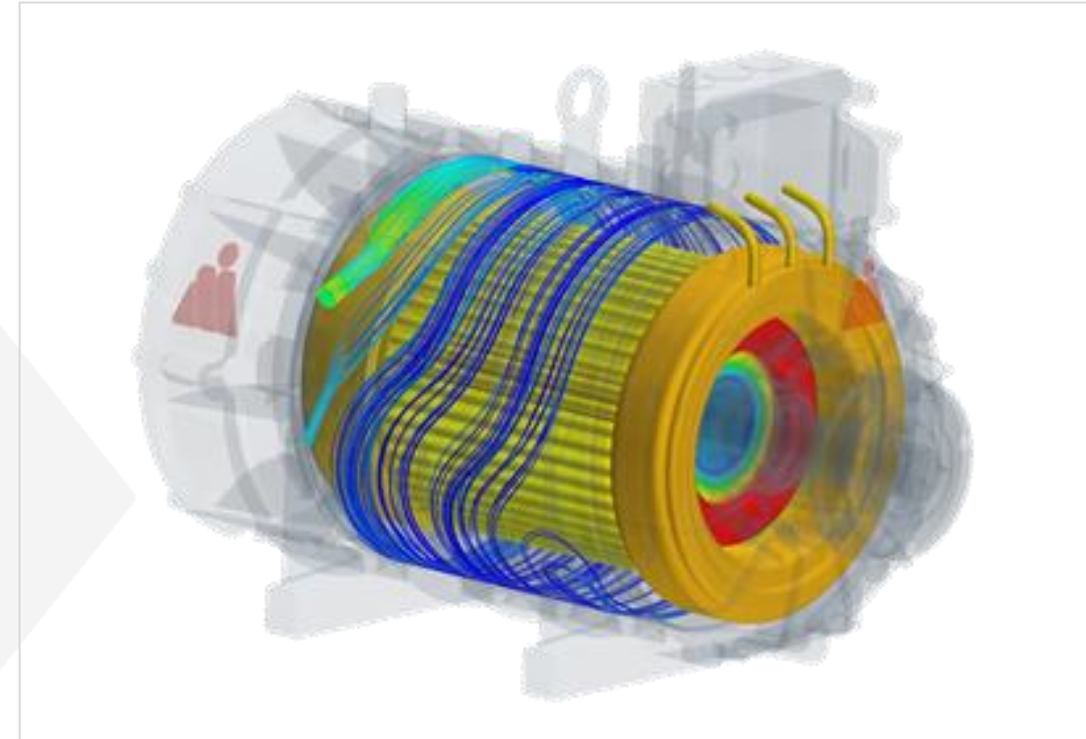- Load Data Generation for Vehicle Components

Software Products

- FEMFAT
- FEMFAT LAB
- MAMBA
- MNOISE
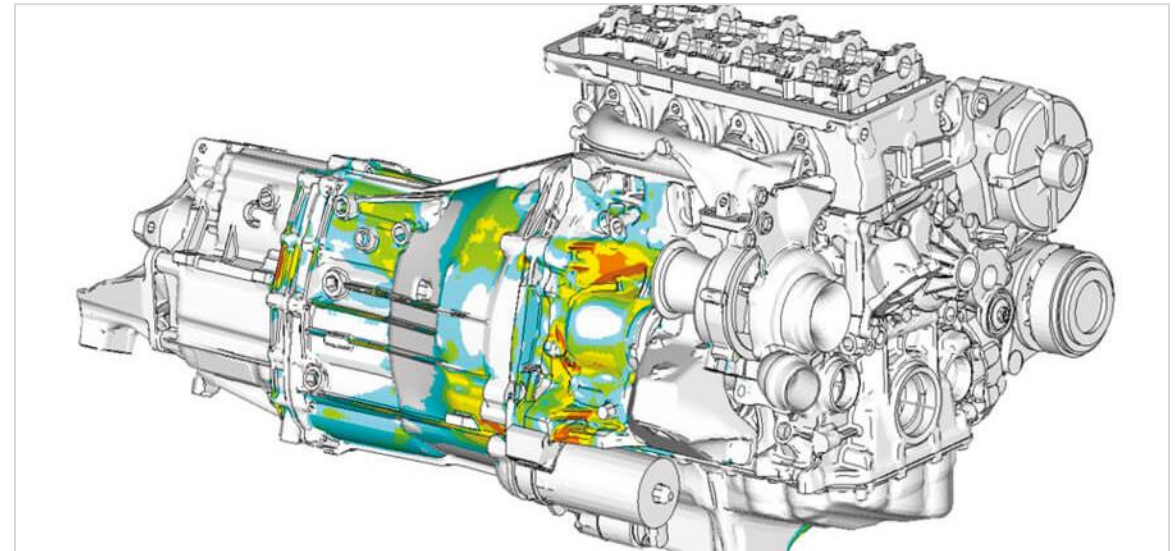- KULI

CFD Simulation

- **Virtual Product Development using CFD Simulation**
  - Oil flow distributions for lubrication and cooling investigations
  - Temperature hot spot investigations of sensible components
  - Design optimization with respect to pressure drop and temperature

- **Full Vehicle System Simulation** KULI software
  - Powertrain cooling
  - HVAC strategy optimization for Evs
  - Energy management optimization and temperature

- **CFD Simulation for Full Vehicle Design Improvement**
  - Drag coefficient and fuel consumption reduction
  - Cabin comfort evaluations
  - Soiling
  - De-Icing of front and side screen
  - Soiling of cabin
  - Cooling package integration
  - Heat protection of underhood components

Strength & Durability

- Large range of simulations from standard to high end Finite Element Analyses (FEA) & fatigue assessment
- Passenger cars, LCV to HD trucks, busses, construction- & special vehicles, railway structures

- Specimen or component hardware tests and corresponding material database set up

- Powertrain, body, frame & chassis simulations

- Loadings from standards, road load data, MBS simulations or CFD

- New materials assessment like elastomer, short-fiber reinforced plastics, laminates
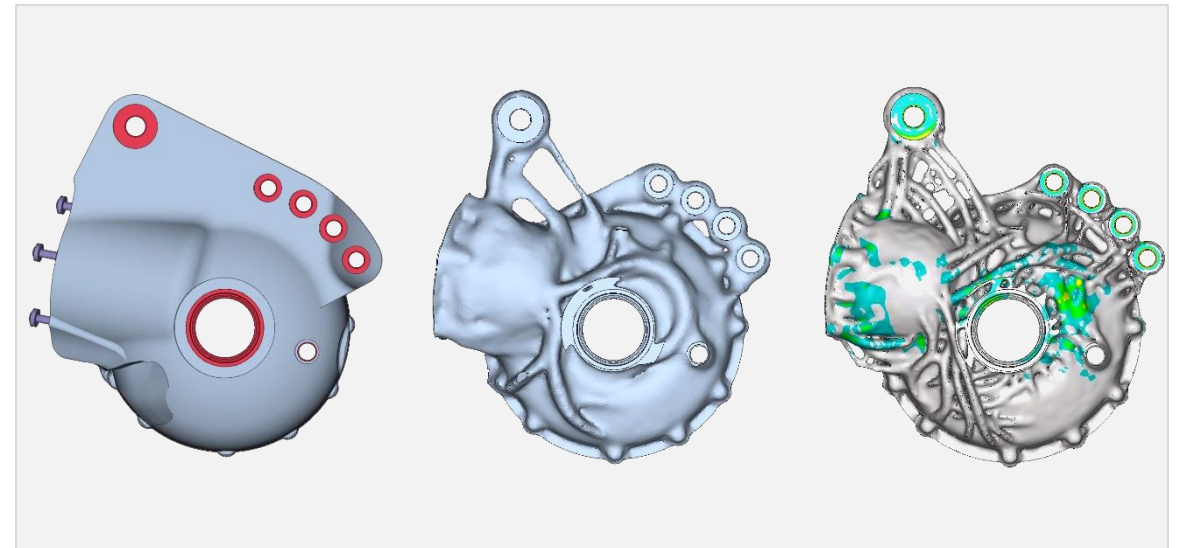
Strength & Durability

- **Examples of Typical Analyses**
  - Thermal & mechanical analysis incl. heat transfer and radiation of ICE and transmissions
  - E-drive simulations: rotor, water jacket, inverter
  - Fatigue assessment (LCF, TMF, HCF)
  - Frame, add-on parts, steering and suspension systems
  - Body stiffness, strength and fatigue assessments

- **Component Optimization and Weight Reduction**
  - Shape, topology and material optimization

- **Joint Assessment**
  - Spot Welds, self-piercing rivets, seam welds, laser welds, capacitor discharge weldings

- **Crash Simulation for Truck Cabs**
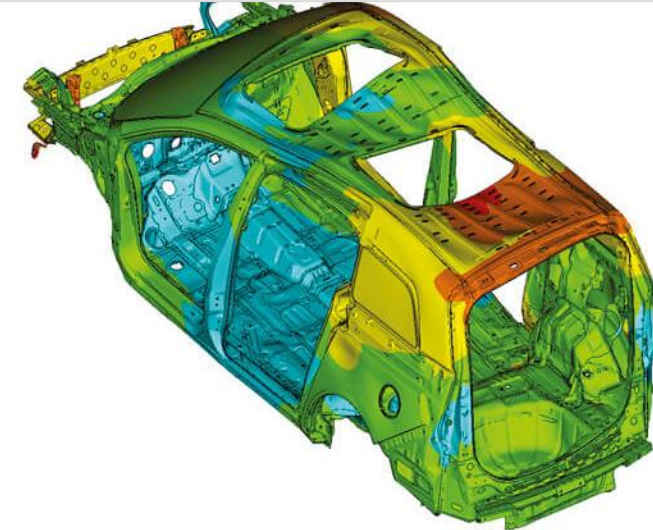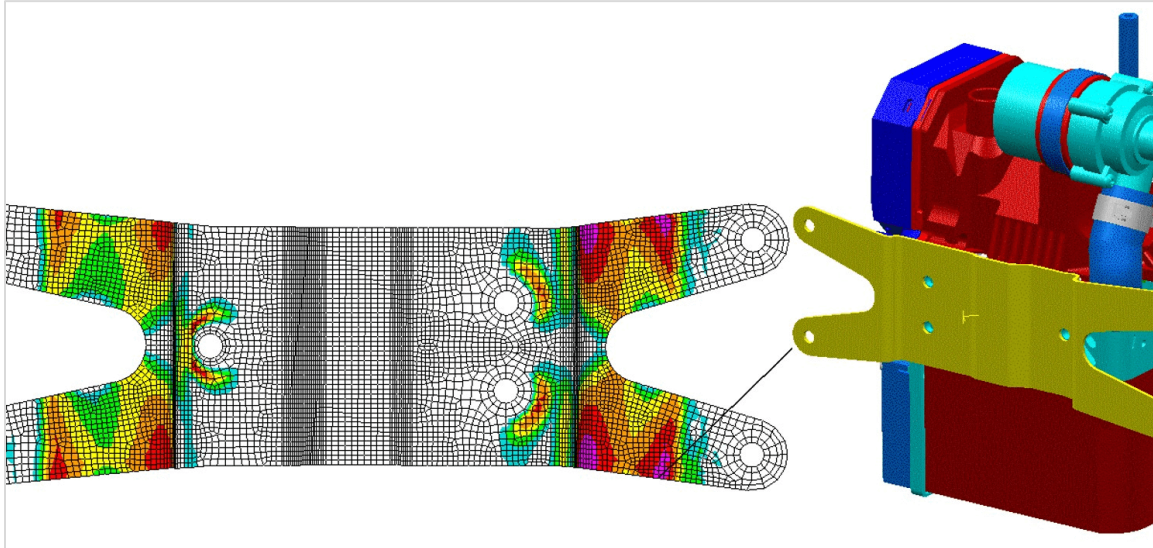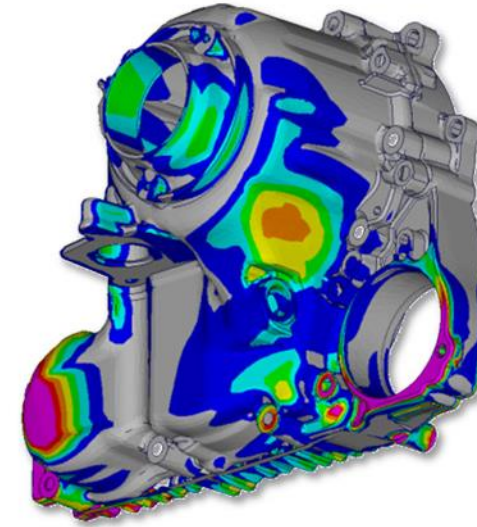 - Certified for ECE R29 Simulation• Simulation of ECE R14 & ECE R1

FEMFAT software

NVH and Vibration Fatigue

- **New Mobility**
  - Acoustic analysis of hybrid- and electric-drives with MNOISE
  - Inverter acoustic and vibration fatigue of PCB solder joints
- **Combustion Engine and Gearbox**
  - Crank train dynamics for fatigue and acoustics
  - Structure and air borne noise of engine-transmission unit and gearbox
  - Vibration fatigue of powertrain components
  - Vehicle integration analysis
- **Truck Cabin and Car Body**
  - Dynamic evaluation of trimmed body
  - Noise and vibration transfer functions
  - Interior noise and vibration from powertrain or road excitations

MNOISE software

Vehicle Dynamics

- **Ride and Handling Analysis**
  - Suspension and steering kinematics
  - Parameter tuning for ride and handling improvement
  - Sophisticated leaf spring model including friction characteristics with MAMBA

- **Road and Powertrain Vibration Analysis**
  - Road and tire interaction
  - Suspension bushing tuning
  - Powertrain run-up and idle simulation
  - Noise and vibration comfort for passenger

- **Load Data Generation for Vehicle Components**
  - Fatigue test rig layout evaluation and improvement
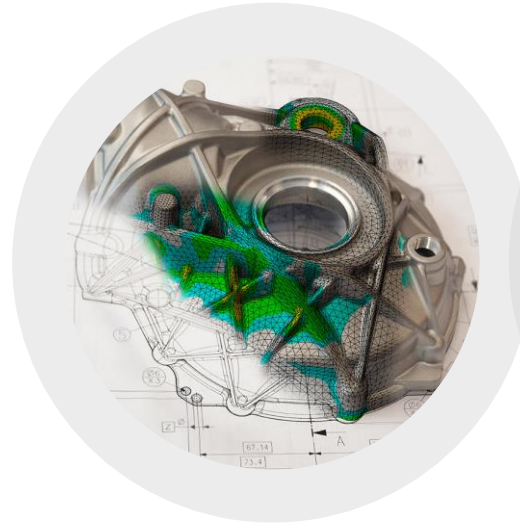 - Virtual iteration of measured road loads using FEMFAT LAB vi
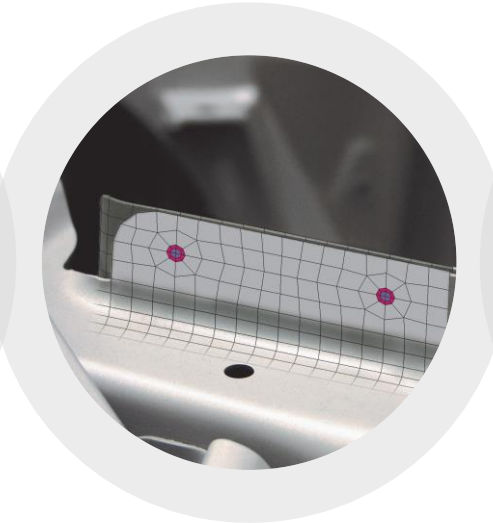
Software Products

FEMFAT

Finite Element Method Fatigue
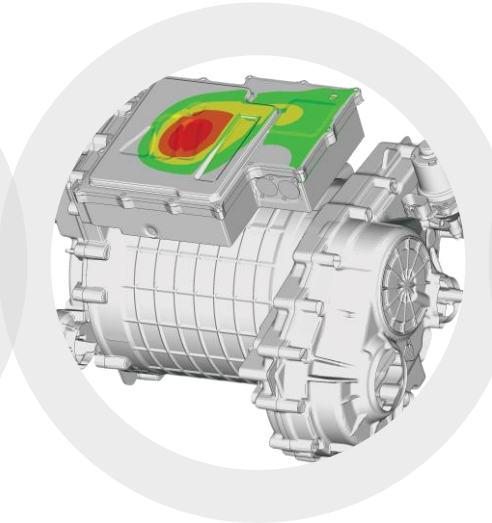
FEMFAT LAB
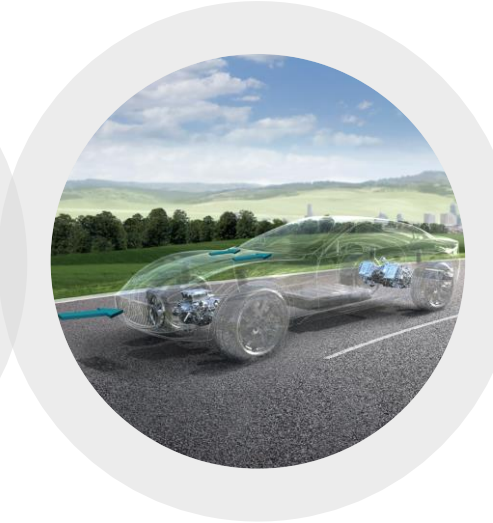
Load Data Analysis

MAMBA

Modal Based Analysis

MNOISE

Modal Noise Analysis

KULI

Energy Management Optimization