

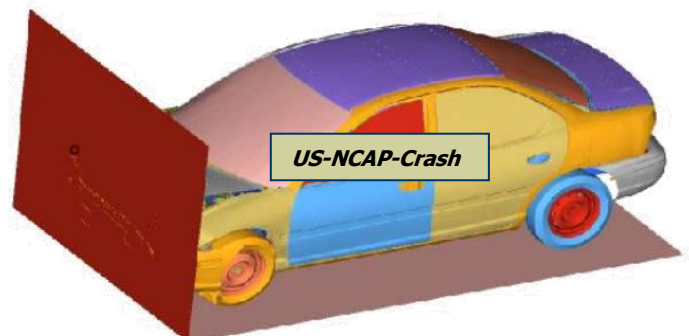
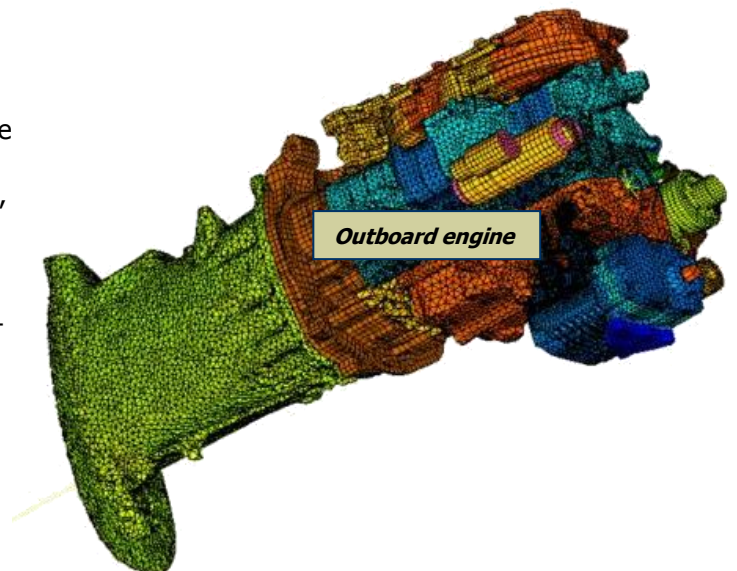
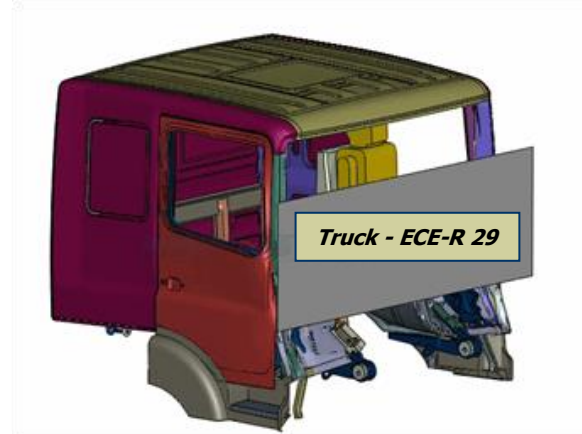
CAE-Servicesolutions

CAE services for efficient product development

The engineering services company MORPHOTEC was founded in the year 1995 as a spin-off of the institute for mathematical modeling in material science at the technical university of Aachen.

The most experienced and highly efficient team of engineers of MORPHOTEC yet successfully carried out over 3800 CAE-Projects (2019) for customers from the automotive industry, the aircraft industry, the mechanical engineering industry and other industries. Some representative projects conducted by MORPHOTEC's engineering team are listed below.

- Finite element thermal and stress analyses of various power train components (e.g. crankcase, cylinder head, connecting rod, piston, crankshaft, valve bridge, intake manifold)
- Development of rubber, plastic and composite parts using finite element stress and deformation analysis (e.g. flexible clutch disk, door seals, ventilator cowl, loudspeaker housings, plastic seats, fuselages) under consideration of different material models and failure criteria (e.g. Neo-Hooke, Mooney-Rivlin, Ogden, Tsai-Wu)
- CFD analysis of combustion engine's components, CFD of vehicles
- Crash analysis of vehicles based on different impact testing procedures
- Topology and structural optimization of different components such as bearing blocks, blow mouldings, flanges, crankcases, bearing caps, door seals, brackets, oilpans
- Fatigue analyses of dynamically loaded components resulting in life time prediction or safety factors against endurance limits
- Forced vibration analyses of e.g. vehicles, combustion engines, aircraft wings, crankshafts and oilpans which are mainly based on modal analyses to reduce computing times



All analyses are conducted by using standard software tools such as MARC, NASTRAN, FLUENT, ANSYS, LS-Dyna and others. The software packages Ansa, Hypermesh, Patran and others are applied for pre and post processing.

Scope of services

Static and dynamic simulations with

- metallic and nonmetallic materials (e.g. plastics, composites and rubber)
- steady-state loads
- transient loads
- natural and forced vibration
- three-dimensional surface to surface contact

Heat transfer simulations with

- steady-state or transient boundary conditions
- temperature-dependent material properties
- uncoupled thermal-mechanical analysis
- coupled thermal-mechanical analysis
- convection and radiation

Computational fluid dynamics with

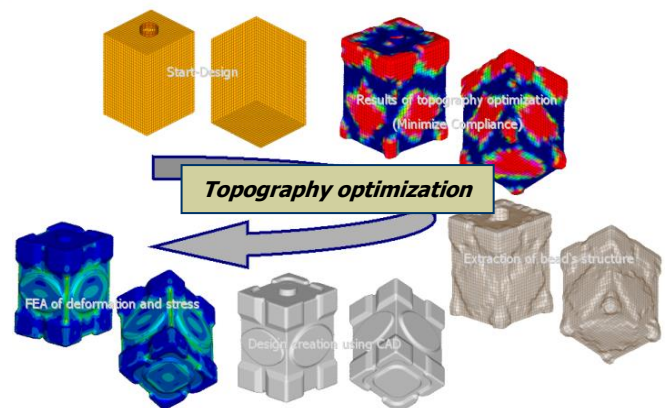
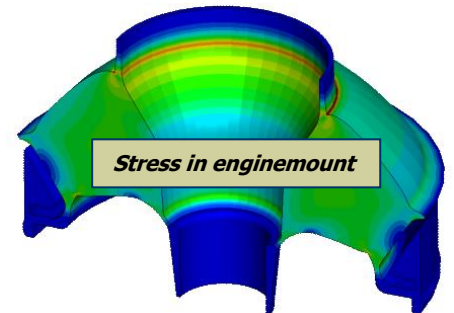
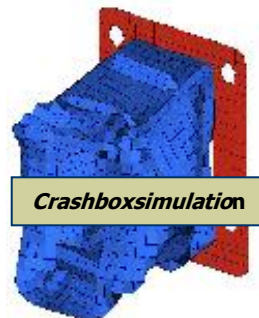
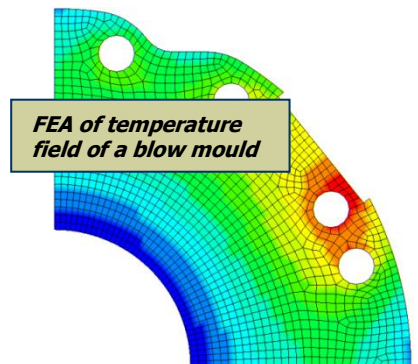
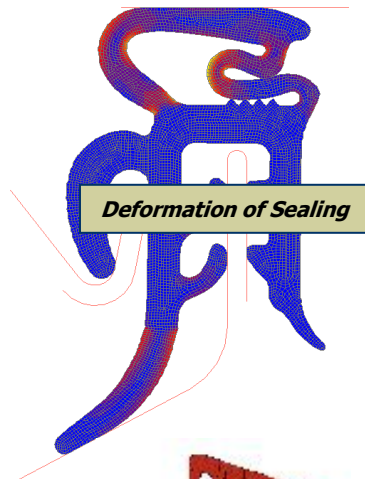
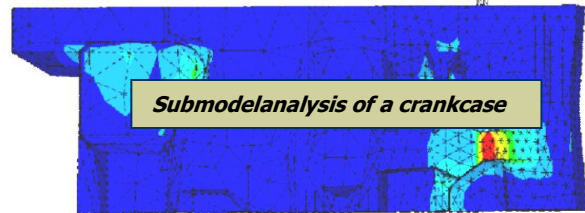
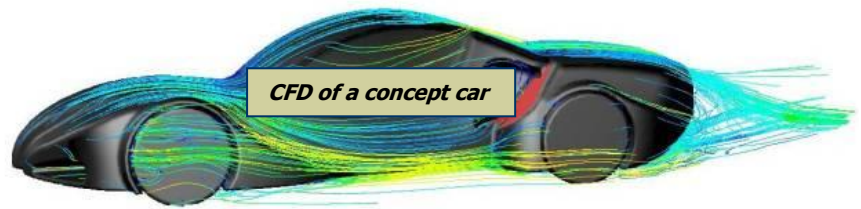
- steady and transient state
- laminar and turbulent flow
- incompressible and compressible fluid behavior

Structural and shape optimisation as well as topology optimisation with

- different materials like plastics, rubber, metal and non-metal
- reinforced materials
- restrictions and constraints
- multidisciplinary design goals

Multibody simulation

Management of CAD/CAE-Projects





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