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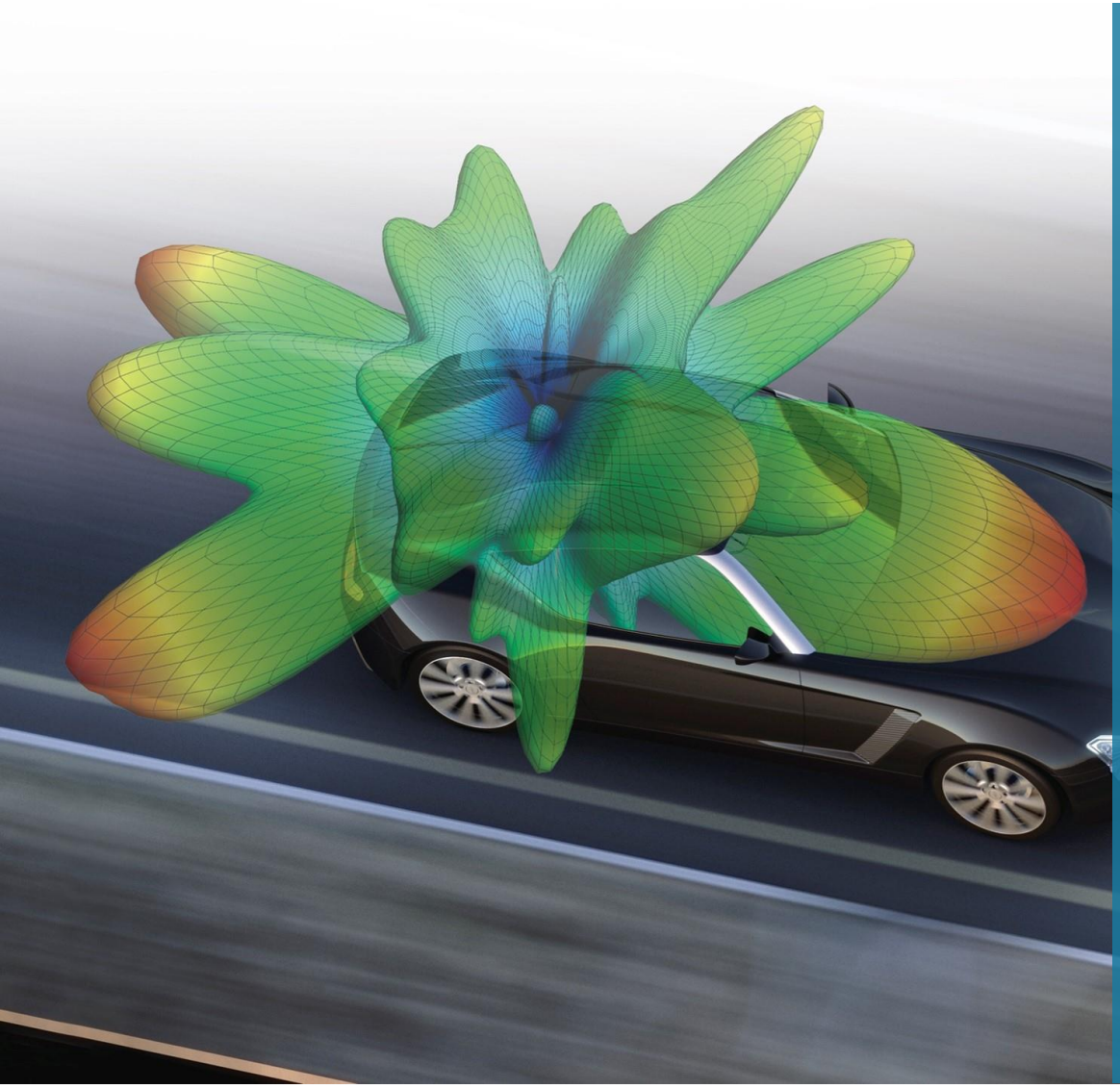
HyperWorks®

# FEKO Quick Overview

3 February 2016

# Introducing FEKO



## Electromagnetic simulation

Altair FEKO is a leading comprehensive electromagnetic (EM) analysis software, widely used in many industries and built on state of the art computational EM (CEM) techniques, to provide users with software that can solve a broad range of electromagnetic problems.

# Main FEKO Industry Sectors

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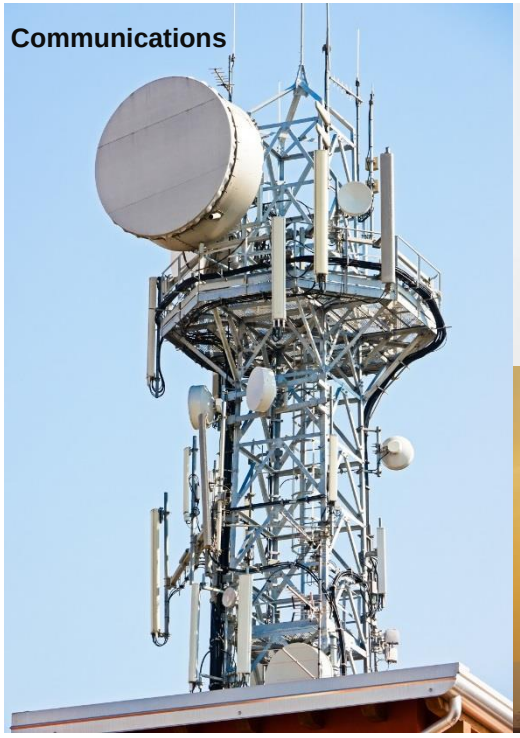


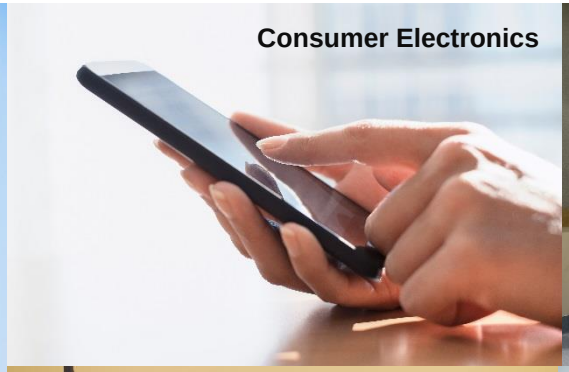




# FEKO Key Applications

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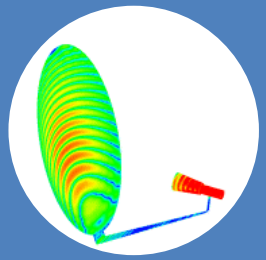
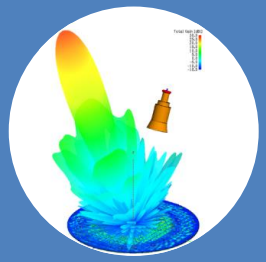
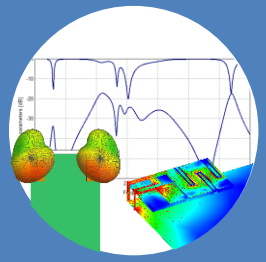
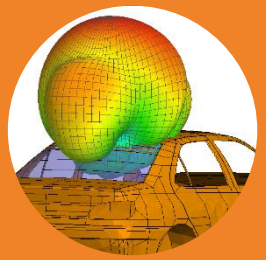
## Antenna Design

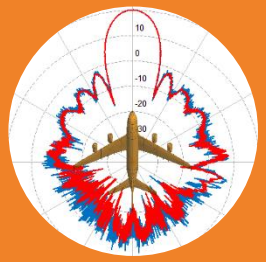


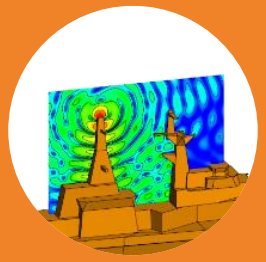




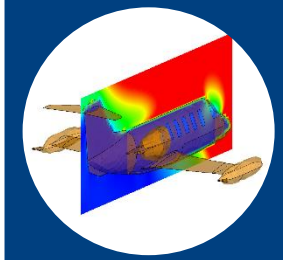
## Antenna Placement

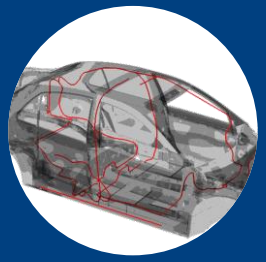


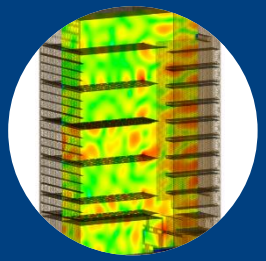




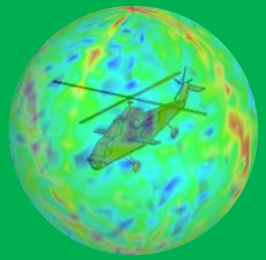
## Electromagnetic Compatibility (EMC)

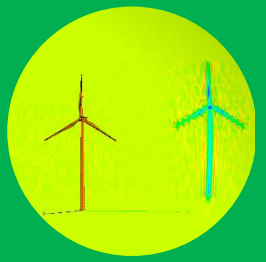


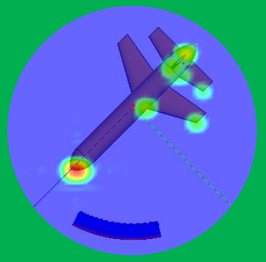




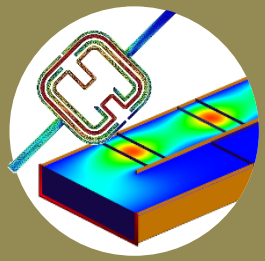
## Scattering / RCS

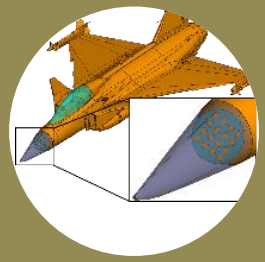


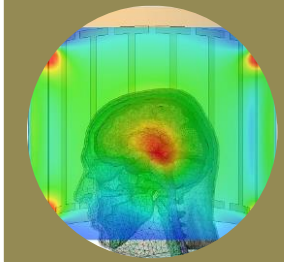




## Others







Multiphysics Analysis and Optimization

# Selection of Commercial Customers

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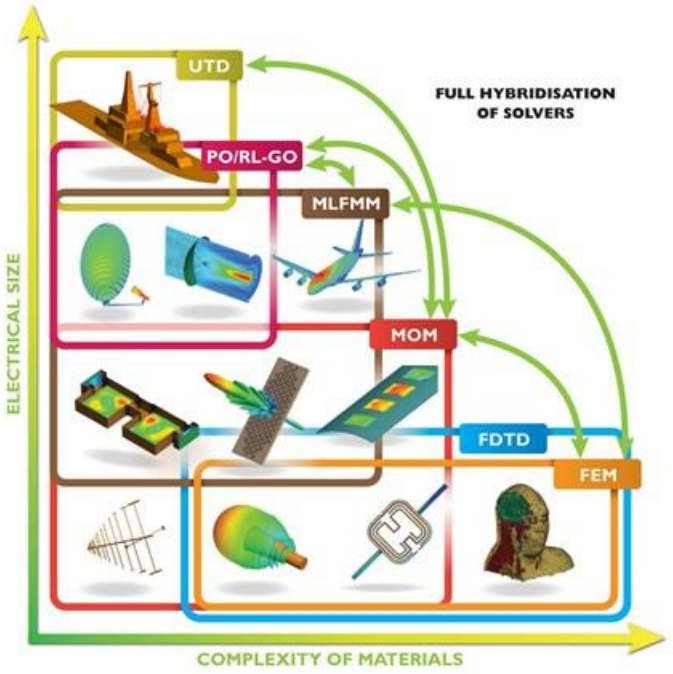
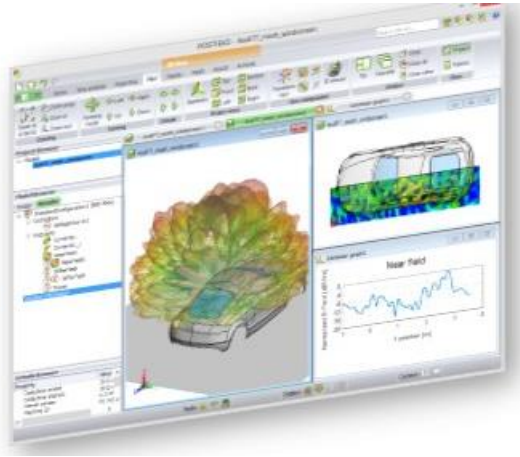
# FEKO Key Features and Benefits

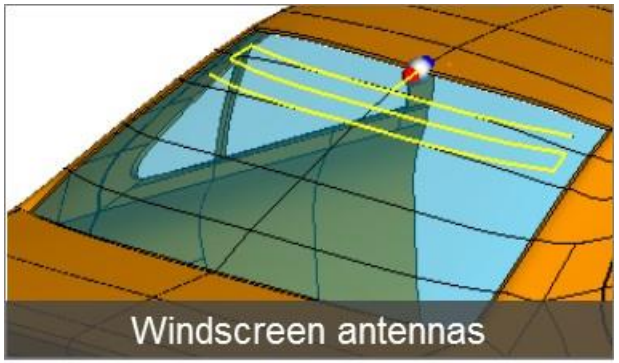
- **Key Features and Benefits**
  - Comprehensive suite of accurate, powerful and reliable solvers with true hybridization, all of them included in the same package for the same price
  - Easy to use with integrated GUI, with all CAD geometry and mesh import/export modules included
  - Fully parallized solvers with multi-core CPU and GPU support, also supporting HPC
  - Model decomposition to faster and efficiently solve big problems
  - Specialized tools, including windscreen antennas, cable analysis and composites
  - Excellent local technical support

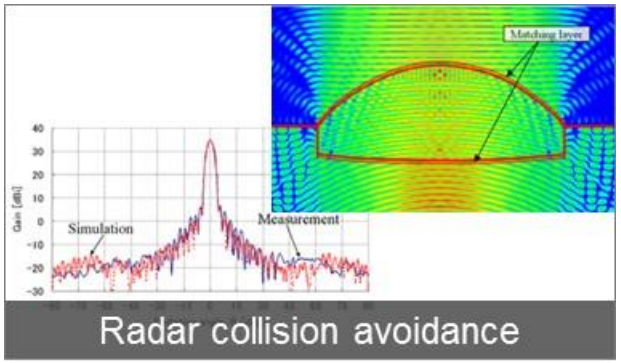


# FEKO for Automotive - Applications

- **Antenna analysis and design, and EMC problems related to:**
  - Radio and TV broadcasting
  - Remote keyless entry systems
  - Tire-pressure monitoring systems (TPMS)
  - Wireless and satellite communications
  - Radar collision avoidance
  - Cable coupling
  - Shielding effectiveness
  - Measurement chamber modelling
  - Others

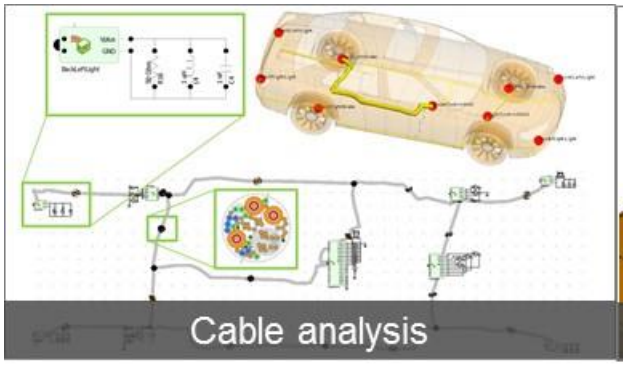

Windscreen antennas

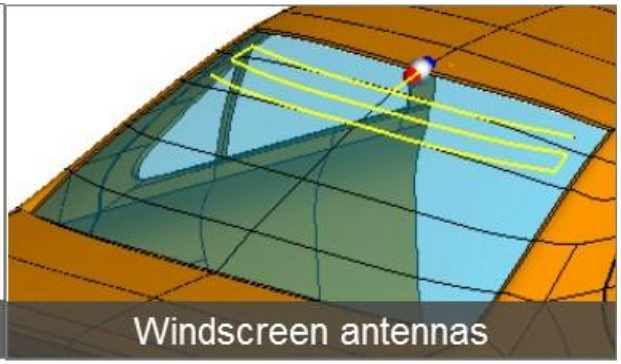


Radar collision avoidance

# FEKO for Automotive – Key Capabilities

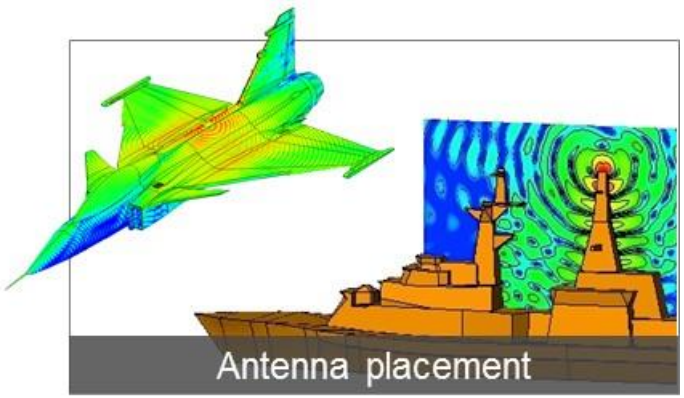
- **Key capabilities:**
  - MLFMM method enables efficient vehicle simulation in the GHz range and the hybridized asymptotic solvers at radar frequencies
  - Enhancements for antennas integrated into windscreens
  - Complex cables modelling with bi-directional cable coupling analysis
  - Model decomposition to replace complex sources and receivers (like antennas and PCBs) with equivalent sources to solve large and complex problems efficiently
  - Special formulation for calculation of electric and magnetic shielding
  - Import for cable path .kbl format
  - Advanced material modelling, including composites

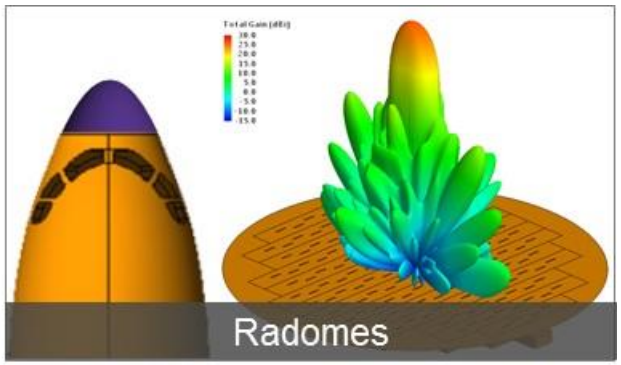


# FEKO for Defense and Aerospace - Applications

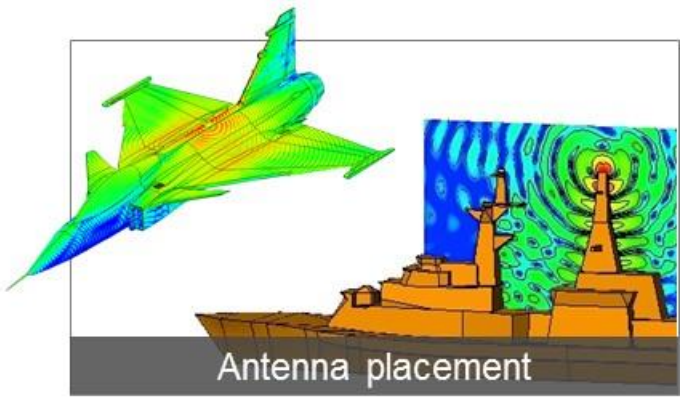
- **Key applications for FEKO in these industries are:**
  - Design of communication, navigation and radar antennas for aircraft, ships, vehicles, satellites, missiles and other platforms
  - Investigation of antennas' placement to optimize radiation performance and mitigate cosite interference
  - Analysis of electrically large platforms
  - Scattering and radar cross section (RCS) analysis
  - EMC analysis, including cable modelling, electromagnetic pulses (EMP), lightning effects, high intensity radiated fields (HIRF) and radiation hazard

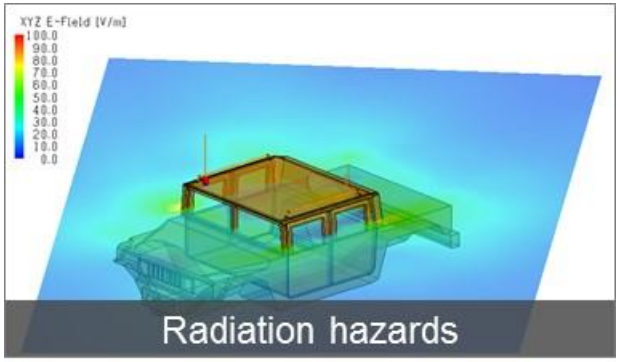


# FEKO for Defense and Aerospace – Key Capabilities

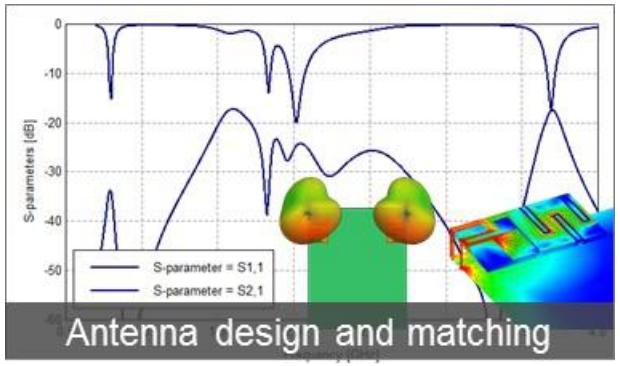
- **Key capabilities:**
  - MLFMM for the efficient simulation of electrically large platforms and asymptotic solvers for electrically very large platforms
  - Advanced material modelling including anisotropic layers
  - Model decomposition to replace complex sources and receivers by equivalent sources to efficiently solve large and complex platforms
  - NGF method for the analysis of dynamic elements and antenna placement investigations
  - Co-site interference analysis
  - Special shielding formulation
  - Advanced cable coupling modelling and simulation
  - CMA solver gives insight into the resonant behavior of the structure

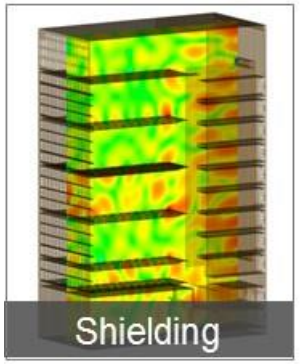


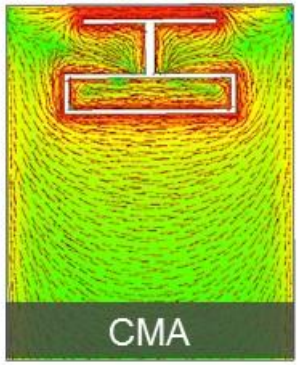



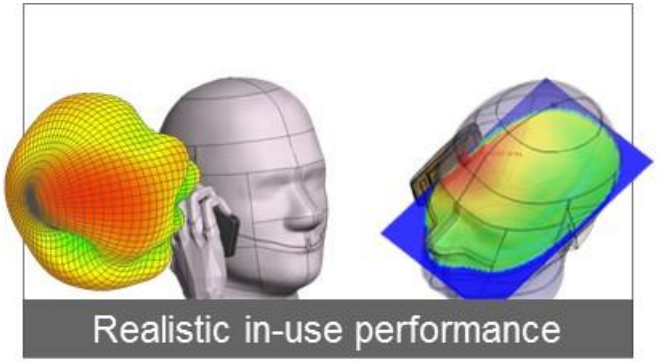
# FEKO for Electronics – Applications

- **Key applications for FEKO are:**
  - Antenna design and integration for a wide set of products including mobile phones, tablets, cameras, laptops and TVs
  - Design of diversity and MIMO antennas
  - Pre-compliance radiation performance evaluation ans specific absortion rate (SAR) analysis
  - Shielding effectiveness for electronic housings
  - Wireless power transfer



# FEKO for Electronics – Key Capabilities

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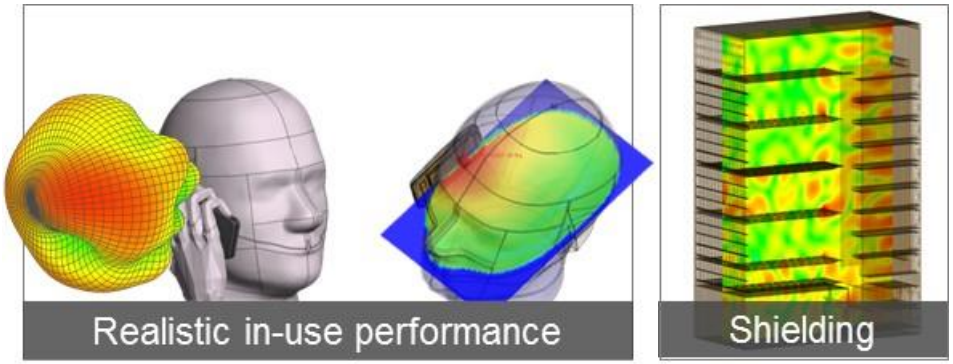
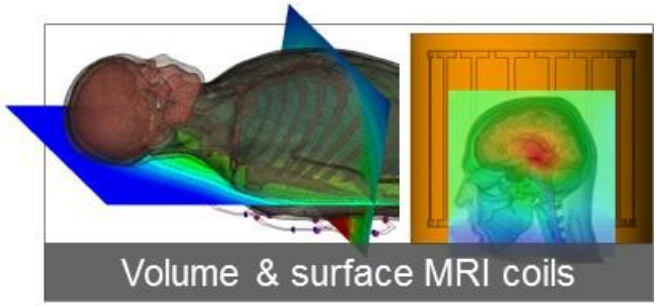
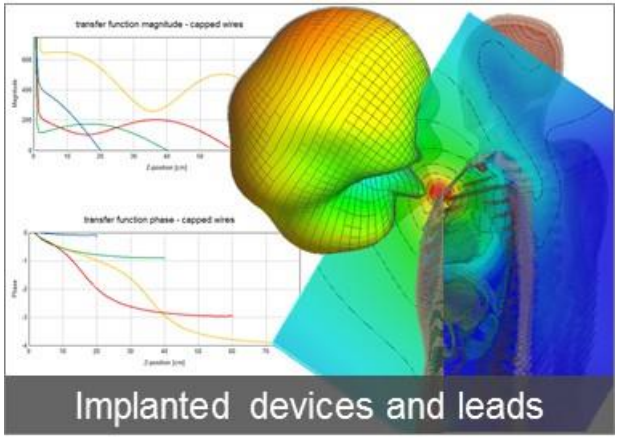
- **Key capabilities:**
  - Efficient antenna conceptual designs and virtual prototyping with the MoM
  - Advanced material modelling
  - CMA for investigation of the fundamental resonant behavior of the structure
  - FEM and FDTD methods for the integration of the antenna in the device including components, housing and a variety of anatomical models
  - Special formulation for shielding analysis
  - Adaptive frequency sampling and continuous far fields for efficient simulation of broadband antennas
  - Automated antenna matching circuit design with Optenni Lab
  - OTA radiation performance parameters and SAR compliance testing



# FEKO for Healthcare - Applications

- **Key applications are:**
  - Volume and surface coil antenna array design for Magnetic Resonance Imaging (MRI)
  - Body mounted and implant (pacemakers, neurostimulators, etc.) telemetry and compatibility with MRI systems
  - RF and safety performance including efficiency, gain, averaged specific absorption rate (SAR) and estimated link budget
  - System/device antenna performance studies for patient variation, for example, position, posture, gender, age and height

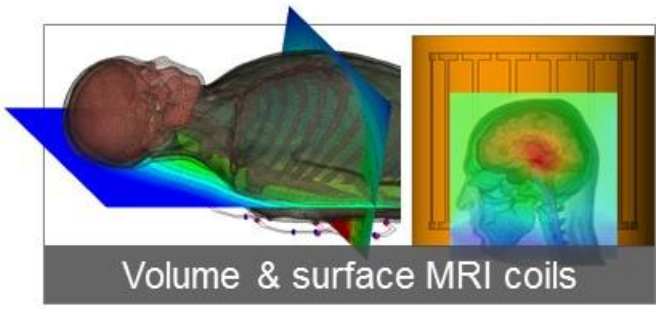

Volume & surface MRI coils



Implanted devices and leads

# FEKO for Healthcare – Key Capabilities

- **Key capabilities:**
  - Triangles are well suited for meshing curved metallic geometries
  - Efficient treatment of high Q structures with frequency domain solvers
  - Choice of two solvers for anatomical models – the accuracy of the finite element method (FEM) meshes versus the low computational requirements of the FDTD method
  - A variety of different anatomical models are available with tetrahedron and voxel meshes
  - Standard MRI performance parameters – rotational $B_1$ fields, averaged SAR
  - Lua script implementation of the Pennes bioheat equation for calculating the temperature increase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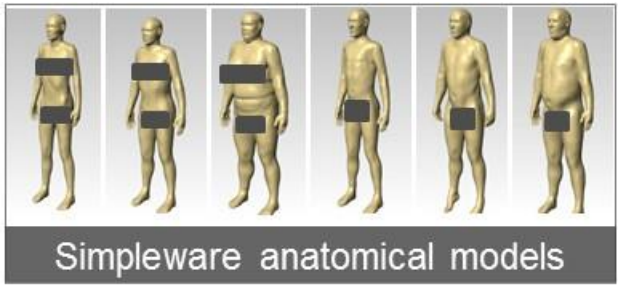
Simpleware anatomical models

# Thank you!

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**For more information visit**

**www.altairhyperworks.com/feko**