MagNet Suite

Electromagnetic Field Simulations

MagNet uses the finite element technique for an accurate and quick solution of Maxwell's equations. Each module is tailored to simulate different types of electromagnetic fields and is available separately for both 2D & 3D designs.

Transient or Time-varying electromagnetic fields

- Non-linear analysis
- Second-order time stepping
- Resume Feature: pause at a particular time step for inspection
- Core losses, proximity effects and eddy currents
- Demagnetization Prediction
- Motion
  - Supports rotational, linear and general (multiple degrees of freedom) motion
  - Velocity & load driven motion problems
  - Computes induced currents due to motion
  - Supports multiple moving components

AC or Time Harmonic electromagnetic fields

- Analysis based on a single frequency in the complex domain
- Eddy currents, displacement currents, skin effects & proximity effects

Magnetostatic fields

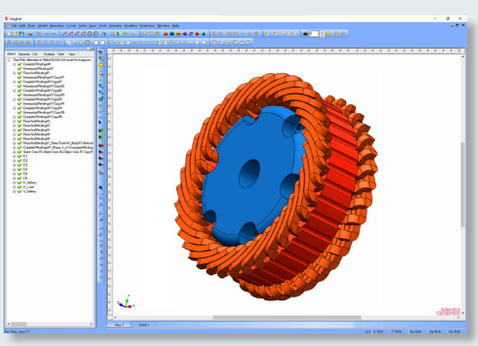
- Non-linear analysis
- Specified currents may flow through any type of conducting material, including magnetic materials

Common Applications

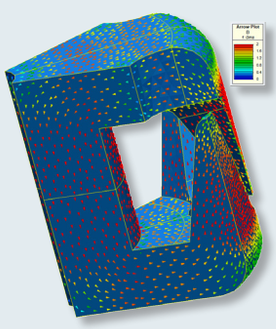
- Electric Motors/Generators
- Transformers
- Actuators
- Sensors/NDT
- Induction Heating
- Loudspeakers
- Magnetic Levitation
- MRI/medical

We also support

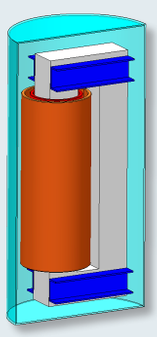
- Multithreading for true multicore support
- Symmetry for reducing solution domain
- Parametric Modeling for ranging, tolerance or "What If?" analysis
- Coupling with ThermNet 2D/3D for thermal analysis
- Optimization with OptiNet
- Circuit Coupling
- Scripting



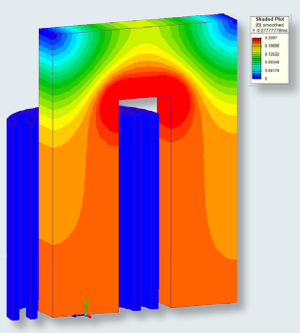
Claw-pole vehicle alternator



Flux-density of the Claw-pole alternator



Single-phase transformer



Flux-density of the single-phase transformer

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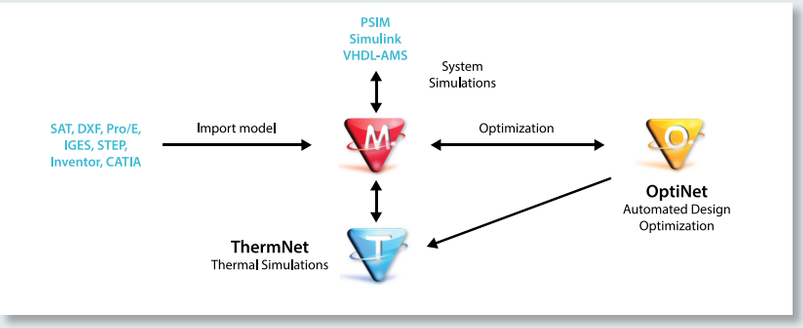
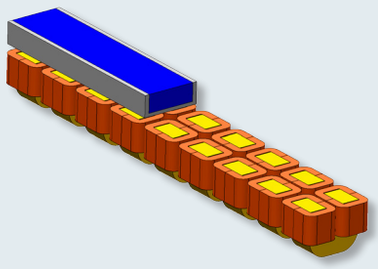
A Siemens Business

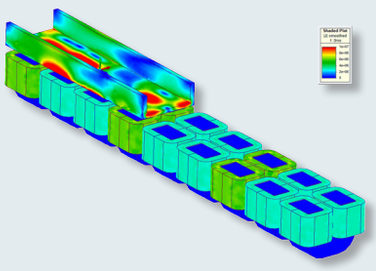
MagNet Suite

Electromagnetic Field Simulations





Magnetic levitation (maglev)



Eddy-current density of the maglev

Useful Features

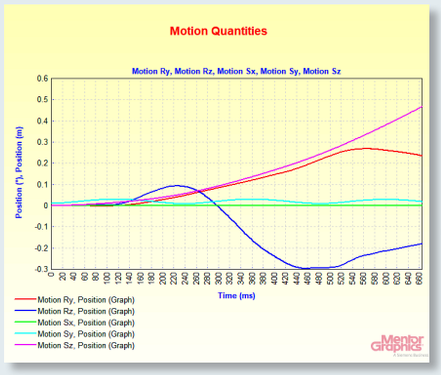
- Simulate the magnetization process for permanent magnets
- Freeze the permanent magnet magnetization for use in other simulations
- Modeling nonlinear surface impedance
- Native import from Pro/E, Solidworks & others

ElecNet 2D/3D

ElecNet uses the finite element method to solve for the electric field strength, forces, capacitances and other quantities. ElecNet can simulate static, AC and transient electric field and current flow problems.

ThermNet 2D/3D

ThermNet 2D/3D simulates the steady-state and transient temperature distribution of specified heat sources. Couple with MagNet and ElecNet for accurate magnetic-thermal analysis and electric-thermal analysis, including heating effects due to eddy current and hysteresis losses



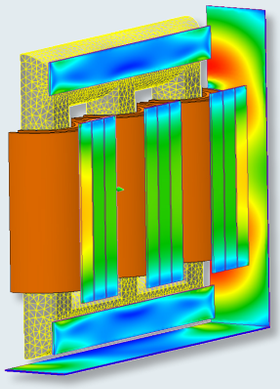
6 degree of freedom (DOF) motion of the maglev mover

OptiNet

Automated design optimization option to MagNet, ElecNet & MagNet-ThermNet coupled together. OptiNet can find optimal values for different design variables within a specified design space.

Optional Modules

- System Model Generator: create accurate response surface models (RSM) in VHDL-AMS or Simulink for multi-domain system simulations
- Trajectory Evaluator: simulating the trajectory of a particle over time
- MagNet Plug-in for Simulink© and MagNet Plug-in for PSIM : Co-simulations of the dynamic control system and the electromagnetic device



A 3-phase transformer

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