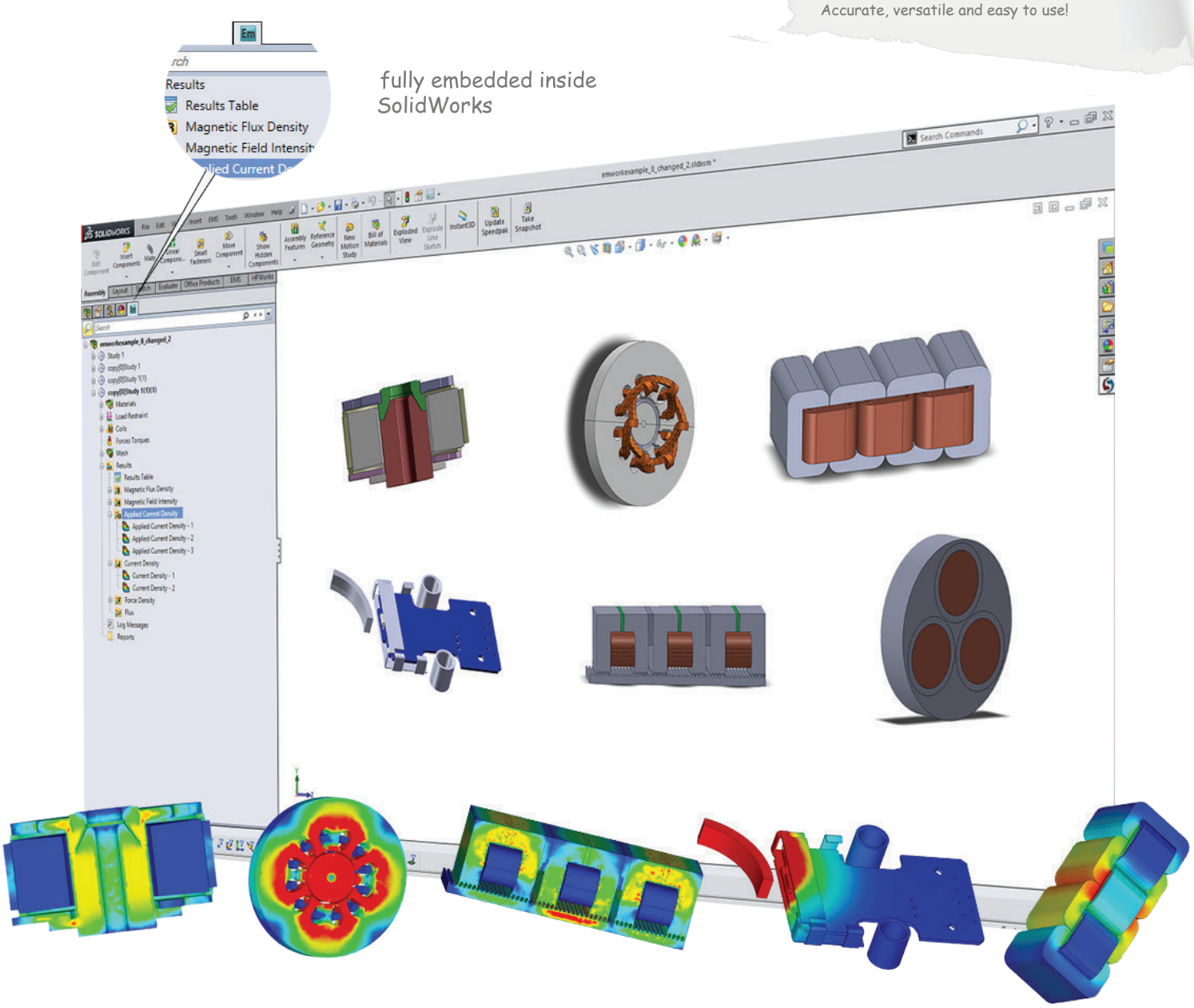
EMS

Electro-thermo-mechanical **Simulation** for SOLIDWORKS

The only electro-thermo-mechanical simulation fully embedded inside SolidWorks and SolidWorks Motion!

The ultimate workbench to test your design ideas!

Accurate, versatile and easy to use!



EMS allows you to leverage the full power of SolidWorks to bring your design experience to a whole new level

Because it is fully embedded inside SolidWorks, EMS enhances your productivity and your design experience. In this powerful multi-physics design environment, you will be able to:

- Quickly and efficiently compare alternative designs and choose the optimal one for final production.
- Analyze complex 3D designs quickly.
- Import designs in a wide range of popular CAD formats.
- Couple with Motion, Thermal and Structural for real world simulation.

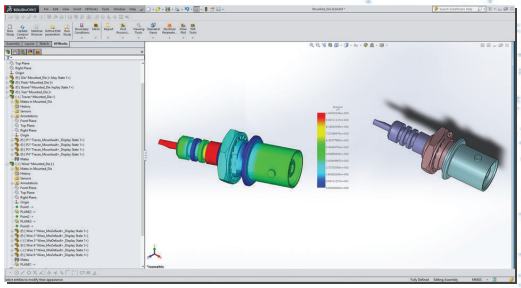
EMWORKS

ElectroMagneticWorks, Inc

The original electro-thermo-mechanical simulation package developed exclusively for **SolidWorks** users

ELECTROSTATICS

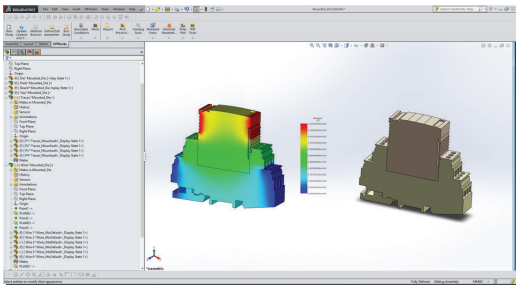
- Does your design require careful attention to dielectric breakdown or electronic discharge issues?
- Are corona effects of interest/concern to you?
- Are you worried about sparking and grounding?
- Do you work on linear or circular particle accelerators?
- Is the success of your MEMS design hinging on the proper electrostatic actuation?
- What about the proper shielding of your circuit and cross-talk among transmission lines?



Electric stresses for a high voltage panel

CONDUCTION

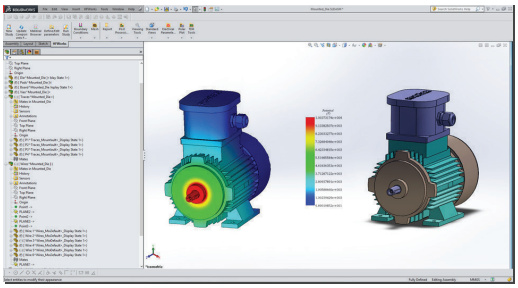
- Does your system require protection against over voltage conditions?
- Do you need to sense/measure current flow in your device?
- Do you have the right resistance value at the proper location?
- What is the impact of the conductivity on your power budget?
- Does power dissipation require you to review your thermal management plans?
- Are you working with biological tissues and need to accurately model their electric behaviour?



Voltage distribution in surge protector

MAGNETOSTATICS

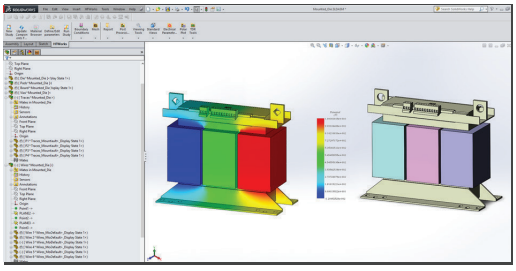
- Are you concerned about magnetic saturation?
- Do you need to minimize the cogging torque?
- Do you want to optimize torque and minimize driving current?
- Are you worried about brush wear?
- How much force and torque can you get from your magnetic design without over heating the windings?
- Is it possible for you to lower weight and cost by trimming excess material from ferromagnetic cores?



Flux density distribution in a DC motor

AC MAGNETICS

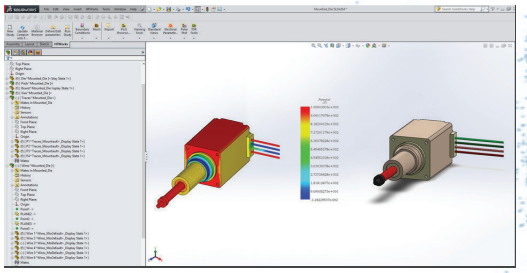
- Do you want to reduce Eddy current losses?
- Do you need to minimize skin effects in conductors?
- Do you want to eliminate ripples, vibration and noise from your motor?
- Do you want to minimize flux leakage in your transformer?
- Do you want to optimize your coil design to build better metal detectors and non-destructive testing equipment?



Eddy currents for a three phase transformer

TRANSIENT

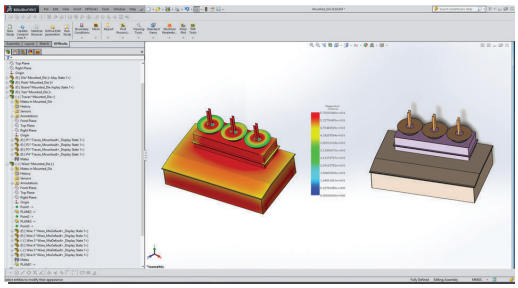
- How does your design respond to a power failure or a switch-off?
- Does it withstand a pulsed power surge?
- How do your non linear materials behave under transient conditions?
- What is the impact of coupled Eddy currents and saturation on your design?
- Are you working with magnetic heads, pulsed power transformers or electromagnetic launchers?



Joule losses for a solenoid

COUPLED THERMAL

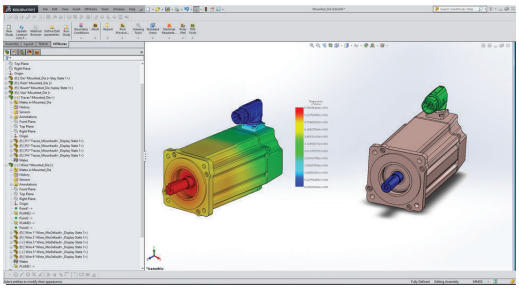
- How much heat does power dissipation cause?
- How much temperature rise does this lead to?
- Is a heat sink needed?
- Is active cooling required?
- Where are the hot spots in my design?
- What is the temperature distribution throughout the model?
- Do you have fire safety and security concerns?
- Does your design meet UL norms?
- What design changes are required for better thermal management?



Temperature distribution for a step-up transformer

COUPLED MOTION

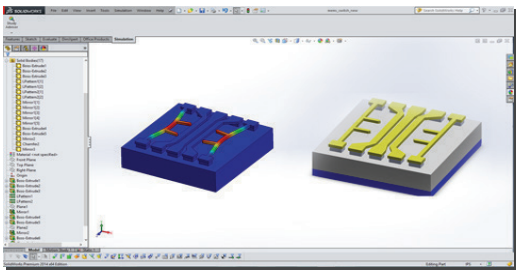
- Analyze complex moving machines with powerful coupled electromagnetic motion simulation.
- Because of the direct coupling to SolidWorks Motion, you have access to all 6 degrees of freedom.
- Compute useful design parameters like eddy current, torque, acceleration for your moving machine.
- Plot and study the thermal effects at each position of your motion.
- Design rotary motors and linear actuators using real world motion.



Force density distribution for a stepper motor

COUPLED STRUCTURAL

- How does your design respond to electromagnetic loads?
- What effect do electrostatic forces and Lorenzt forces have on deformation?
- Does the temperature distribution lead to high thermal stresses?
- What is the safety factor of my design under the combine electromagnetic, thermal and structural loading conditions?



Mechanical stresses on a MEMS switch

Advanced Features

Design Tables | **Parameterization** | **Multicongurations**

- Quickly and efficiently compare alternative designs and choose the optimal one for final production.
- Drag and drop to create and clone analysis studies.
- Easily model air parts and gaps using features like molds and cavities.
- Easily apply metallization in printed circuit boards using split surfaces.
- Examine electrical, thermal, and structural aspects of your design in one single integrated study.

Specify your materials and excitations and let EMS do the rest.

Materials:

- Built-In Extensive Library
- Linear
- Nonlinear
- User-defined

Loads/Excitations:

Electrical
- Voltages
- Currents
- Charges
- Charge Distributions
- Polarization
- Coils
- Magnets
- Pulses

Thermal
- Temperature
- Convection
- Heat Flux
- Volume Heat

Structural
- Force
- Pressure
- Moment
- Gravity
- Centrifugal Force
- Distributing Coupling
- Remote Load
- Temperature

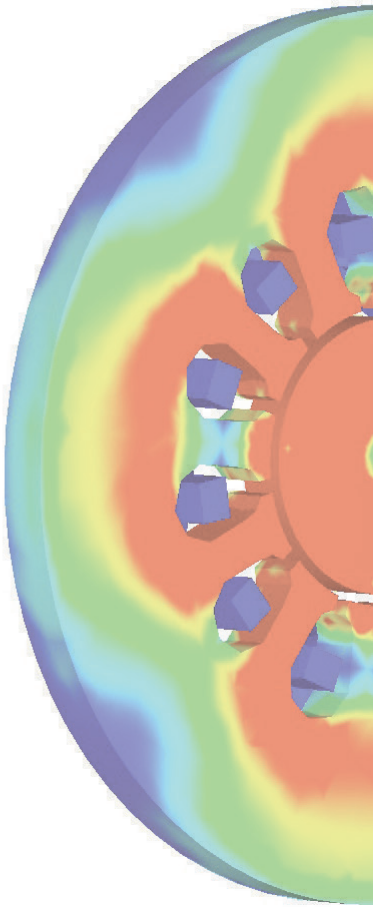
Use EMS's visualization tools to help you gain insight into your design and validate your work.

Results:

Electrical
- Electric Field
- Flux density
- Power loss
- Resistance
- Stored Energy
- Voltage Distribution
- Magnetic Field
- Current Distribution
- Capacitance matrix
- Flux Linkage
- Eddy Current
- Force
- Torque
- Inductance matrix

Thermal
- Temperature Distribution
- Temperature Gradient
- Heat Flux

Structural
- Stress
- Strain
- Displacement
- Safety Factor



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