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EMS

Em

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

fully embedded inside SolidWorks

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:

.

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?
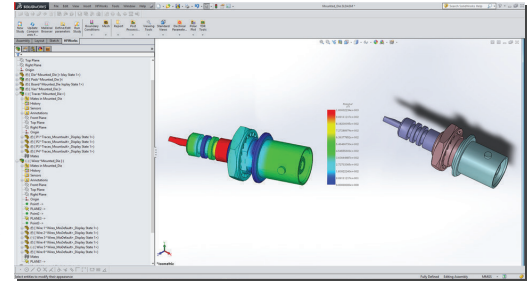
Electric stresses for a high voltage panel

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?
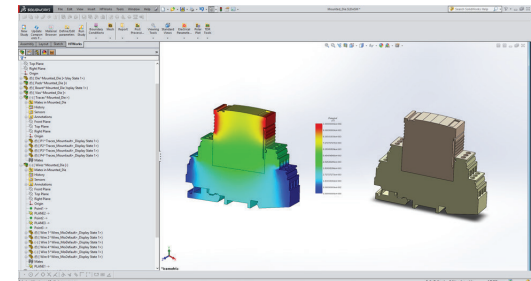
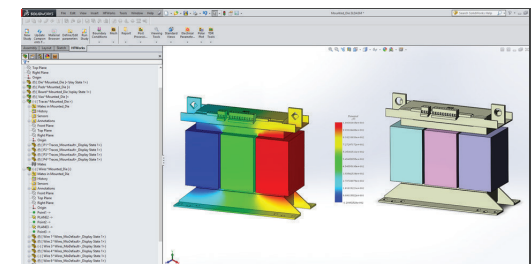Voltage distribution in surge protector

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?
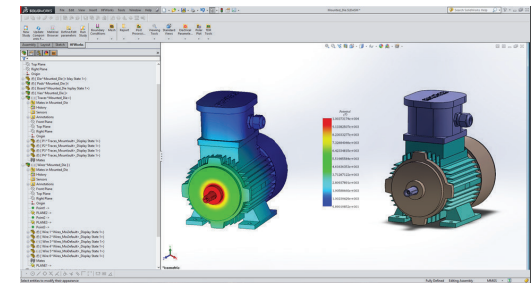
Flux density distribution in a DC motor

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

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www.goengineer.com

SOLIDWORKS SALES
info@goengineer.com
888.688.3234

TECHNICAL SUPPORT
support@goengineer.com
888.559.6167

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?
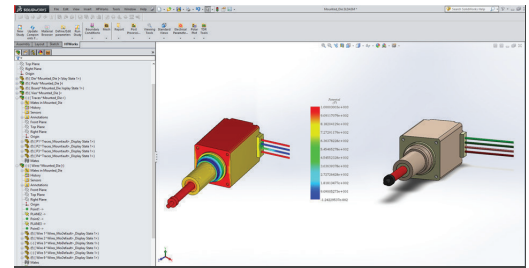
Joule losses for a solenoid

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?
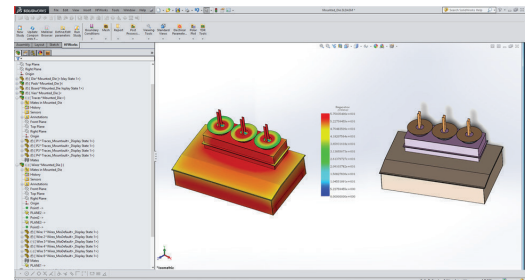
Temperature distribution for a step-up transformer

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.
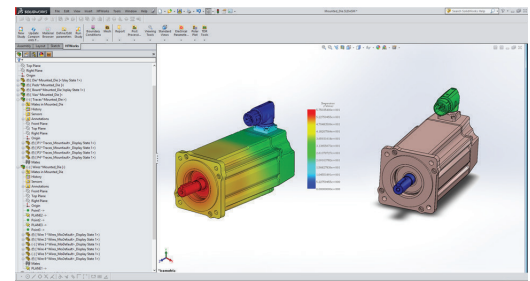
Force density distribution for a stepper motor

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?
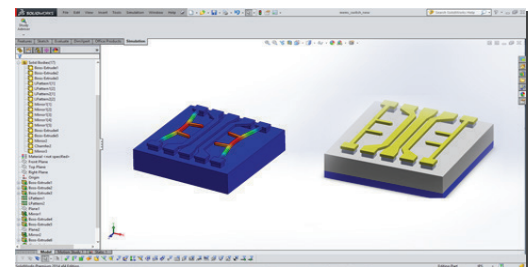
Mechanical stresses on a MEMS switch

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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