

# JMAG-Designer

**JMAG-Designer** is the high-speed, high-precision FEA software tool at the core of JMAG. An intuitive interface and precise modeling technology with a wide variety of results displays are built in. Multifaceted evaluation of various design ideas is made possible by freely manipulating geometry, material properties, and drive conditions.

## **FEM Engine:**

### **- Solver**

Solver speed is directly related to model accuracy and reliability. Finite element analysis comes down to solving very large matrices. JSOL has developed advanced techniques to solve these matrices faster and produce more consistent results.

JMAG users have some of the most advanced solver algorithms at their fingertips, and can be certain that JSOL will continue to adopt the latest calculation architecture within JMAG.

### **- Mesher**

It goes without saying that a high quality mesh is critical for a high precision analysis. JMAG gives users several options to create mesh: from automatic to manual mesh, users can choose the method that works best for them. The mesher within JMAG is both advanced and easy to use, which means that JMAG can generate optimal mesh for every type of analysis. We strive to develop automatic mesh generation technology by leveraging more than 30 years of FEA expertise and utilizing JMAG's unique geometry recognition technology.

## **Modeling:**

### **- Material**

JSOL has developed partnerships with material manufacturers to obtain the best possible data for JMAG's material database. Along with including stress dependent magnetic properties and iron loss properties of electromagnetic steel sheets, we also continue work with our partners to provide data needed in advanced analyses.

### **- Modeling**

JMAG leads the field in material modeling technology.

Fast, detailed modeling methods are developed based on our understanding of characteristics for magnetic steel sheets, magnets, and powdered metals. Many companies use JMAG to help develop new materials, which ensures JMAG is always capable of capturing precise material responses.

### **- Multiphysics**

As computational power has increased, companies have started incorporating multiphysics models into their analyses. JMAG began offering this functionality to its users in 1994, when magnetic field/thermal coupled analysis functionality was implemented for induction heating device design. Since then, a considerable amount of development has taken place in the area of multiphysics.

With such a large variety of analysis domains and the complexity of modeling within each domain, JSOL has formed partnerships with CAE vendors in each analysis field with the goal of providing an easy to use platform from which to embark on multiphysics modeling.

#### **Interpretation:**

##### **- Optimization and Parametric/Automation**

JMAG provides a variety of features to powerfully support optimized design. Large numbers of design proposals can be evaluated efficiently using JMAG's parametric analysis and optimization functions. In addition, results analysis and sensitivity analysis functions offer points where design can be improved.

##### **- Model Based Development**

JMAG-RT enables model based development with high concurrency, allowing plant design and control design to be performed concurrently. JMAG-RT is a system which generates high-fidelity plant models (JMAG-RT models) in a system level simulation from FEA models. From system design, to ECU verification using HILS, JMAG-RT has a wide range of uses.

#### **User interface:**

##### **- Customization**

A flexible framework is provided allowing the user to customize JMAG to his needs. Being able to use scripts and user subroutines, analysis and results analysis with the use of the user's own algorithms can be performed. In addition, a geometry library and templates facilitate in creating desired geometries.

##### **- Guideline**

Easy-to-use for the beginner, useful for the expert, this is the user interface JMAG is aiming for.