# JMAG's Proposed 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.

Features

- Using a virtual device model in HILS means that it is possible to test the ECU while the device is still under construction. This can reduce the amount of test time necessary on the actual test bench.
- Conceal information about geometries or materials so it can be shared between business companies.
- The JMAG-RT model captures device performance that includes non-linear effects, saturation, and space harmonics. This high fidelity model's response is nearly identical to the actual device's response.
- FEM-Parameterized PMSM Block Support: Use JMAG-RT models with Simulink and Simscape.
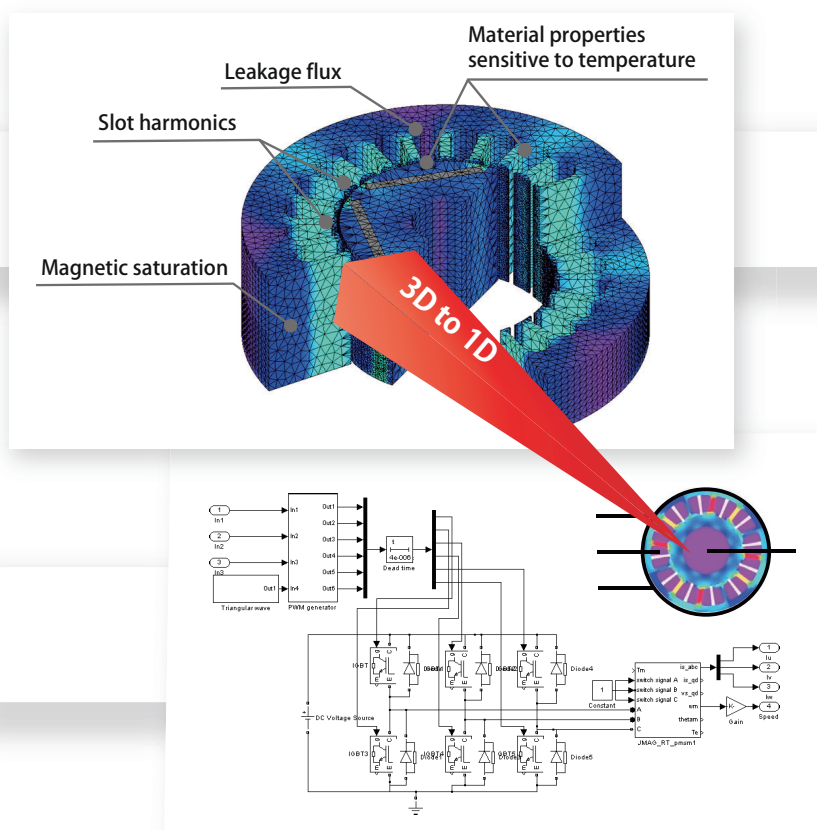
About JMAG

- JMAG is simulation software for electric device design and development. It accurately models the complex electromagnetic phenomena in a wide range of equipment.
- Since being released in 1983, JMAG has been used in industries and universities world-wide and has contributed to the development of thousands of products.

Monitor Physical Quantities Inside a Motor

When performing a simulation of control system, magnetic flux density and electromagnetic force can be monitored in real time in motors.

This is useful when evaluating control methods for NVH or improving magnetic circuit designs.

Current (A) — Time (sec)

Electromagnetic force (N) — Time (sec)
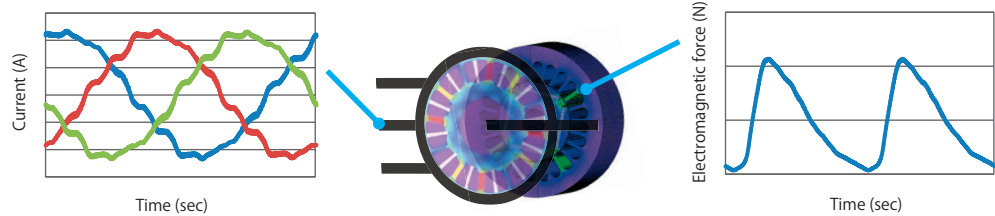
Support for Arbitrary Models

FEA-based high-fidelity plant model with arbitrary circuit topology can be used at circuit simulations.
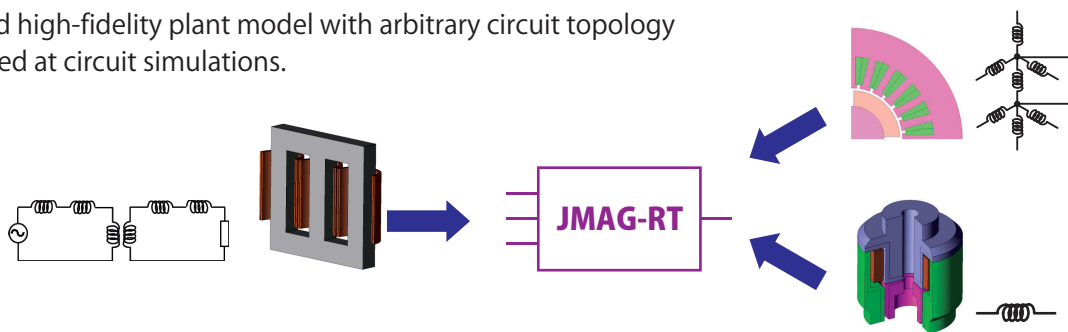
JMAG-RT

How to Create JMAG-RT Models

- JMAG's finite element method (FEM) analysis allows the model creation even without an actual machine.
- Also possible from actual measurement values of the motor.
- Plant models can also be obtained from the JMAG-RT motor model library.

JMAG-Express

JMAG-Designer

Measurement

JMAG-RT Model Library
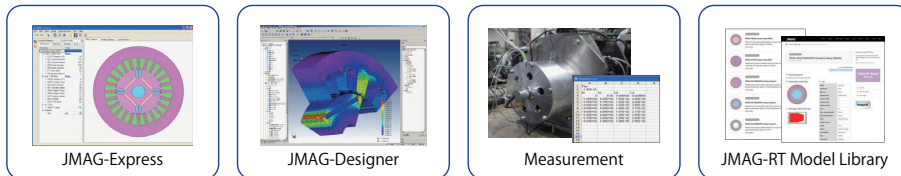
Supported System

JMAG-RT is applicable to major SILS, MILS and HILS systems which are used for system-level and real-time simulations.

- SILS/MILS
  - MATLAB/Simulink   - GT-SUITE   - Amesim   - MapleSim
  - PSIM   - SaberRD   - SimulationX   - RecurDyn   - SIMBA
- HILS
  - OPAL-RT   - dSPACE   - DENSO TEN   - A&D
  - DSP Technology   - Speedgoat   - Typhoon HIL
  - Concurrent RT

Supported Devices

- Permanent magnet synchronous motors (3-phase, 6-phase)
- Induction motors (3-phase, 6-phase)
- Stepping motor (2-phase)
- Switched reluctance motors (3-5 phase)
- Linear solenoid
- Permanent magnet linear motors (3-phase)
- Wound-Field Synchronous Motor
- Synchronous reluctance motor (3-phase, 6-phase)
- Generic model

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JMAG Division
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