

Motor-CAD Lab

Efficiency mapping and performance across a drive cycle.

The Motor-CAD Lab module has been developed to enable rapid and accurate analysis of any electric machine design over the full operating envelope. It couples to both the EMag and Therm modules and provides outputs such as efficiency maps and torque/speed characteristics.

Key Features

- Generates efficiency and loss maps.
- Calculates the peak torque/speed characteristic.
- Calculates the continuous (thermally constrained) torque/speed characteristics.
- Analyzes performance over complex driving cycles.
- Uses maximum torque/amp and maximum efficiency control strategies.

Workflow

STEP 1 | BUILD THE MODEL

Build the saturation and loss model using the electromagnetic FEA solver. This process builds a set of response surfaces in a few minutes, which are then saved internally.

STEP 2 | CALCULATE RESULTS

Calculating efficiency maps and torque/speed curves

- Specify inputs, such as DC link voltage, control strategy, maximum inverter current and maximum modulation depth.
- Complete the model build and generate outputs such as efficiency maps and peak torque/speed curves within seconds.

Calculating Thermal Envelopes and Drive Cycles

- The Motor-CAD Lab and Therm modules can be iteratively solved to provide outputs, such as the continuous torque/speed envelope, which calculates the maximum continuous output torque across the speed range within a set of winding and rotor temperature limits.
- The Lab module also calculates the losses and temperature rise of a prototype design over a drive cycle.

STEP 3 | GENERATE OUTPUTS

- Users can plot, visualize and study a large range of different outputs such as power/speed characteristics, loss maps, efficiency maps, drive cycle efficiency and thermal maps.
- Results can be exported in various standard data formats.
- Motor-CAD software can be fully automated and controlled through scripting tools such as MATLAB® and Excel® as well as a range of other third-party optimization solutions.

