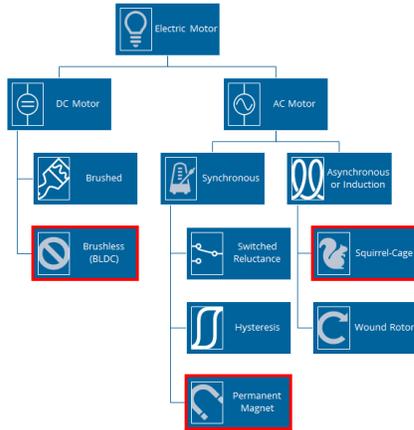


# Machine Section

The OPAL-RT Electric Machines allow for simulating the electric motors, mechanical models, and associated sensors and can be coupled with the eHS for customized drive circuits. For our currently supported configurations, please see [Supported Hardware Configurations](#).

Detailed mathematical models of different types of electrical motors can be simulated, such as:



## Permanent Magnet Synchronous Machine (PMSM)

The automotive and transportation industries comprise the core markets for PMSMs. This machine type is known for its power density (power per unit of size/weight), and its higher speed capacity. OPAL-RT's solutions provide resolver and encoder I/O interfaces and communications protocols to exchange time-accurate information and position sensor responses—crucial for the successful testing and simulation of this motor type.

The following PMSM models have been developed:

- Dual PMSM BLDC, which can simulate the following PMSM motor types
  - PMSM Constant Ld/Lq
  - PMSM Variable Ld/Lq
- Dual PMSM SH, which can simulate a PMSM Spatial Harmonics (SH) model that relies on finite element analysis

## Squirrel-Cage Induction Machine (IM)

Induction motors are widely used as industrial drives because they are self-starting, reliable and economical. They're also increasingly used with variable-frequency drives (VFDs) in variable-speed service, as well as in wind turbines, for example. OPAL-RT's solutions support various machine configurations, machine parameters that can be modified at runtime, enabling flexible test possibilities--making our simulation tools indispensable for induction machine control testing.

The following IM models have been developed:

- Quad IM SM, which can simulate a Squirrel-Cage Induction Machine (SCIM)

## Brushless DC Motor (BLDC)

A brushless DC motor or BLDC, is synchronous motors powered by direct current (DC) but which you control by feeding alternating current (AC) to drive each phase. The absence of brushes gives BLDC motors the ability to rotate at high-speed and increased efficiency, as well as being low maintenance and durable.

BLDCs have the advantage of being low maintenance, high efficiency, and durability.

- Dual PMSM BLDC, which can simulate a BLDC with Constant Ls motor type

For information on the support of other machine types, please contact [OPAL-RT Technical Support](#).

The types of machine models available in the Machine section of the Configuration tree is dependent upon the selected [Hardware Configuration](#). See the table below for a list of hardware configurations and their corresponding machine models:

Hardware Configuration	Machine Model
<a href="#">(Archived) Dual_eHSx64_Quad_PMSM_VDQ_IO_Dual_7868R</a>	<a href="#">Dual PMSM BLDC</a>
<a href="#">eHSx32_Dual_PMSM_SH_IO_7868R</a>	<a href="#">Dual PMSM SH</a>
<a href="#">eHSx32_Dual_PMSM_VDQ_IO_32DO_7868R</a>	<a href="#">Dual PMSM BLDC</a>

eHSx64_Dual_PMSM_VDQ_IO_7868R	Dual PMSM BLDC
eHSx64_Quad_IM_SM_IO_7868R	Quad IM SM