

LMS Imagine.Lab AMESim Electromechanical



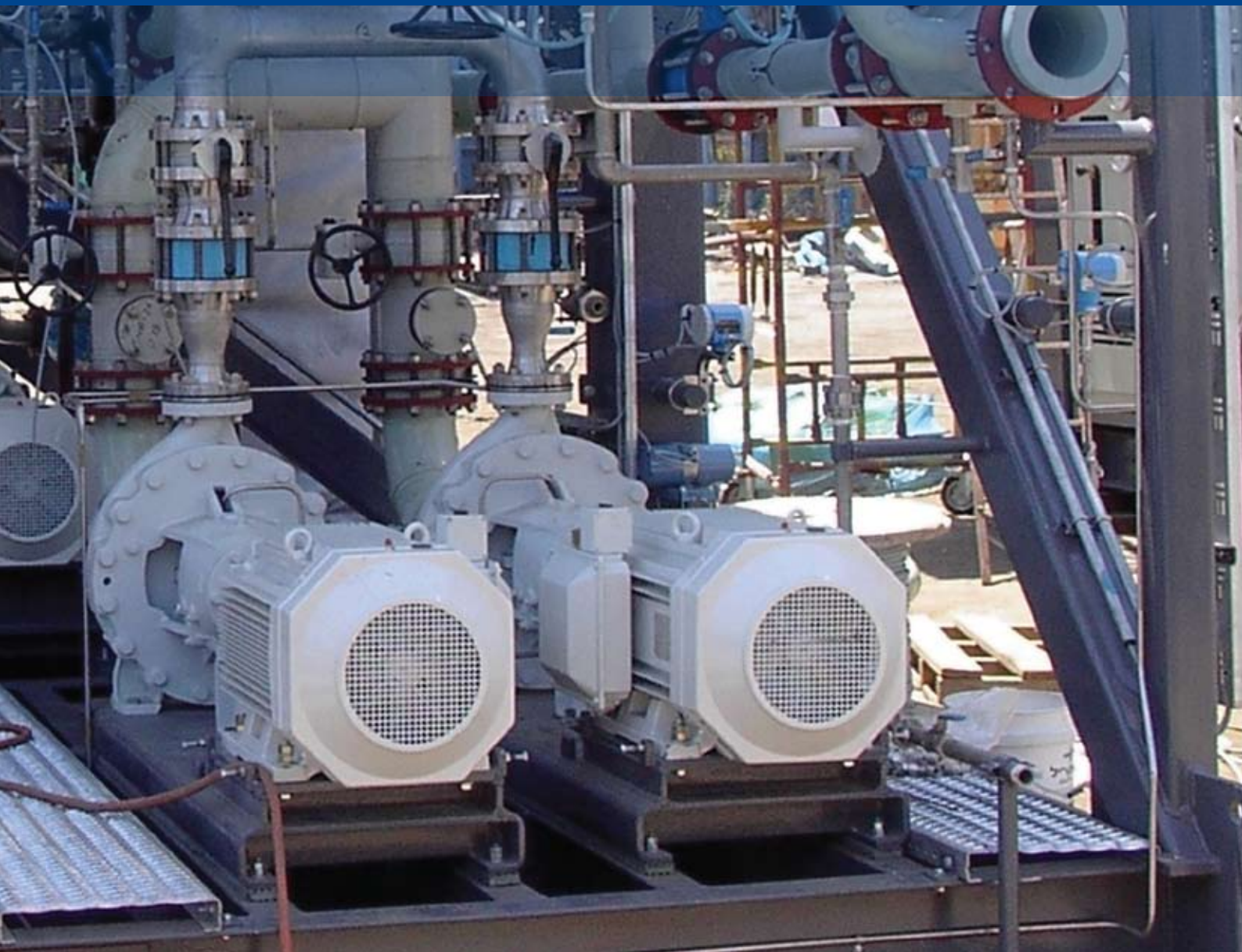
LMS Imagine.Lab Electromechanical

LMS Imagine.Lab Electromechanical helps engineers define straightforward strategies throughout the design process of electrical or electromechanical systems. Mechatronic system engineering has become a key development concern due to the increased use of electrical and electronic systems in automotive, aerospace and other mechanical applications.

LMS Imagine.Lab Electromechanical simulates electromechanical components like linear actuators and electric motors, from the specification to the design and validation of control strategies. Furthermore, it supports different analysis levels of electrical systems, such as power consumption estimation, accurate transient response evaluation or thermal effects.

LMS Imagine.Lab Electromechanical simulates the functional behavior of complex electromechanical actuators. Designers of electromechanical and electro-fluid components get access to an integrated platform to simulate the overall system response. Moreover, the solution can take into account a combination of electrical, magnetic, mechanical, thermal and fluid phenomena.





- Electromechanical Components
- Electrical Systems

References

- BorgWarner** - Full transmission system with electromechanical valve design
- IN-LHC** - Design of the pressure valve for aircraft braking system
- Bosch** - Simulation of electronic-controlled diesel fuel injectors
- Hilite International** - Simulation of a Cam-phaser and 4-way solenoid valve system

LMS Imagine.Lab Electromechanical Components

LMS Imagine.Lab Electromechanical Components helps simulate mechatronic systems for the specification of components, the interaction with their mechanical structure and the design and validation of control strategies. Designers of electromechanical and electro-fluid components get access to an integrated platform to simulate the overall system response and take into account a combination of electrical, magnetic, mechanical, thermal and fluid phenomena which are accurately described within the AMESim components.

The AMESim multi-disciplinary platform comes with a set of specific libraries of thermo-electric and magnetic models that help to model electromechanical actuators such as solenoid valves and torque motors. LMS Imagine.Lab Electromechanical Components integrates two complementary approaches: description of the magnetic circuit using simple elements such as reluctances and airgaps (lump parameter) and the use of FEM tables. Strong coupling capabilities between electric/magnetic/mechanic models enable component specification and sizing as well as optimization of dynamic behaviors.

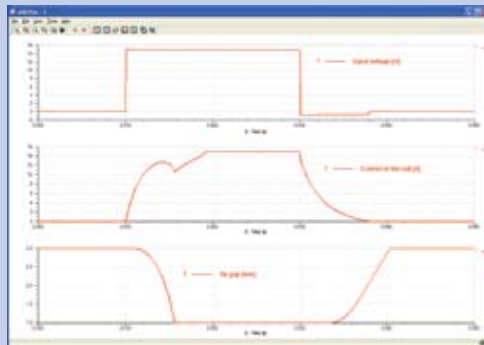
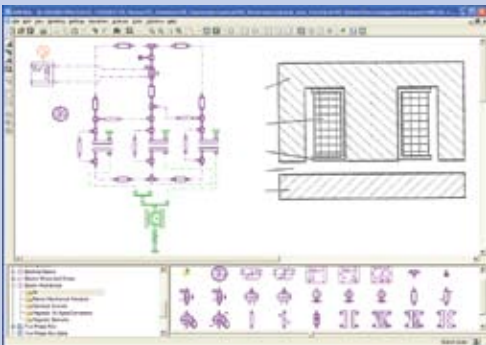
Engineers are able to design multi-disciplinary systems and subsystems and evaluate their behavior in function of technological choices. The platform's short computation times lead to faster analysis and refined optimization.

Features

- Magnetic lump parameter approach or import of look-up tables coming from any type of magnetic finite elements analysis
- Strong coupling between electric/magnetic/thermal/mechanical models
- Modeling of energy losses: hysteretic and eddy currents
- Links with multi-body software
- Modeling of piezzo-electric stack

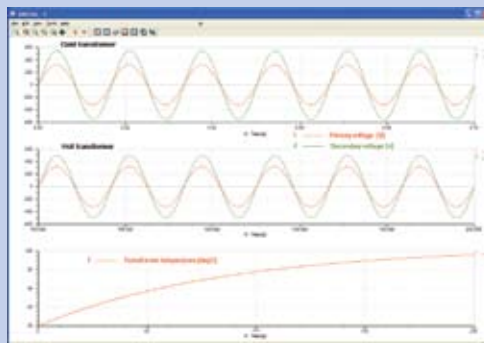
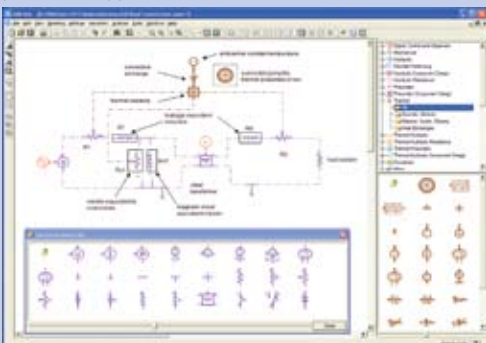
Benefits

- Simulate and analyze response time of magnetic actuator
- Real transient analysis of electromechanical and electro-fluid components
- Impact of component temperature on transient behavior
- Short computation times leading to faster analysis and refined optimization



LMS Imagine.Lab Electromechanical Components helps simulate solenoid valves with a magnetic lump parameter approach.

Results showing the coupling between electrical, magnetic and mechanical phenomena.



LMS Imagine.Lab Electromechanical Components can study the impact of temperature on component performance.

This simulation shows the temperature increase on the electrical component and its impact on the electrical performance.

LMS Imagine.Lab Electrical Systems

LMS Imagine.Lab Electrical Systems focuses on the electrical power network and its components as well as on the global electrical power distribution for the automotive and aerospace industries and the power generation and distribution markets. It is able to simulate the interaction of the electrical network with a large diversity of electricity consumers, from electrical components to complex subsystems with mechanical, fluid and thermal aspects.

New components for cars and aircrafts are developed to meet the demand for new safety and comfort features while at the same time improving fuel-economy. Many of these components use electrical energy.

Based on the AMESim multi-domain system simulation approach, LMS Imagine.Lab Electrical Systems brings a comprehensive set of electrical behavioral models for the evaluation of new architectures (sizing of power generation, storage elements and loads), for the analysis of power consumption and the impact on fuel consumption, as well as for the design and validation of control laws.

Thanks to its advanced features, LMS Imagine.Lab Electrical Systems significantly helps customers to optimize dynamic performances, check controls, minimize energy consumption and study the impact on the electrical environment (voltage drops, current peaks).

Features

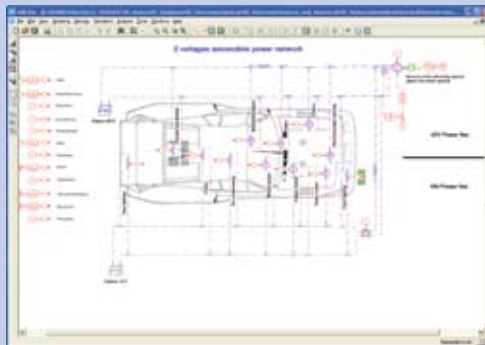
- Electrical components with thermal ports
- Multi-domain platform
- Real-time code export for controller validation
- Electrical motor library
- Modeling of power electronic converter

Benefits

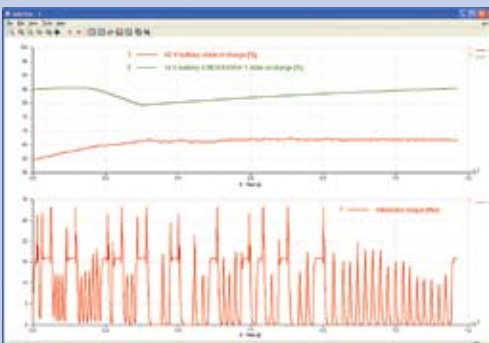
- Power consumption and transient analysis
- Estimate impact of temperature on system performance
- Common tool for system specification, development and validation of controllers



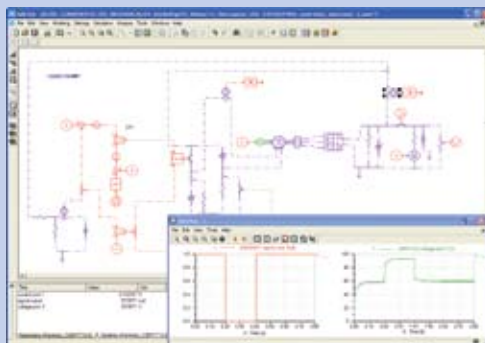
LMS Imagine.Lab Electrical Systems focuses on the electrical power network.



LMS Imagine.Lab Electrical Systems helps simulate automotive electrical networks including two voltage levels.



Results show the charge stage of each battery and the torque required by the alternator.



Example of an alternator piloted by a PWM signal.



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LMS is an engineering innovation partner for companies in the automotive, aerospace and other advanced manufacturing industries. With approximately 30 years of experience, LMS helps customers get better products to market faster and turn superior process efficiency into key competitive advantages.

With a unique combination of 1D and 3D simulation software, testing systems and engineering services, LMS tunes into mission critical engineering attributes, ranging from system dynamics, structural integrity and sound quality to durability, safety and power consumption. With multi-domain solutions for thermal, fluid dynamics, electrical and mechanical system behavior, LMS can address the complex engineering challenges associated with intelligent system design.

Thanks to our technology and dedicated people, LMS has become the partner of choice of more than 5,000 leading manufacturing companies worldwide. LMS is certified to ISO9001:2000 quality standards and operates through a network of subsidiaries and representatives in key locations around the world. For more information on LMS, visit www.lmsintl.com.

