

LMS Imagine.Lab AMESim Energy



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LMS Imagine.Lab Energy provides users with advanced libraries and toolsets to handle energy systems with specific thermodynamic issues, like aerospace propulsion and pyrotechnic systems, automotive and stationary fuel cells. LMS Imagine.Lab Energy comes with a set of specific tools and libraries dedicated to thermodynamic, for gas mixtures, fluid properties, thermo-chemistry, and compressible flows. Fully compatible with standard solutions, LMS Imagine.Lab Energy fits perfectly with today's customers needs. The dedicated energy expert team can assist customers with a varied set of services, including development of specific libraries.



LMS Imagine.Lab Fuel Cells

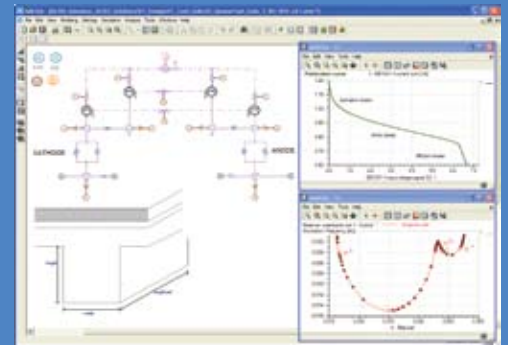
LMS Imagine.Lab Fuel Cells helps design and optimize fuel cell stacks and systems by offering a modeling environment. With LMS Imagine.Lab Fuel Cells, users can size components, optimize architecture and geometries, and develop and test control strategies. Furthermore, it helps to test different gas mixtures and material solutions, predict produced voltage and transient evolution of temperatures, pressures, mass flow rates and gas mass fraction everywhere in the system.

LMS Imagine.Lab Fuel Cells uses physical modeling, based on an energy exchange approach between basic elements which can be assembled to represent any configuration of a complete fuel cell system. It helps create a predictive model of a complete system, and represent both static and dynamic behavior. LMS Imagine.Lab Fuel Cells comes with multi-disciplinary libraries to cover each subsystem, all elements to build the complete digital mock-up of a FC system together with adapted tools to analyze and optimize it. It is able to simulate global systems as well as the stack (coupling between stack, cooling system, feeding system, control system, electrical system, etc.). For example, engineers can easily simulate either a polarization curve or an impedance spectrum, which makes it possible to run sensitivity analyses or parameter optimization to enhance the performance and the efficiency of the complete system or of a specific component.

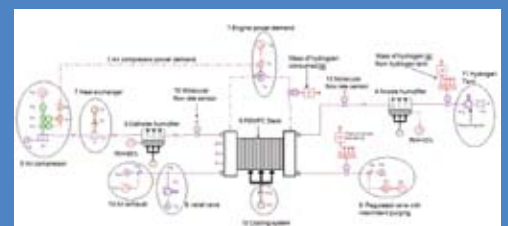
LMS Imagine.Lab Fuel Cells comes with a set of analysis tools that are able to perform sensitivity analysis and obtain a better understanding of the physical behavior of the system. LMS Imagine also provides consulting services to customize existing solutions to specific needs and support our customers to get the best of our platform. From the model, it is easy to:

- Compute a polarization curve or an impedance spectrum of a stack in different operational conditions
- Test new architecture
- Test new management strategies that work on the control laws of the different subsystems
- Represent break-down configuration to optimize the design

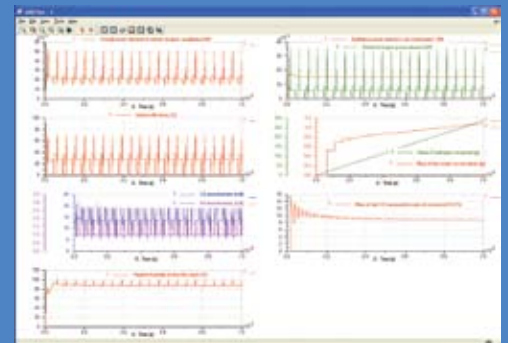
LMS Imagine.Lab Fuel Cells is of particular interest to PEMFC or SOFC system integrators, fuel cell component manufacturers and electrochemistry research laboratories.



Physical stack model for simulating the transient fuel cell phenomenon (electrical, thermal and fluid).



System model obtained by the assembly of a fuel cell and auxiliaries functional models. This model can be used in order to optimize system design (component sizing, computation of overall energy efficiency, evaluation of new architectures).



Results of the functional auxiliaries models showing the hydrogen consumption on a driving cycle, and several internal values of the system such as the water production in the stack.



The AMESim tool helps develop high-precision models that are well suited to customer requirements.

Features

- Mass and heat transfer for gas mixtures and thermal hydraulic
- Component design libraries
- Stack dynamic modeling (electrochemistry, heat and mass transfer)
- Subsystem interactions (storage, feeding, stack, after-treatment, cooling system, power conversion unit)
- Tools for system analysis, parameter estimation and optimization

Benefits

- Rapidly test and study new configurations and architecture on system efficiency and performance
- Capitalize know-how and support collaborative engineering
- Lower cost and higher efficiency product design
- Reduce time-to-market and development costs
- Optimize experimental programs



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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.

