

SIEMENS

Siemens PLM Software

LMS Imagine.Lab Amesim

The de facto tool for physical simulation of mechatronic systems

siemens.com/plm/lms

LMS Imagine.Lab Amesim

Driving product innovation

Intelligent systems have become a key driver for improved product performance and innovative design in many industries. Car manufacturers, for instance, have to take critical requirements into account in their products' development processes, such as safety, driving pleasure and comfort, as well as fuel economy and emissions. They respond to these challenges by increasingly integrating active control systems. The same trend applies to many other industries: new aircraft designs rely heavily on active systems to control key operating and safety mechanisms; intelligent packaging machines, high-speed printing presses, excavators and wind turbines all intensively use active control mechanisms to deliver higher productivity, superior reliability or a more cost-efficient operation.

In this race for smarter product design, the ability to reduce costs, shorten time-to-market and increase quality of the output has a decisive impact on success. Therefore, optimization of the design cycle is key. Designing and developing smart mechatronic systems that integrate mechanical and electronic components and software is a complex issue: controls and mechanical parts form one interlocked system and cannot be designed separately.

Coupled with uncertain timelines and costs, design teams face huge risks in not knowing about possible future rework required to get to the production-ready stage in a process where the first testing and validation

only occurs late in the design cycle (for example, after the first physical prototype becomes available). The ability to frontload the testing as early as possible in the design cycle can eliminate major late design issues and save important iteration-related costs. In the face of the increased importance of cost reduction, time-to-market control and enhanced quality features, this ability has become a key driver for a brand's performance.

In the case of mechatronic systems, control functions and systems have to be designed, verified and validated together early in the development cycle. This implies the adoption of novel engineering methodologies. Virtual prototyping through analytical



simulation makes this frontloading possible: it stands as the preferred solution to eliminate design issues upfront and keep time-to-market and costs under control.

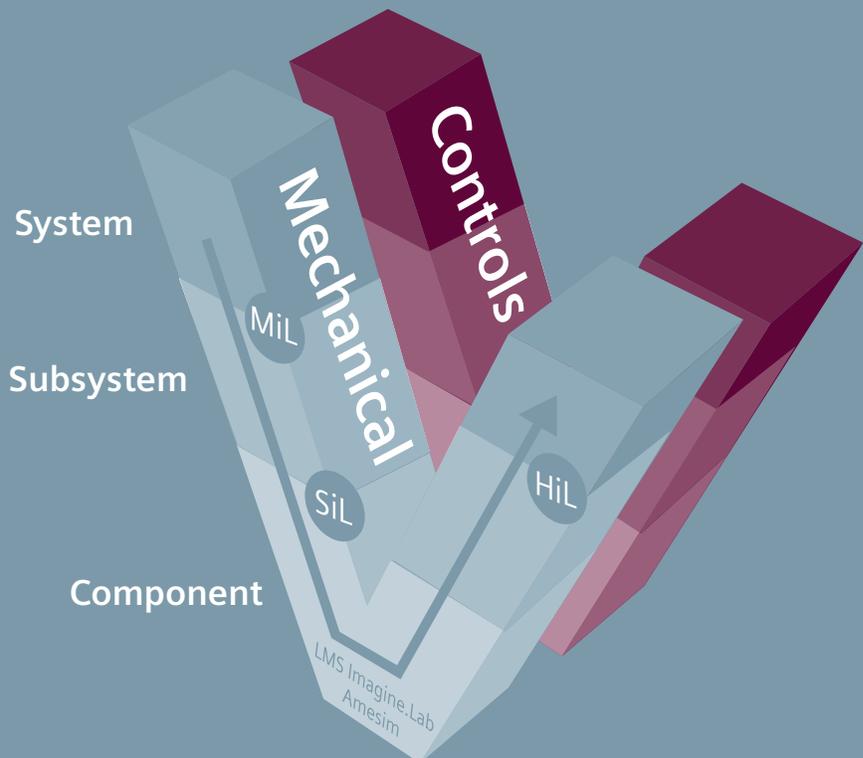
The path to smarter-greener-better products

LMS Imagine.Lab Amesim™ software offers engineers an integrated simulation platform to accurately predict the multi-domain performance of intelligent systems. LMS Amesim enables engineers to model, simulate and analyze multi-domain, controlled systems, and offers capabilities to connect to controls design, helping to assess and validate control strategies.

LMS Amesim enables the frontloading of testing which, as a result, saves time and costs. LMS Amesim addresses the multiple challenges generated by smart systems engineering. Combining mechatronic system simulation and application expertise, the LMS Amesim mechatronic system simulation platform aids companies in making the right choices earlier in the design process and provides higher-quality results in shorter time. The LMS mechatronic system simulation platform can thus be seen as an inspiring tool to create additional brand value.

LMS Amesim stands as the system simulation platform of choice to:

- Analyze the functional performance of mechatronic systems from the early development stage onwards
- Optimize the complex interaction between mechanical, hydraulic, pneumatic, thermal and electric/electronic systems well before the first physical prototype becomes available
- Proactively engineer a critical function and improve overall product performance and quality
- Avoid design flaws, explore innovative designs and accelerate product development



LMS Imagine.Lab Amesim platform

An open, powerful and user-friendly platform to model, run and analyze complex multi-domain systems and components

Master the design, modeling and analysis of controlled multi-domain systems easily, using the unique capabilities of the LMS Amesim platform.



Platform facilities

Take advantage of the unique usability and scalability of the LMS Amesim platform with its graphical user interfaces, interactive help and associated features such as the supercomponent facility, batch run monitor, experiment manager, app designer and postprocessed variables.



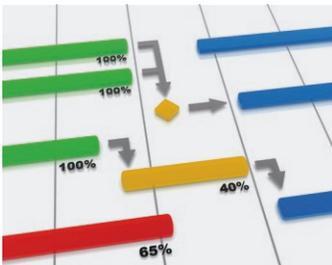
Analysis tools

Analyze your data and system behavior with advanced plotting facilities, dashboard, animation, table editor, linear analysis, activity index or replay.



Optimization, robustness, design of experiment

Improve your system design with LMS Amesim design exploration, LMS Amesim export module to third-party design of experiments tools or the interface between LMS Amesim and Optimus.



LMS Amesim simulator scripting

Use advanced LMS Amesim scripting tools for automating modeling and simulation actions, as well as LMS Amesim APIs for full command-line building of complete LMS Amesim models.



LMS Amesim customization

Tailor your simulation using assistants for your application tools, as well as customized parameter editing using external executable.

Seamlessly integrate LMS Amesim into your company's software environment and cover the various phases of your design cycle.



Solvers and numerics

Benefit from cutting-edge numerical solving methods and features such as performance analyzer, discrete partitioning of models and parallel processing feature.



MiL/SiL/HiL and real-time

Model plant to be controlled with Simulink or LabVIEW interfaces, and exported to various real-time targets like dSPACE, xPC Target, RTLab, LabViewRT among others.



Software interfaces

Co-simulate your model with any software using the LMS Amesim generic co-simulation capability, as well as dedicated interfaces and support to functional mockup interface (FMI).



1D/3D CAE

Import/export and interface with many 1D/3D CAE tools like MBS software (with LMS Virtual.Lab™ Motion software, MSC.ADAMS), CFD software (Fluent, CFX, StarCD, Eole) and import reduced modal basis FEM.



Modelica platform

Use of LMS Amesim as a Modelica compliant platform with Modelica editor, Modelica import assistant, Modelica assembly and Modelica compiler with LMS Amesim symbolic manipulation.

LMS Imagine.Lab Amesim libraries and applications

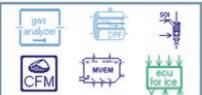
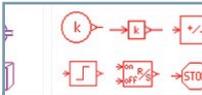
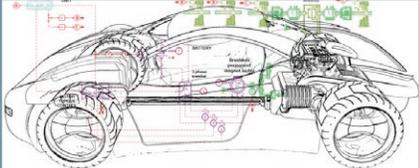
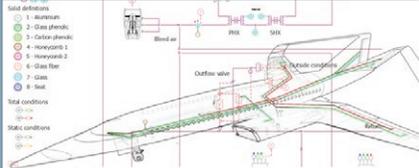
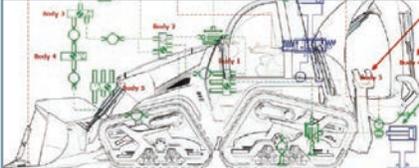
A large set of validated physical libraries to address a broad range of applications

Thanks to its 38 libraries and more than 4,500 ready-to-use components, LMS Amesim provides a great scalability in the main physical domains (fluids, thermodynamics, electrics, electro-mechanical, mechanics and signal processing) as well as application libraries (cooling system, air-conditioning, internal combustion engine, aerospace).

By combining models from both the physical and application libraries, engineers are able to build specific application-oriented solutions to simulate various systems in the automotive, aerospace and mechanical industries. They can address myriad engineering challenges: performance, safety, comfort, fuel economy, energy management and more.

This unique access to a powerful platform and dedicated libraries enables design and engineering teams to carefully balance attributes of their product in multiple domains, long before committing to expensive prototype testing. LMS Amesim enables system simulation from the early development stage onwards, allowing critical functions of a new product to actually drive its design.

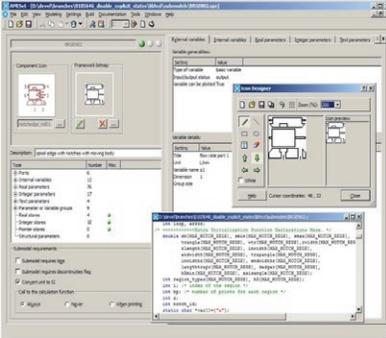
LMS Imagine.Lab Amesim

 <p>Fluids</p>	 <p>Thermal</p>	 <p>Mechanics</p>	 <p>Electrics</p>	 <p>Control</p>	 <p>IC Engine</p>
 <p>Automotive and ground vehicle</p> <ul style="list-style-type: none"> • Internal combustion engine • Electrical systems • Vehicle thermal management • Transmission • Vehicle system dynamics • Vehicle integration and multi-attribute balancing 	 <p>Aviation and aerospace</p> <ul style="list-style-type: none"> • Landing gear • Flight controls • Electrical aircraft • Environmental control system • Aerospace engine equipment • Fuel systems • Aircraft engine 	 <p>Mechanical Industry</p> <ul style="list-style-type: none"> • Pumps and valves • Energy • Consumer goods • Mechanical machinery • Off-highway • Medical 			

LMS Imagine.Lab Amesim suite

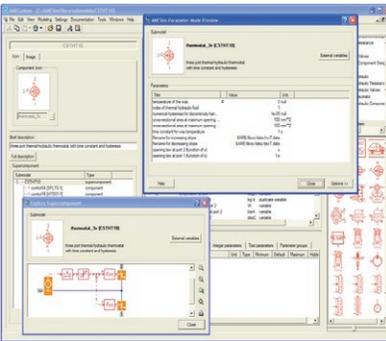
An extensive suite to adapt to specific simulation needs

LMS Imagine.Lab Amesim simulation platform offers additional tools to adapt to specific modeling and simulation needs:



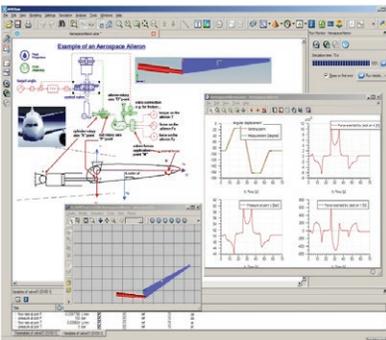
Ameset – Extend modeling capabilities with user’s libraries

Ameset provides a comprehensive set of tools to extend the standard LMS Amesim libraries of components. It is designed to assist users in writing well-documented, standardized, re-usable and easily maintainable libraries. By following simple rules, component models become fully compatible with the existing LMS Amesim models and are automatically usable on each supported platform.



Amecustom – Customize models and components

Amecustom is a customization tool that allows engineers to adapt models and components to the end-users’ requirements. With Amecustom, company-specific model databases can be built, with custom user interfaces and parameter sets. In addition, Amecustom offers the possibility to protect sensitive information through encryption facilities before supplying models to third-parties.



Amerun – Transfer simulation models to end-users

Amerun is a run-only version of the LMS Amesim software, dedicated to users who need to run a simulation model to analyze and visualize different design alternatives. With Amerun, engineers can easily share their validated, tested and customized LMS Amesim models with nonexpert users. Amerun offers the same features available in LMS Amesim to set model parameters and perform what-if analyses.

LMS Amesim highlights

- Simulation of multi-domain physical systems
- Broad range of application-specific solutions
- Steady-state and transient analysis
- Linear and nonlinear systems
- Input/output analysis
- Parameter sensibility analyses
- Vibration and order analysis
- Time-domain and frequency-domain analysis
- Test systems in MiL/SiL/HiL (real-time)
- Integration with CAE software tools

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a world-leading provider of product lifecycle management (PLM) software, systems and services with nine million licensed seats and 77,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software helps thousands of companies make great products by optimizing their lifecycle processes, from planning and development through manufacturing and support. Our HD-PLM vision is to give everyone involved in making a product the information they need, when they need it, to make the smartest decision. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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