



SIEMENS

Ingenuity for life

Controls and mechatronics engineering solutions

Transform controls and embedded software development with best practices and the latest technology

Benefits

- Rapidly adopt advanced controls technologies like deep learning, sensor fusion and optimal control
- Use Siemens know-how and solutions to increase your confidence in ADAS, electrification and powertrain controls quality
- Understand your company's practices in comparison to industry practices to identify improvement opportunities
- Define a roadmap to institutionalize best practices in your organization using a combination of tools and services
- Iteratively transform your organization and track your progress against KPIs

Summary

To stay ahead in today's fast-growing global market, companies are under pressure to develop cutting-edge products that are more engaging and less expensive.

To achieve these goals, engineers apply mechatronic solutions to develop breakthrough products with brand-differentiating functionalities. These solutions use electronics and software with advanced controls to optimize the performance and efficiency of systems.

Companies that deliver high-quality smart products accomplish this by using model-based systems engineering (MBSE). MBSE enables you to effectively balance performance, complexity and

quality while addressing and conforming to government regulations and industry standards; for example, the International Organization for Standardization (ISO) 26262.

Although MBSE has many benefits, companies often struggle to adopt it and institutionalize practices that deliver these benefits.

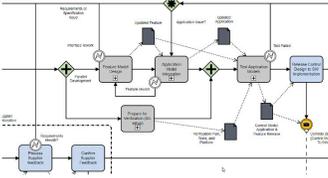
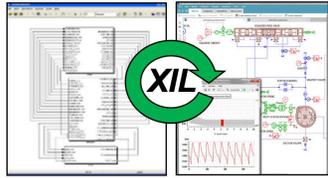
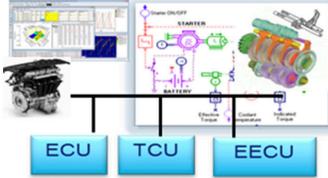
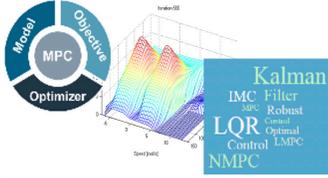
Combining experience and technology

Siemens Digital Industries Software offers the Xcelerator™ portfolio, a comprehensive and integrated portfolio of software and services as well as a proven track record of helping customers transform the way they develop controls and embedded software for smart systems.

As a technology innovator and partner with the European Commission, Siemens funds research programs supported by its engineers who have devised and deployed state-of-the-art control algorithms, verification and validation methods.

For instance, Siemens provides engineering experts who actively assist in developing and deploying functionally safe and reliable control system features throughout phases of the development process. For individual industries, we apply processes and methods in accordance with the ISO 26262 standard to verify the functionality of our customer's controls systems and safety measures.

Controls and mechatronics engineering solutions

<h3>Controls business transformation</h3>	<h3>Controls and embedded SW quality</h3>	<h3>Controls system development</h3>	<h3>Advanced controls technology</h3>
			
<p>Benchmark EE/SW practices to identify improvement opportunities</p>	<p>Improve controls software quality while reducing physical prototypes</p>	<p>MBSE enabled controls development, code generation, and simulation</p>	<p>Accelerate adoption of new technologies using MBSE best practices</p>

Controls and mechatronics engineering solutions

Controls business transformation

Siemens' project experience enables us to provide insight into the state of MBSE for controls. Our engineers can assess a company's controls capabilities against best practices and industry standards. This analysis delivers valuable insight into development gaps that can be addressed by combining process improvement and technology advancement.

This offering helps you develop a value roadmap that lays out a multi-year deployment plan based on return-on-investment (ROI) analysis to prioritize and schedule process and tool changes. Deliverables can include:

- As-is state of controls practices
- Industry benchmark report with comparison across MBSE dimensions
- Detailed transformation plan with value, cost, timelines and ROI

Controls and embedded software quality

Traditional verification and validation (V&V) techniques are time-consuming and expensive because they rely mostly on physical prototypes available late in the development cycle. This offering focuses on virtualizing the V&V process, taking advantage of simulation and data management to:

- Understand, define and verify system and subsystem requirements
- Ensure controller performance in the context of the overall system
- Effectively identify issues and resolve them early in the process
- Define, execute and report on verification activities
- Manage and execute change

Siemens supports customers by executing a range of engineering and consulting activities, including requirements engineering and test case development; closed-loop test platform model-in-the-loop (MIL), software-in-the-loop (SIL) and hardware-in-the-loop (HIL) setup, test execution, results analysis, troubleshooting and reporting.

Engineering processes are automated and artifacts managed with an application lifecycle management (ALM) solution customized for controls, which is delivered as part of the project execution.

Controls system development

In addition to supporting V&V for controls and software development, Siemens can support enhancements to existing or new controls using model-based design (MBD) methodologies in the following areas:

- Baseline powertrain electrification functions for energy efficiency and multi-attribute balancing
- Implement best practices that promote re-usability, testing and good code generation
- Model and verification framework that facilitates virtual development and testing
- Setup and deployment of ALM environment to manage controls artifacts and automate workflows

Siemens' project team actively works alongside our customers to deliver in-production software.

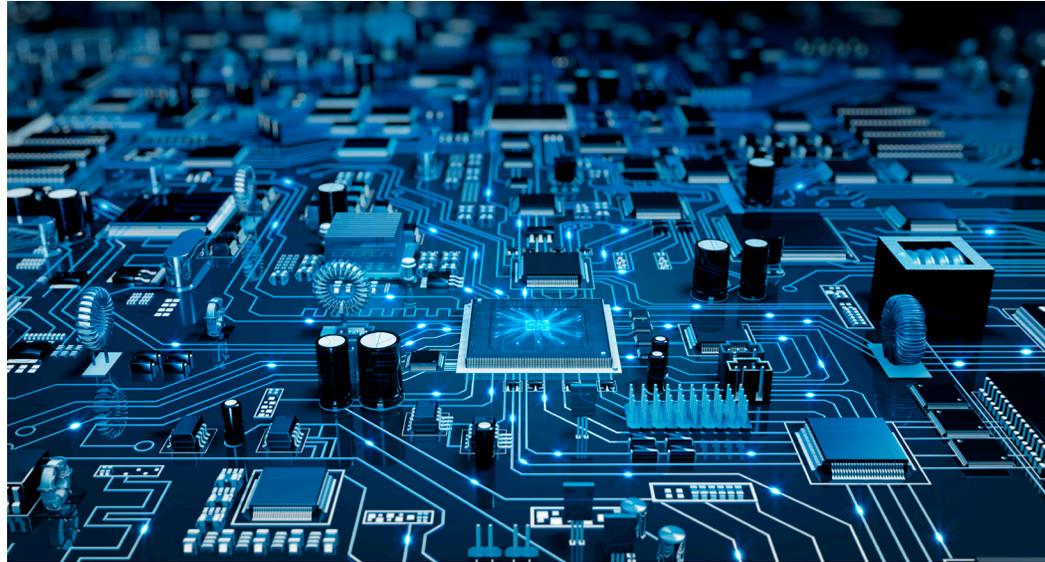
Advanced controls technology

Siemens' prototyping services help customers adopt advanced controls technology using MBD methodologies. Our expertise includes areas like optimal controls, sensor fusion and deep learning for advanced driver assistance systems (ADAS) and powertrain electrification.

Siemens' advanced controls services offerings include the full range of engineering activities from algorithm conception through implementation. Typical project deliverables include:

- White box application layer
- Embedded software
- Reference electronics
- Development environment including simulation, design and data management tools

For more information contact MBSE.plm@siemens.com or the services manager in your country.



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