Rapid Prototyping und Hardware-In-The-Loop – Simulation mit Simulink Real-Time™

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MathWorks
Simulink Real-Time – the new xPC Target

It enables you to:

- Test, verify, and validate your algorithmic and system designs early in real-time
- Achieve determinism through automatic generation and execution of real-time applications on computer-based hardware
- Evaluate new ideas using a flexible, scalable, production independent development platform
- Minimize risk, reduce costs, shorten time-to-market
- Instrument your real-time application now with high-definition controls and scopes
Continental Develops Electronically Controlled Air Suspension for Heavy-Duty Trucks

Challenge
Design an electronically controlled air suspension (ECAS) for heavy-duty, 40-ton trucks

Solution
Use MathWorks tools to trace requirements to design specifications, model and simulate the ECAS, and automatically generate production code

Results
- Six months of hardware development effort eliminated
- Verification time cut by up to 50 percent
- 90 percent of application automatically coded

“With MathWorks tools for Model-Based Design, we have one integrated tool chain from the beginning of development to the end. We have clear traceability of requirements, and our software is more maintainable because it is implemented as a model from which we automatically generate code.”

Thomas Ehl
Continental
Model-Based Design
Continuous Verification and Validation

System-Level Specification
Subsystem Design
Subsystem Integration & Test
Code Verification and Validation
HiL Simulation
User Acceptance Testing
Complete Integration & Test
System-Level Integration & Test

Rapid Prototyping
Verification and Validation

Requirements

System Design
Environment
Physical Components
Algorithms

Research
Data Analysis
Algorithm Development
Data Modeling

Subsystem Design

Implementation
Embedded Software
C, C++, VHDL, Verilog
Digital Electronics
MCU, DSP, FPGA, ASIC

Generate

Continuous Verification and Validation
Rapid Prototyping

- Ethernet
- RS232

Controller
Model

Inputs

Controller
Model

- Ethernet
- RS232
- CAN
- I/Os
- ...

Motor
Model
HiL – Simulation

- Ethernet
- RS232
- CAN
- I/Os
- …

- Ethernet
- RS232
Instrument your Real-Time Applications

Simulink Real-Time Explorer

- Manage and control Real-time target machines and applications
- Graphical controls and displays to design and run instrument panels
- Monitor signals using scopes, and log data on the fly
- Tune parameters individually or as groups
External Mode – Interaction with Simulink Real-Time Explorer
Simulink Real-Time Target Machines

Speedgoat

- Highly specialized developer of Real-time target machines, expressly designed to work with Simulink Real-Time
- Headquarters in Switzerland, founded by former MathWorks employees

Other Platforms

- Simulink Real-Time includes hardware driver support for a range of commercial off-the-shelf I/O boards

http://www.mathworks.de/products/simulink-real-time/
3 Things to Remember

- Rapid-Prototyping helps you to detect design bugs in real-time
- Use Hardware-In-The-Loop simulation to test your controller hardware
- Instrument your Real-Time Applications using high-definition scopes together with a variety of instruments