Key Takeaways

Meet stringent requirements and lower costs

Reduce hardware testing time up to 5x

Manage design complexity and improve team collaboration
Punch Powertrain develops complex SoC-based motor control

- Powertrains for hybrid and electric vehicles
- Hardware choice through simulations
- Traditional microcontroller too slow
- No experience designing FPGAs!

- Designed integrated E-drive: Motor, power electronics and software
- 4 different control strategies implemented
- Done in 1.5 years with 2FTE’s
- Models reusable for production
- Smooth integration and validation due to development process
Key trend: Increasing demands from motor drives
Systems-on-Chip for motor control
Key Trend: SoCs are now used in 36% of new FPGA projects

Challenges in using SoCs for Motor and Power Control
Why use Model-Based Design to develop motor control applications on SoCs?
Field-Oriented Control of Velocity
Hardware/Software Test Bench

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Conceptual workflow targeting SoCs
Hardware/software partitioning

Target to ARM

Target to Programmable Logic
Code Generation
3T Develops Robot Emergency Braking System with Model-Based Design

Challenge
Design and implement a robot emergency braking system with minimal hardware testing

Solution
Model-Based Design with Simulink and HDL Coder to model, verify, and implement the controller

Results
▪ Cleanroom time reduced from weeks to days
▪ Late requirement changes rapidly implemented
▪ Complex bug resolved in one day

"With Simulink and HDL Coder we eliminated programming errors and automated delay balancing, pipelining, and other tedious and error-prone tasks. As a result, we were able to easily and quickly implement change requests from our customer and reduce time-to-market."

Ronald van der Meer
3T
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Learn More

- Get an in-depth demo in the Technology Showcase
  - discuss the award-winning Native Floating Point in HDL Coder!

- Videos
  - HDL Coder: Native Floating Point

- Webinars
  - Prototyping SoC-based Motor Controllers on Intel SoCs with MATLAB and Simulink
  - How to Build Custom Motor Controllers for Zynq SoCs with MATLAB and Simulink

- Articles
  - How Modeling Helps Embedded Engineers Develop Applications for SoCs (MATLAB Digest)
  - MATLAB and Simulink Aid HW-SW Codesign of Zynq SoCs (Xcell Software Journal)

- Tutorials:
  - Define and Register Custom Board and Reference Design for SoC Workflow
  - Field-Oriented Control of a Permanent Magnet Synchronous Machine on SoCs