WIND™

Bosch Motorsport Speeds Development of Critical Racing Components with Wind River VxWorks

Development Time for Engine Control Units Cut by 50%

Bosch Motorsport, a unit of Bosch Engineering GmbH

Industry

Automotive electronics and components

Solutions

- VxWorks
- Wind River Workbench
- Wind River Professional Services
- Wind River Education Services

Benefits

- Shortened engine control unit development time by 50%
- Met nine-month product delivery deadline
- Developed platform for next generation of products

Part of Germany's Bosch Engineering GmbH and one of the world's largest automotive suppliers, Bosch Motorsport develops and manufactures electronics and components for high-endurance race cars.

The Challenge

Engine control units built by Bosch Motorsport play a critical role in race cars, controlling fuel injection and intelligently managing all the engine's functions, while simultaneously collecting and transmitting massive amounts of critical data to the race team's engineers via telemetry. Reliable, real-time performance for ECUs is mission-critical. One failed signal could destroy the engine and lose a race—or worse, endanger the driver.

Bosch Motorsport decided to choose a new hardware architecture as well as a new operating system in order to optimize performance and stay competitive. The hardware, in fact, was so new that board support packages were not yet available.

Moreover, the company faced a tight time-to-market challenge—one key customer had a race looming in just nine months.

> *"Wind River helped us develop an advanced, high-quality product while meeting challenging deadlines. We were able to shorten development time by over 50 percent for our engine control units for motorsports use."*
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> *— Markus Kirschner,*
> *Group Leader for Hardware*
> *Development, Bosch Motorsport*

The Solution

After discussions with a number of potential providers, Bosch Motorsport engaged Wind River® to help develop the new platform. Only Wind River could offer a complete package: a fully integrated development platform based on the VxWorks® operating system, with the necessary middleware, tools, and a board support package for the selected architecture.

Wind River also conducted educational sessions to bring the Bosch Motorsport engineers up to speed quickly on VxWorks and the Wind River Workbench development tool. The engineers attended onsite training classes as well as web-based training.

This comprehensive combination of advanced technology and expert assistance meant that Bosch Motorsport did not have to search further for the resources needed to get the project started—and completed—on time.

"Real-time performance is absolutely critical in racing conditions," says Andreas Becker, group leader of software development at Bosch Motorsport. "The real-time capabilities of VxWorks were a strong factor in our decision. It's robust and reliable, and very feature rich. It allows very deeply embedded development."

Telemetry is also vital to a winning race strategy, enabling the racing team's engineers to analyze and interpret massive amounts of data during the course of the race. A precursor to the Internet of Things, race telemetry requires significant machine-to-machine connectivity and intelligence. VxWorks also allows telematics-enabled components to manage tasks for data acquisition and communication, and deliver vast amounts of performance data to race engineers in real time.

"VxWorks is certainly a mature product with a long track record, and it's backed by a stable company with a strong local support team," says Wolfgang Assfalg, software architect at Bosch Motorsport. "We trusted that Wind River would help us meet our target."

Speeding Development with Simulation

The Bosch Motorsport team was able to get development underway well before the actual boards were available from the hardware vendor by leveraging the Wind River VxWorks Simulator capability within VxWorks. The simulator is a software application that provides a virtual platform that replicates the target hardware. By the time the software is moved to the hardware, it is already in a very advanced stage of development, testing, and debugging. In Bosch Motorsport's case, the simulation capability helped shave three months off the normal development cycle.

The Result

In the past, developing the system that runs ECUs took from 18 months to two years. With Wind River software, tools, and technical support, Bosch Motorsport cut the cycle by more than half. The developers met their immediate deadline and set the stage for building the next generation of ECUs on the Wind River platform. "Using VxWorks, Bosch Motorsport can create components that allow race engineers to be competitive and achieve optimum vehicle performance," says Markus Kirschner, group leader for hardware development at Bosch Motorsport.

With the support of Wind River, Bosch Motorsport was able to help their customer participating in the FIA World Endurance Championship (WEC) win first place in multiple races. During the 2013 season, Bosch Motorsport ECUs powered the winning team at "6 Hours of Silverstone" in April, "6 Hours of Spa" in May, and "24 Hours of Le Mans," the crown jewel event of the FIA World Endurance Championship, in June.

"Wind River provided highly effective and reliable technology, support, and services throughout the entire project," Assfalg concludes. "Wind River helped us develop an advanced, high quality product while meeting challenging deadlines. We were able to shorten development time by over 50 percent for our engine control units for motorsports."

Bosch Motorsport enjoys a strong relationship with Wind River that extends well beyond the purchase and implementation of any one product. "We know that Wind River will support us if we run into difficulties," Becker says. "They understand our issues and help us solve them. We will continue to work with them on additional projects in the future."