



Magneti Marelli, Wind River Give Grand Prix Performance

International Automotive Company Satisfies Formula 1 Customer's Need for Speed with VxWorks

Magneti Marelli

Industry

Automotive

Solutions

- Wind River Platform for Automotive Devices, VxWorks Edition
- Wind River Workbench

Benefits

- Won Formula 1 customer due to reputation of VxWorks in the marketplace
- Completed product within four months, without sacrificing performance or reliability
- Reduced development time and testing and qualification costs
- Met unique customer coding requirements using the Wind River partner ecosystem
- Increased productivity and collaboration using Wind River Workbench



Magneti Marelli is an international company that designs and produces high-technology systems and components for all the leading automotive manufacturers in Europe, North and South America, and Asia.

The company's Motorsport department specializes in designing, manufacturing, and selling parts, hardware, and software products for motor-racing competitions. In this department, 100 specialized engineers and technicians develop products for the top teams in Formula 1; World Rally Championship (WRC); Road Racing World Championship Grand Prix (MotoGP); Superbike; Grand Prix 2 (GP2); Fédération Internationale l'Automobile Grand Tour (FIA GT); and other automobile, bike, and offshore races.

The Challenge

Let the Race Begin

Magneti Marelli Motorsport understands the need for speed—without ever sacrificing quality. Execution time is key for control system and data acquisition software. Engineers usually start with tested hardware components to implement desired software functionalities. With each product release, performance must increase dramatically and reliability must remain high.

Motorsport systems and components include motor control systems; internal vehicle management systems; and telemetry systems, which collect data from onboard sensors and forward them to ground systems. These products have shorter life spans than those used in ordinary cars and bikes because of tightly scheduled races and constantly changing rules. The Magneti Marelli Motorsport engineering team is always developing new systems and upgrading existing designs for motorsport races.

“We have very little time to design and develop a system,” says Riccardo De Filippi, head of development at Magneti Marelli Motorsport. “Because we only work on a small number of cars compared to mass car production, rapid prototyping is ongoing.”

The Approach

Formula for Success

In 2008, Magneti Marelli Motorsport began working on a telemetry logger for Formula 1 races. The instrument is contained within a black box that lies under the driver’s seat. It collects critical vehicle data, such as suspension and cockpit temperature, from sensors and board control units. This data is forwarded to telemetry radio systems during test, warm-up, qualification, and race laps so that pit staff, designers, and engineers receive real-time information about the vehicle’s performance. An efficient, high-performance telemetry system is an important part of a winning race strategy.

“We needed to release a high-performance, reliable product in a very short time frame,” De Filippi says. “We wanted a real-time operating system (RTOS) partner who could cope with this type of commitment and ensure high-level support—and this led us to Wind River.”

Magneti Marelli Motorsport evaluated many different software solutions to find a real-time computing platform that would ensure data-logger’s required performance levels. After a complete market analysis, the department decided upon Wind River Platform for Automotive Devices, VxWorks Edition.

“We appreciated that this Wind River software solution was specifically created for automotive devices requiring an RTOS,” De Filippi says. “VxWorks allows us to manage parallel synchronous tasks for both data acquisition and encryption and enables communication with FlexRay, Ethernet, controller area network (CAN), and Attached Resource Computer Network (ARCNET) buses.”

Support from the Starting Line

Wind River engineers worked with the Magneti Marelli Motorsport team to design a solution and dedicated a team to support the project on the customer’s site.

“Wind River Support has been excellent from the beginning,” De Filippi says. “We quickly completed negotiations and put a contract into place. Wind River provided us with an outstanding product complete with efficient support throughout the project. They ported the software onto our hardware platform and helped us keep up with challenging deadlines.”

Because of customer-specific hardware and requirements, Magneti Marelli Motorsport required customized firmware for the data-logger project. Wind River helped develop a flexible solution to meet these needs and used its partner ecosystem to meet additional requirements. Datalight, a Wind River partner that develops technologies to manage data in embedded devices, was brought on board to help with disk-management coding.

“One of our biggest challenges during this project was the system startup time,” De Filippi recalls. “Some situations require immediate data collection after the logger is powered up, so a fast startup time avoids critical data loss. With VxWorks, we were able to reduce the startup time from seconds to milliseconds. It was largely due to this success and our customer’s overall confidence in VxWorks that we were able to win this new contract with Formula 1.”

“With so little time available, any delays or difficulties would have been disastrous. Responsive, efficient technical support allowed our project to go fullspeed ahead, without any stops or delays.”

*—Riccardo De Filippi, Head
of Development, Magneti
Marelli Motorsport*

The Result

Full-Speed Ahead

Magneti Marelli Motorsport was able to reengineer the data-logger for Formula 1 within four months. By outsourcing a portion of the software development to Wind River and its qualified partner, Datalight, Magneti Marelli achieved its desired results.

“With so little time available, any delays or difficulties would have been disastrous,” De Filippi says. “Responsive, efficient technical support allowed our project to go full-speed ahead, without any stops or delays. Wind River was a constant presence during the entire project. The same Wind River people we met at the beginning of the project still support our products, and we find that priceless.”

The project’s success is evidenced by the product’s performance. The data-logger achieves high-frequency acquisition rates and still delivers the required high reliability. The product is used in the new Formula 1 Kinetic Energy Recovery System (KERS) automobiles, which use new energy-storage systems and require high-performance, reliable monitoring of high-frequency control systems.

“Wind River VxWorks is the right platform for high-end applications that require the best of performance and reliability, thanks to product maturity and skilled global technical support,” De Filippi concludes.

Learn More

For additional information about the products mentioned in this case study, visit www.windriver.com and www.magnetimarelli.com.

