"THE FOCUS IN THE DEVELOPMENT OF NEW RACE CARS IS ON IDENTIFYING NEW INTELLIGENT WAYS OF DRIVETRAIN AND ENERGY MANAGEMENT"

INTELLIGENT SOFTWARE

ITK Engineering's Dr Houssem Abdellatif explains the increasing importance of implementing intelligent software in motorsport

Development teams in motorsports are faced with a whole host of demands: they are under pressure to bring winning technical innovations to the racetrack, while being expected to shape the automotive industry's future. In their efforts to address this challenge, many of the big names in manufacturing rely on technological partners known for contributing their know-how and their latest methods of development. Here, Dr Houssem Abdellatif, program manager for ITK Engineering, talks about the ever-growing importance of electronics and intelligent software algorithms for motor racing.

Some of the big names in motorsports series have undergone major changes over the past year, and races today are governed by a whole set of new regulations. Has this development also left its mark on the engineering of sports cars?
Indeed it has, since abiding by the regulations is a major challenge to any developer of sports cars. Previously, depending on the series and regulations, the main focus was on aerodynamics and engine performance. Today, we are looking at strict rules just for fuel consumption alone – which is a huge challenge to any developer of technology. It is electronic components and controls featuring intelligent software that now ensure that these rules are adhered to.

Today's big issues in motorsport are efficient operating strategies and optimized energy management. With sophisticated electronics here to stay in racing cars, the scales will be tipped by an E/E architecture designed to save weight. Many of the big names in automobile manufacturing, in an effort to meet the goals they have set for themselves, are turning to the know-how of their partners in technology. ITK Engineering is supporting Audi Sport in the development of software for the control modules in drivetrains, energy management and driving dynamics, and also by providing specific test environments and simulation models.

Testing has traditionally taken high priority in race car development. What has testing come to mean today?
Today's high level of vehicle complexity has made it virtually impossible to continue testing as before, i.e. solely by taking cars for a test drive on the test track. In fact, testing needs to start early on in the process, using virtual prototypes, simulations, test benches and model-based approaches. Only by verifying and validating the individual components and their effects on each other right from the development phase is it possible to meet the usually tight time schedules, while keeping within a reasonable budget.

You just mentioned simulation and model-based testing. What are the advantages of this method?
Simulation makes it possible to test new functions at a stage when the actual vehicle components do not even exist. Specific testing environments and simulation models provide reliable data on feasibility and behavior within the overall system. A single virtual environment permits continuous adjustments to individual modules and great acceleration of the development processes; this method makes it possible to implement development enhancements and configurations within a very short time in all testing platforms including MIL (model in the loop), HIL and the component test bench.

The results obtained from virtual validation can be applied perfectly to the vehicle. All it requires is a good emulation of reality and an accurate mapping of the original interfaces. The result is an outstanding degree of flexibility. This method also makes it possible to perform performance analyses, including the driver and track, at a very early stage in development, to allow for optimizing steps very early on. This is the way to accelerate development processes and achieve ambitious goals – a key advantage in motorsports.

What challenges do you anticipate for sports car development in the years to come?
Both sports cars and Formula 1 cars are seeing a constant increase in vehicle intelligence and complexity in an effort to achieve the efficiency criteria required. The focus in the development of new race cars is on identifying new and intelligent ways of drivetrain and energy management – a trend that is here to stay for the years to come. <