

Application for Simulation Technologies in Driver Control Simulation



Dallara

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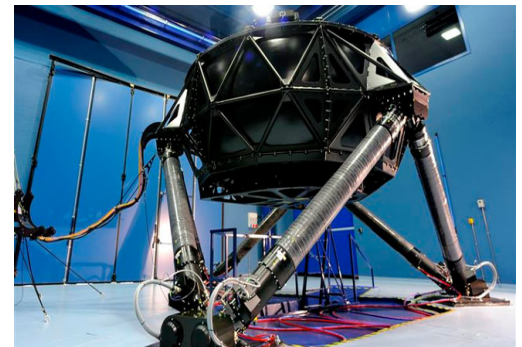
Dallara is an Italian company, born in 1972 and specialized in design, engineering and manufacturing of race cars. The company has two center: Varano (Italy) and Indianapolis (USA). During the last years the engineering activities are significantly increased, reaching about 40% of turnover. To be competitive on the global market, it has to satisfy 4 points: Its cars must win every weekend; global customer care; to deliver better products at lower price; 9 months from starting the project to first track test.

Manufacturing scenario description

As it happens in every business, it is crucial to save both time and money in each project development. To realize this, Dallara developed its own technologies, and in the pursuit of excellence, the company has been pushing towards a Global Virtualization path. The intensive uses of super-computer and 3D software have become central in Dallara's design process, and now allow a car to be driven before it has even been built. The first simulator is located in Varano plant, another installation is planned for 2014 in Indianapolis plant. The simulator offers to engineers, race team and drivers the possibility of setting-up vehicle development, data analysis and driver coaching.

Approach and results with simulation technologies

The Dallara Simulator enables a driver to drive the exact same monocoque used on track, with same driver controls. The simulation engine, complete with laser scanned tracks and multi-body model, can replicate real car behavior. Changing virtually any parameter of a car's setup, it is possible to meet the driver's needs and test the changes. The tire thermal model allows for the preparation of setup based on tire usage, track characteristics and weather conditions. The user interface, designed for speed, ease of use and security of data, allows instantaneous parameters' changes.



Graphs showing pressure regulation

Once the virtual model is built, it is processed through a range of tests simulating different manoeuvres: straight line acceleration, braking, lane change, steering pad. After analyzing data and evaluating car performance, minute adjustments are made and an entire lap is simulated. In a data analysis phase, a comparison between a simulated and a real lap is made. Simulation cannot exactly reproduce reality; however it shows trends and feelings. Dallara takes great care of comparing simulations data with reality, in order to extend their records and validating their projections.

Benefits for the Company

- Simulator has same data channels of real cars, but better accuracy due to absence of signal noise and calibration errors
- There is the possibility to access to not measurable parameters on real cars, in order to perform a deeper and more thorough analysis of car behavior

Key Success Factors

- Real data access for simulation scenarios for replicate real car behavior
- Simulator with the same driver controls
- Possibility to change virtually any parameter of a car's setup and test the changes
- system's reaction to changes