

ITK and Formula E: Simulating the road to victory

Engineers develop the perfect energy strategy for the E racing series



Daniel Abt, race car driver for Audi Sport ABT Schaeffler, puts the energy strategy to the test in the Audi simulator. (Photo credit: Audi Communications Motorsport)

Rülzheim, July 10, 2018 – When the lights turn green at the New York City E-Prix in Red Hook, Brooklyn, this weekend (July 14. and 15), Daniel Abt, Lucas di Grassi, and their Audi e-tron FE04s will be good to go. The limited battery capacity of these vehicles calls for an intelligent energy management strategy that ensures an intelligent energy distribution, maximizing in turn the average vehicle speed in every situation – including on unfamiliar race tracks, in adverse weather conditions, during safety-car periods, or when racing head-to-head with a rival. What are the most challenging aspects of the track? At which points will

energy consumption peak? And how can this energy be saved? As a technology partner to Audi Sport, ITK Engineering used a strictly model-based process to help develop software that enables the drivers to successfully employ previously tested and optimized energy strategies during the race. Abt and di Grassi have an excellent track record: Lucas di Grassi won a spot on the podium in the last five races, while his colleague Daniel Abt chalked up wins in Berlin and Mexico. Their current total of 186 points puts Abt and di Grassi in second place overall in the team challenge and in an excellent position to take the team title at the final race this weekend in New York.

In Formula E, the amount of time between races can often be just a weekend. This leaves very little time to implement any changes resulting from insights gained in the previous race. “What’s more, vehicle tests are heavily regulated. It’s not uncommon for the vehicle’s first run to be on the race day itself. For this reason, the full development cycle has to be completed within this tight timeframe – from the requirement analysis to implementation and testing – to ensure everything works reliably for the first run on race weekend,” says Sven Wergandt, program manager for the motorsport business unit at ITK Engineering. He explains that preparing the vehicle for potential problems on a given course is not the only reason modifications are necessary: “What sets Formula E apart from other events is that new tracks are added to the mix each season and some of the familiar tracks are modified slightly. So, even when our team often finds itself on unfamiliar territory, the design of the vehicles has to be optimized for these situations.”

Outstanding racetrack solutions through virtualization

In this context, the definition of temporally deterministic development processes plays an essential role in enabling the team to implement outstanding racetrack solutions in the vehicle in the short time they have available before race day. In the absence of real vehicle tests and experience, the team must do all its preparation for the event in a virtual environment. Virtualization and simulation

enable requirements to be met extremely quickly while maintaining the highest standards of quality, traceability, test coverage, and documentation.

ITK – Technology partner to Audi Sport

As a long-standing technology partner to Audi Sport, ITK Engineering has been helping develop the software for the vehicles driven by Formula E champion Lucas di Grassi and his fellow driver, Daniel Abt from the Audi Sport ABT Schaeffler team since 2016. This support extends to the control system for the Audi e-tron FE04's new-design drive train – including the energy strategy and the cockpit display that serves as a human-machine interface for visualizing details such as energy metrics.

Further Information:

- About [ITK Engineering](#)
- Find out more about our involvement in [Formula E](#)

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About ITK Engineering

ITK Engineering GmbH was established in 1994 as “Ingenieurbüro für technische Kybernetik” and is an internationally operating technology company with customers in the automotive and aerospace industries as well as in building and medical technologies, motorsports, robotics and transportation. In addition to tailored technical consulting and development services, the company offers turn-key systems in the fields of software engineering, embedded systems, model-based design and testing as well as control systems design and signal processing. With a staff of more than 1.000 people, ITK is headquartered in Rülzheim (Palatinate) and has nine branch offices in Germany. In addition, ITK is represented in the USA, in Japan, Spain and Austria.