



Top Speed on Every Track

Calibrating motorsport and production vehicles with ETAS INCA

At WENDLAND MOTORENTECHNIK GmbH in Rangendingen, Germany, ETAS INCA is ever present, whether the team is preparing cars for the next race or optimizing production vehicle powertrains for low emissions. Looking back at more than three decades of motor racing experience – with many wins and records as well as a considerable number of production-vehicle projects – Dieter Wendland, the company's head, is entirely satisfied.

AUTHOR

Dieter Wendland, together with his brother Karl-Heinz, has been managing the business affairs of the engine technology company **WENDLAND MOTORENTECHNIK GmbH** in Rangendingen, Germany, since 1985.

Every racetrack has its own characteristics, and every race has different environmental and weather conditions. The conditions change even during the course of a weekend's racing, because there is so much rubber on the track towards the end that the tires noticeably lose traction. In any case, cold snaps or the onset of rain change everything. For us at WENDLAND MOTORENTECHNIK, it's this uncertainty that makes motor racing so appealing. We have been optimizing racing car engines, transmissions, and chassis for over 30 years. On our test benches we simulate racetracks, we

adapt powertrains, chassis, and transmissions to any upcoming race, and we coax the highest levels of performance out of gasoline and diesel engines. We mainly work with Porsche engines, but just in 2014 we also put a VW Polo TDI on a racing chassis in Hockenheim and converted it from 130 bhp to 200 bhp. It still holds the diesel class track record today. Our other three vehicles were also best in class that weekend. Such victories – which include our win in 2007, when we entered the ADAC Rallye Masters for the first and currently only time, as well as

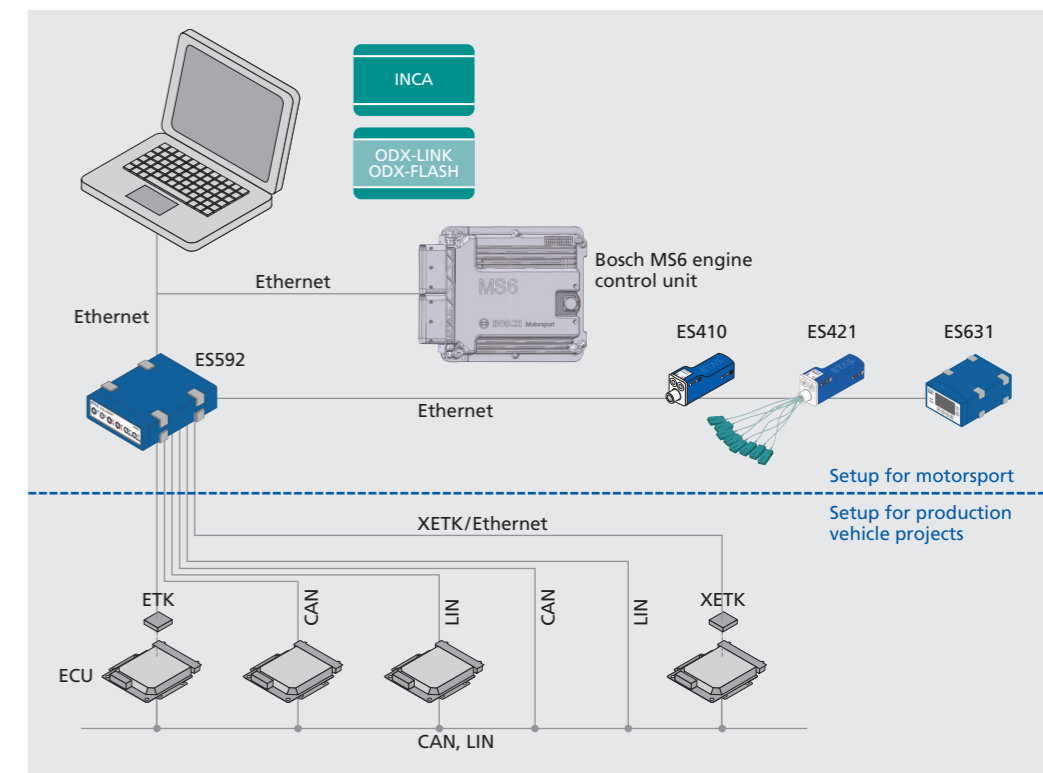
our triumphs in many Porsche Carrera Cup and Porsche Supercup races and even the 24 Hours Nürburgring event – are the icing on the cake. Just getting ready for a race is pure joy. We are caught up in dismantling and gauging engine components as we revise them, in reading and analyzing vehicle data at our test benches and the racetrack, in deciding on which tires to use and the suspension geometry, and in developing the race strategy. Then, on the night before the race, we realize just how many things are different than expected. That's when we work until deep into the night, tweaking the

A Wendland Porsche 911 having its power measured on the dynamometer test bench.

engine management system and fine-tuning the gear pairs or the chassis design. I wouldn't want to change places with anyone. We have fulfilled our dream and turned our hobby into our job.

On this journey, ETAS has been at our side almost from the beginning. I can still remember the INCA V1.0 measurement, calibration, and diagnostics software, that came in a dedicated motorsport version. Today, we're using INCA V7.2. That means we've worked with seven generations of this tool – in the context both of motor racing and also of our production vehicle projects, where our role is to provide services for powertrain development and calibration. Before a race, we use INCA to go over the mappings of all the powertrain parameters: ignition timings, fuel injection strategies, turbocharger boost pressures, and many more things. On the basis of this, we aim to adjust the calibration of the engine and transmission control units in order to optimize the responsiveness and acceleration respectively for the racetrack in question.

Our calibration experience in the motor racing context teaches us a lot of things that can be applied in the production vehicle context, and vice versa – particularly as regards the relationship between fuel consumption and performance. Efficiency is essential. Moreover, emissions limits are an important matter on public roads in the same way as there are regulations that have to be obeyed on racetracks. In both cases, INCA helps us to gather and evaluate powertrain data and to calibrate engines in a way that conforms to the regulations. It is *the* calibration tool on the market – and with good reason. On the one hand, the INCA



product family's open interfaces and its compliance with the most important industry standards make it easy for us to integrate it into the hardware and software environment that we have developed. On the other hand, it simplifies our work because the graphical measurement displays and oscilloscopes, the ease of use, and also the calibration and data management tools are all well thought out. When we're caught up in the stressful stages of a project or when we're preparing for a race, this defined structure is very helpful. And last but not least, our measuring equipment comes from ETAS, too – in other words, Lambda Module and devices for measuring temperature, voltage, and pressure. This equipment gives us a fast and flexible setup, and we can rely on the accuracy of the measurements as well as on their time-synchronous acquisition and transmission.

We've been working with INCA successfully for over 20 years. Yet even now I am still discovering new possibilities of this calibration software. Measuring equipment has advanced enormously in recent years, and consequently we can work faster and with greater precision today. For us, the functions afforded by the INCA product family are a key to our success – both on the racetrack and in production vehicle projects. We need state-of-the-art measuring equipment and well thought-out tools if we are to master the increasing complexity of tuning and calibrating production powertrains. That is all the more true during the stress of preparing for a race. We've been counting on ETAS tools for two decades, and so it was the perfect match when ETAS came on board as one of our sponsors two years ago. Together we're hitting top speed on every track.

Dieter Wendland relies on INCA V7.2 to calibrate and adjust his engine control units. In this process, he uses INCA software to transfer data through an ES592 Universal Interface Module to a PC. The data is collected by an ES410 A/D Module and an ES421 Thermo Module. The ES631 Lambda Module measures the oxygen content in the exhaust gas and records the ambient atmospheric pressure.