



## Not without my KiBox

Prototyping and engine development at Suter Industries



Successful Swiss collaboration: company founder and owner Eskil Suter (left) with Denis Marschel, Divisional Marketing Manager at Kistler, in front of an engine model.

**As a dynamic partner for vehicle manufacturers across the globe, Suter Industries combines in-depth know-how with rapid development processes. To be on the safe side when testing prototypes on the test stand, the Swiss engineers opt for KiBox – the universal system for combustion analysis and engine indication from Kistler.**

Key player in the motor racing business, valued partner for engine development and prototype construction: Suter Industries, the Swiss provider of engineering services, can look back on some remarkable advances over the last two decades. Founded in 1996 by motorcycle racing driver Eskil Suter, the company has taken just 20 years to evolve from a specialist in motorcycle sport into a research and development center for cutting-edge drive technology – which, of course, includes the trend towards electrification of the drivetrain. “We do have some highly specialized products for the racing market that are in heavy demand – such as the Suter Clutch, which we developed ourselves – but the racing segment accounts for only 15% of our sales nowadays,” the company’s CTO Alessandro Giussani points out.

“We currently offer one-stop development services for various vehicle industries – including watercraft and aircraft as well as land vehicles. Suter has a particular advantage: we offer end-to-end handling of the project here in house – from engineering, design, production and assembly through to comprehensive prototype testing,” Giussani continues. “That means short distances and fast throughput times – for which we are well known.” Although Suter is a relatively small company with a workforce of 40, prestigious names pass through its doors: cooperation partners include renowned motorcycle brands such as Kawasaki and BMW as well as Liebherr, Alinghi, Oerlikon

Metco and Belassi, the jet ski manufacturer. Suter’s development work also focuses on another important business area: compact APUs (Auxiliary Power Units) – auxiliary generators used to supply power on yachts and in special vehicles, for example.

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Reto Karrer, Head of Development at Suter Industries

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#### **Comprehensive indication on the test stand**

Reto Karrer, Suter’s Head of Development, has been with the firm for over 15 years. He was actively involved in racing sport in the days when Suter sometimes had up to 14 machines competing in the Moto2 series – including direct on-track support at racing weekends. Nowadays, he and his eight-strong team are responsible for all Suter’s development projects, ensuring that each design leads to a successful proof of concept (PoC). Quite often, Karrer and his team are the last hope for desperate engineers who have to cope with time pressure and are unable to find a solution to a difficult problem. “Thanks to our combination of in-depth know-how and an agile organization, we can almost always offer a helping hand, even when time is in short supply. By overlapping some of the individual project phases, we can substantially reduce the development time until the project goal is achieved. There’s only one critical question for us: whether a technical design can function – and if so, how; everything else comes later. And another point: prototypes don’t necessarily have to be expensive,” Karrer comments.



Excellence in design and development: Suter Industries is standing by to help when the going gets tough.

His team is also responsible for designing and supporting the test stands. Suter is excellently equipped in this respect too, with four large-scale installations that cover a range from 60 to 405 kW, with flexible instrumentation capability. When it comes to engine performance indication, Suter regularly uses the KiBox by Kistler. On the basis of cylinder pressure measurements, this universal system for combustion analysis supplies accurate information about the process in the individual cylinders, so injection and ignition can be optimized. "We've been using KiBox since the end of 2015, and we're highly satisfied with it. We benefit from the numerous different features to form a comprehensive picture of the processes in the engine. For instance, we can precisely determine the power loss or thermodynamic loss angle with the help of a TDC probe," Karrer notes.

#### Valuable support from Service and Sales

KiBox is not only used for performance optimization in the strict sense, with a large number of parameters: it also protects engines against damage caused by knocking. Data obtained with KiBox plays an essential part in optimal calibration of knock control in the engine control unit. As well as Kistler's technology, Karrer appreciates the company's cooperative approach: "Whenever we have specific inquiries, the service team responds very honestly; and I really have to bang the drum for the sales force as well: they are always up-to-date with the latest technology; they are highly flexible, and what they offer always focuses on the solution. Those are major benefits in our business, where the heat is often on!" Physical proximity is also a factor – Suter's headquarters in Turbenthal is barely 15 kilometers from Kistler's base in Winterthur. "We're excellently networked, and we like to support Switzerland as an industrial location – but we also have customers all over the world. For a customer in China, we've just finished a complete development project for police motorcycles – and what's more, production will then take place on site in the Far East," Karrer continues.

Independently of KiBox, Suter also deploys Kistler accelerometers to measure vibrations. One current customer project involves the development of a vibration-free generator that has to fit into a very confined space. Another interesting application area for Suter consists of motors and engines for cargo drones that can transport loads of up to 160 kg, enabling them to take over many delivery services. As a passionate developer, it comes as no surprise that Reto Karrer also has his eye on the electrification of the automobile. "Speaking as a technician, I see this as a 'both/and' situation rather than an 'either/or' choice. We're basically developing in both directions, and we're fascinated to see how things will continue. Hybrid technology, in particular, shouldn't be underestimated; we've already been able to make progress on several interesting projects with customers in this field. We'll be glad to opt for solutions from Kistler in the future, too – quite simply, they offer exactly the right mix of performance, value for money and service."

#### Combustion analysis made easy – with KiBox

KiBox by Kistler can be used as a stationary system on a test stand, and also as a mobile in-vehicle application. It supplies these key parameters:

- Knocking
- Peak pressure (mechanical load) and its angular position
- Indicated mean effective pressure (overall, high pressure and gas exchange components)
- Heat release rate
- Energy conversion values and combustion period
- Ignition timing
- Injection timing
- Speed (averaged and high-resolution)
- Maximum pressure increase and its angular position
- Combustion noise (frequency analysis)

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