Automotive
Test
Systems

ESPRIT

Issue 02/2011

Highlights:

New E-Drive test stand at the test centre in Oberursel

Interview with Jean-Pierre Surin, European Segment Leader HORIBA

Dear readers,

The terms E-mobility and alternative powertrains are on everyone's lips these days. HORIBA is fully prepared to meet the growing demand for alternative powertrain test systems following on from its successful trend last year and is going full speed ahead. In recent months we have launched some very important new products which will influence every day testing. In addition, we have extended our capabilities with a new E-motor test stand in our Oberursel test centre. Now we have a state-of-the-art testing system which meets even the highest customer demands.

Furthermore, our restructuring in Darmstadt has been completed and is already bearing fruit while Jean-Pierre Surin, a long standing HORIBA expert, has been announced European Segment Leader. He is now responsible for our ATS business and will continue to focus on high product quality and first class service all over the globe – but find out more about his plans in the interview on page 6 and 7.

Enjoy reading our latest issue

Yours

Andy Keay

HORIBA
Automotive Test Systems

A new face for the Mechatronics sector of HORIBA Europe

New Managing Director optimizes the Mechatronics Product Lines / Brunke: "The future of product development lies in the further modularization."

"The restructuring allows a very targeted – and thus rapid – reaction to the requirements of the customer."

Since the beginning of this year, HORIBA Europe has had a new face in Jörg Brunke. A 50-year-old with a degree in engineering and business, he started his career as a corporate consultant at Coopers & Lybrand in 1989. Now he can look back on more than thirteen years of experience as managing director in the field of test systems. Up to now Jörg Brunke was successfully in charge of support for automotive customers in the production and development sectors worldwide. In Darmstadt, he is the Managing Director of the HORIBA Mechatronics product lines, where he is able to contribute his know-how to the "Productline", "Engineering" and "Operations" areas.
The manager explains the strategic reorientation of the Mechatronics product lines as follows:

Restructuring of the Mechatronics product lines with the focus on core competences

HORIBA offers a comprehensive range of products in the field of system solutions for research and development for passenger cars, trucks and other vehicles propelled by internal combustion engines. All of our products meet the demands made on test systems of today and the future with regard to mechanics, electronics and software.
At the beginning of the year, i.e. shortly after starting in my new position at HORIBA Europe, we divided up the mechatronics field into a delivery organization and a factory organization. Since then the delivery organization has been in charge of marketing products and services whereas the factory organization is responsible for product management, application support, engineering, development, production and taking systems into operation. The restructuring of the Mechatronics product lines allows a very targeted – and thus rapid – reaction to the requirements of the customer. Every sector now has clearly separated functions and is able to achieve an optimum result by concentrating on the core competences in each case. HORIBA has excellent know-how in the development and design of engine, vehicle and drive test stands. The aim for the years to come is therefore to expand these competences via supplementary products etc.

Modularization as the key to success

The future of product development lies in the further modularization of the different assembles. Our approach is currently proving its worth in our new VULCAN Chassis Dynamometers and the TITAN Powertrain test stands. The modular design offers our customers highly flexible, demand-oriented test stands. These can be optimally adapted to fit the individual requirements, for example by using one single test stand for both, engine and powertrain tests.
It does not matter whether a test stand is designed and used for individual components or for complete vehicles. The option of modifying individual components of a test stand (the modular principle) allows all customers to profit from the HORIBA products in equal measure. The implementation of these measures ultimately allows us to gear ourselves to the requests of our customers in an optimum way.

New E-Drive test stand at the test centre in Oberursel

Strategic investment in the future market for alternative powertrains and total solutions

Brought into operation in early September: the new TITAN E-Drive

In early September, HORIBA brought its new E-motor test stand into operation at the test centre in Oberursel. This system adds to the existing chassis dynamometer and the engine test systems, to provide a state-of-the-art testing system in the third test cell. Like the TITAN Engine test stands for combustion engines, HORIBA uses the powerful combination of the HORIBA SPARC controller and STARS test automation for the TITAN E-motor test stand too.

"The electrification of the powertrain using hybrid and E-motors is also a challenge for the suppliers of test stands," says Joachim Misgeld, Manager of the HORIBA test centre in Oberursel. "With the TITAN E-Drive, HORIBA now has a first-class test development tool allowing it to meet these requirements with regard to research on alternative powertrains even in the pre-series status. For this reason, it was a logical step for us to re-equip our test centre in Oberursel with our state-of-the art technology."

HORIBA is experiencing a great demand for test capacities for E-motors which the manager believes will even increase still further: "Our order books are

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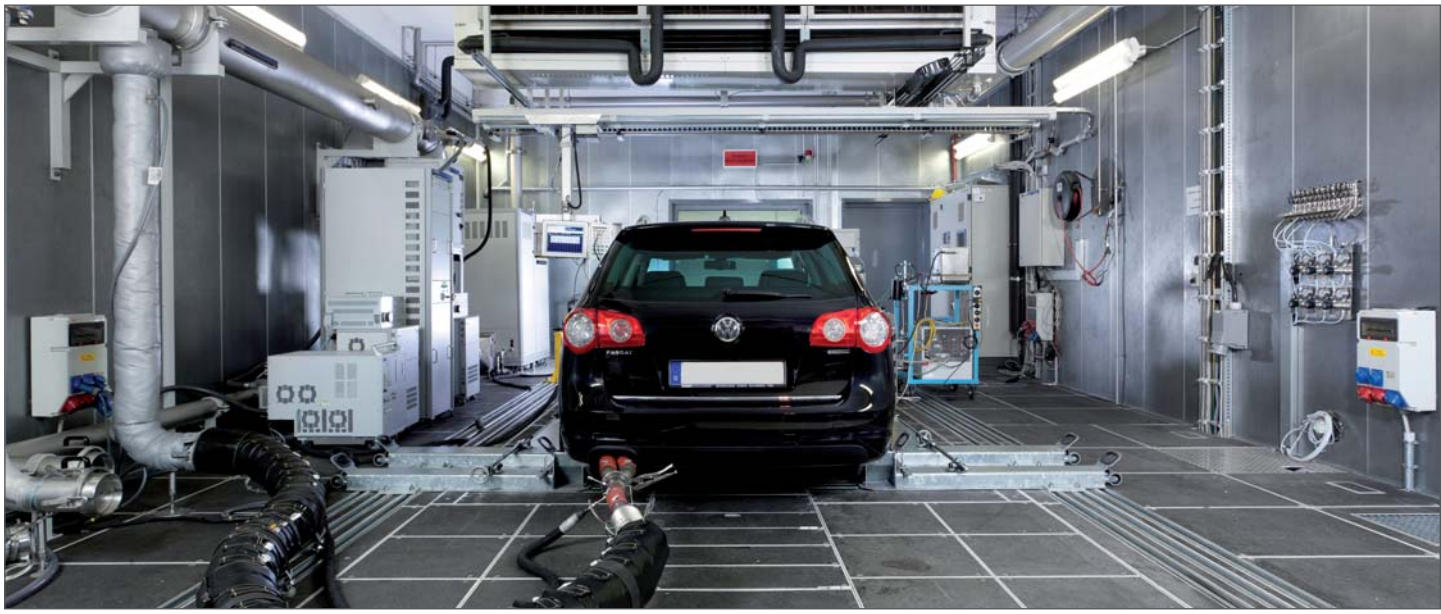

A state-of-the-art vehicle test stand equipped with a driving robot simulates realistic on-road driving conditions for emission measurements

already nicely filled but we've still got capacities for short-term requests," says Misgeld happily. "The new E-motor test stand is a strategic investment for HORIBA which will allow us to expand and intensify our know-how in the field of alternative powertrain systems," Misgeld stressed. "Our employees have completed an extensive training program preparing them in an optimum way for the operation of the test stand. This way we guarantee the necessary safety at the workplace too."

The E-motor test stand allows maximum testing flexibility

The E-motor test stand is used for applications such as carrying out analyses of the characteristic diagram as well as idling and short-circuit tests. The dynamometer used is an asynchronous machine of $DYNAS_3$ HS 180 type designed for the high starting torque of the electric motors with speeds of up to 16,000 rpm. With a rated power output of 178 kW and a rated torque of 430 Nm (overload torque: 559 Nm), the

DYNAS$_3$ HS 180 asynchronous machine covers a wide field of applications and a broad test range.
An optimized DC power source supplies the test specimens with voltages of up to 950 V. As an extension of this DC power supply, the virtual SPARC battery system simulates different battery behaviours and a wide range of battery parameters.
The system not only maps the physical and chemical charging condition of the battery; it also simulates various parameters such as the age and composition of the battery, driving cycles and a wide range of environmental influences. It thus proves its worth as an efficient tool for simulating and forecasting the actual battery behaviour of various battery models. In this way, HORIBA guarantees maximum testing flexibility. In conjunction with HORIBA's own virtual battery simulation system, it is thus possible to test E-motors under realistic conditions. The HORIBA engineers are therefore in a position to carry out complex E-motor analyses according to individual customer requests.

Background Information:

The R&D test stands at the Oberursel test centre

With the Oberursel test centre, which has been in existence since the year 2003, HORIBA has a state-of-the-art test facility with a chassis dynamometer and two test stands for internal combustion engines. One of these two test stands has now been replaced by a TITAN E-Drive. The modular measurement and testing systems are able to test complete engines as well as individual vehicle-related assembles such as turbochargers. Besides emission measurements, the technology behind the test facility is also suitable for extensive development and application work such as the calibration of control units. For example, the new Quantum Cascade Laser (QCL) analyzers are tested here and new knowledge is acquired for their certification. Customers can also use the three test stands to expand their testing capacity. The test centre is thus an important development tool for HORIBA, and for other companies it is an interesting extension and an alternative to their own testing capacities.
The HORIBA TITAN Engine test stand for conventional engines is equipped with a DYNAS$_3$ HD350 asynchronous machine providing an output of up to 350 kW at a maximum speed of 9,000 rpm. The connected MEXA-7100 FX exhaust gas measurement system for raw emission measurements is in particular characterized by its rapid response behaviour. In combination with a HORIBA MDLT1300 microdilution tunnel, solid and gaseous exhaust gas components can also be measured with a high degree of precision.
A HORIBA FQ2100 DP fuel flow meter conditions the fuel, thus allowing the precise determination of the fuel consumption.
The modern chassis roller dynamometer is designed for testing the emissions from passenger cars and light duty vehicles. The powerful VETS One Automation puts HORIBA in a position to carry out individual customer-specific analyses in addition to the driving cycles prescribed by international legislation. A one-axle roller with a diameter of 48 inches and a HORIBA ADS-7000 driving robot are used for the realistic simulation of on-road driving conditions and to provide reproducible test results.
A MEXA-7000 2-line emission system for raw, diluted and bag measurement guarantees high-precision measurements meeting the requirements of all international standards (EU 5-certified).

Interview

"Our customers can rely all over the world and we to support them wherever

Jean-Pierre Surin has taken on the post of European segment leader at HORIBA.
The 44-year-old engineer has had long years of experience in the development of automotive test systems. Having graduated as an engineer at the Ecole des Hautes Etudes Industrielles (Lille, France), Surin started his career as a project manager for test facility engineering at PSA Peugeot Citroën in France in August 1990. Since January 1999, the specialist has been working for HORIBA France, where he held the position of account manager for PSA and supported the implementation of turnkey services. In 2005, Surin was appointed managing director of the HORIBA subsidiary in France.

"Made by HORIBA" stands for high product quality and first class service

Mr. Surin, you have been working for HORIBA for more than one decade now. Where do you see the strengths of HORIBA?
In addition to its global market leadership in the field of emission measurement technologies, HORIBA offers a large product portfolio of test equipment and mechatronic devices. In contrast to many competitors, our extensive scope of supply includes the whole range of products and services necessary for the various applications of automotive testing. At the moment, we are one of the two main suppliers of automotive test systems worldwide, and we will be further expanding our market presence. HORIBA's products are characterized by a very high degree of reliability and stability. We develop our key technologies in-house. For example, the optical materials utilized in our leading exhaust gas analyzers are produced using a unique optical growth technology. This makes the analyzers highly accurate.

Are there any special markets or products you would like to focus on during your presidency?
HORIBA is a global supplier; however, our market presence differs greatly from country to country. Especially in Germany, we are faced with a number of local competitors. At the moment, we are tracing a change in the market whereby the leading OEMs and suppliers are orientating themselves more and more towards countries which have enjoyed advanced economic development lately, such as India and China.

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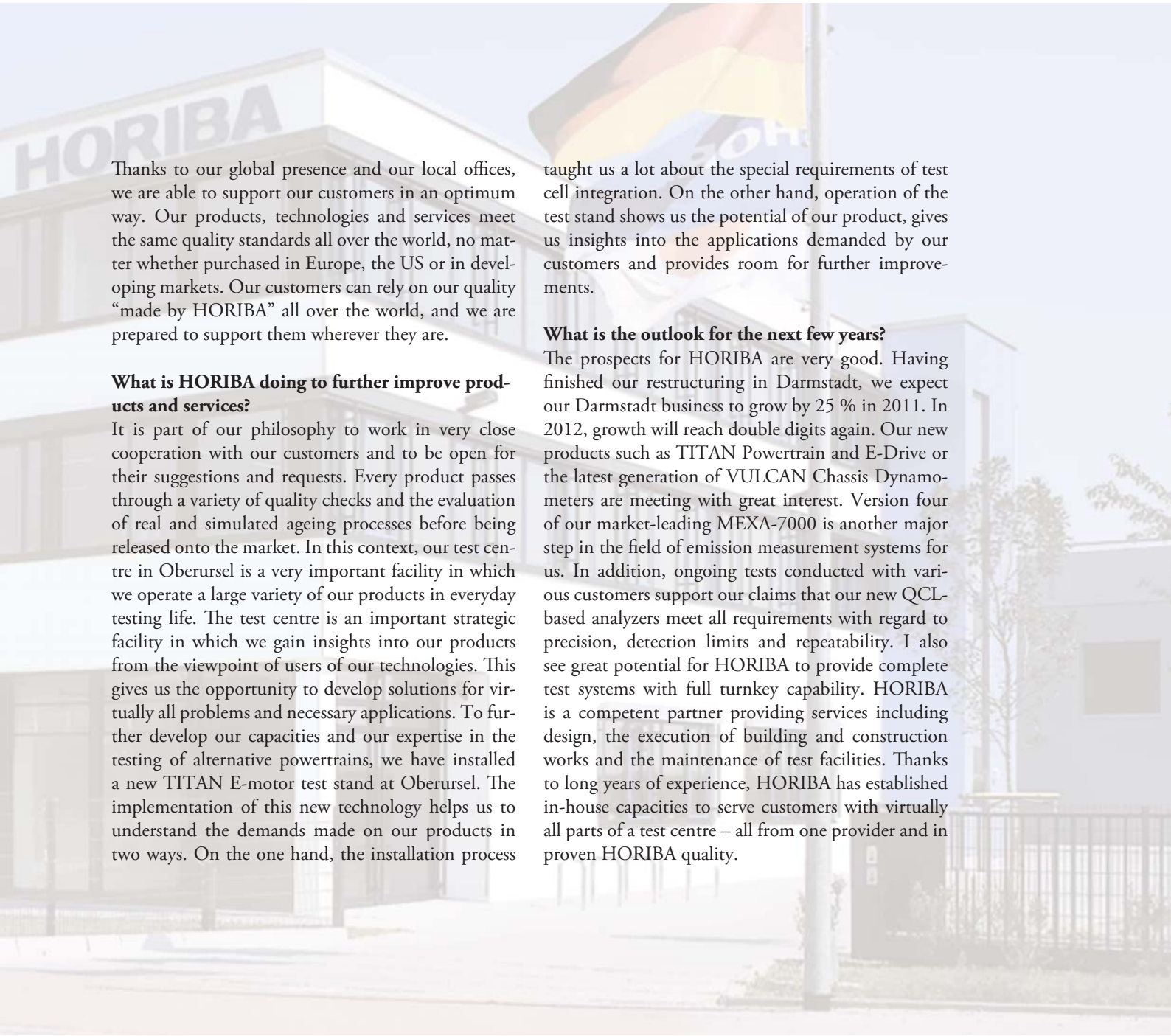


Thanks to our global presence and our local offices, we are able to support our customers in an optimum way. Our products, technologies and services meet the same quality standards all over the world, no matter whether purchased in Europe, the US or in developing markets. Our customers can rely on our quality “made by HORIBA” all over the world, and we are prepared to support them wherever they are.

What is HORIBA doing to further improve products and services?
It is part of our philosophy to work in very close cooperation with our customers and to be open for their suggestions and requests. Every product passes through a variety of quality checks and the evaluation of real and simulated ageing processes before being released onto the market. In this context, our test centre in Oberursel is a very important facility in which we operate a large variety of our products in everyday testing life. The test centre is an important strategic facility in which we gain insights into our products from the viewpoint of users of our technologies. This gives us the opportunity to develop solutions for virtually all problems and necessary applications. To further develop our capacities and our expertise in the testing of alternative powertrains, we have installed a new TITAN E-motor test stand at Oberursel. The implementation of this new technology helps us to understand the demands made on our products in two ways. On the one hand, the installation process taught us a lot about the special requirements of test cell integration. On the other hand, operation of the test stand shows us the potential of our product, gives us insights into the applications demanded by our customers and provides room for further improvements.

What is the outlook for the next few years?
The prospects for HORIBA are very good. Having finished our restructuring in Darmstadt, we expect our Darmstadt business to grow by 25 % in 2011. In 2012, growth will reach double digits again. Our new products such as TITAN Powertrain and E-Drive or the latest generation of VULCAN Chassis Dynamometers are meeting with great interest. Version four of our market-leading MEXA-7000 is another major step in the field of emission measurement systems for us. In addition, ongoing tests conducted with various customers support our claims that our new QCL-based analyzers meet all requirements with regard to precision, detection limits and repeatability. I also see great potential for HORIBA to provide complete test systems with full turnkey capability. HORIBA is a competent partner providing services including design, the execution of building and construction works and the maintenance of test facilities. Thanks to long years of experience, HORIBA has established in-house capacities to serve customers with virtually all parts of a test centre – all from one provider and in proven HORIBA quality.

"Business as usual"?

HORIBA at the Testing Expo

The new booth with a fresh structural appearance and a new graphical concept was a visual highlight

HORIBA took part in the Automotive Testing Expo in Stuttgart again this year. The basic conditions were the same as in the previous years: at the now almost traditional Booth 1512 in Hall 1, HORIBA extended an invitation to an expert discussion and presented a wide range of product innovations, but tried-and-tested technologies were shown too. For the second evening of the fair, HORIBA again organized a boat trip with friends old and new on the River Neckar. These basic facts may seem familiar at first sight, but this year it was anything but "business as usual", as our modest diary of the fair shows:

A real eye-catcher: the model of the latest HORIBA VULCAN generation chassis dynamometer in the scale of 1:10

Early May: preparations in full swing

HORIBA is working full speed setting up its totally new booth at the fair. In addition to the fresh structural appearance, in particular the graphical concept aims to be a visual highlight to impress visitors. The completely revised product brochures which are also materializing reflect the graphical concept. Now it's up to the printers to comply with the delivery deadline so that the entire material is in Stuttgart in time.

Monday 16 May 2011 (last day of setting up), 14.00: arrival at the fair booth

The booth has been set up and it looks excellent. The stand builders were even able to realize all special requests at the last moment. Now the exhibits have to be positioned at their final locations. In particular the model of the latest HORIBA VULCAN generation chassis dynamometers in the scale of 1:10 is a real eye-catcher which illustrates the modular structure and the reduced height of the new product series. Other highlights from the mechatronics product portfolio shown by HORIBA include the newly developed TITAN Powertrain test stands for heavy-duty transmission and engine testing on one single test stand. Visitors to the stand can also admire the latest generation of DYNAS$_3$ HS 180 asynchronous machines,

which were specially designed for the high speeds and starting torques of E-motors.
The last setting-up work goes on until late in the evening, but soon everything is where it should be. The printers have kept their word too, delivering all the brochures in time – everything is ready for the fair to start.

Tuesday 17 May 2011, 10.00: the fair begins

It soon becomes obvious that everything has been done correctly beforehand. The feedback for the new presentation at the fair has been extremely positive throughout, and the product innovations are a convincing proposition too. Besides the mechatronic components, the latest version of the market-leading MEXA-7000 emission measurement system meets with great interest. Newly implemented software functions improve maintenance and operation whereas the optimized cabinet design offers a wide range of new integration options. This keeps HORIBA in an excellent position with regard to any competitive products and impressively underlines its worldwide market leadership in the field of exhaust gas measurement systems.

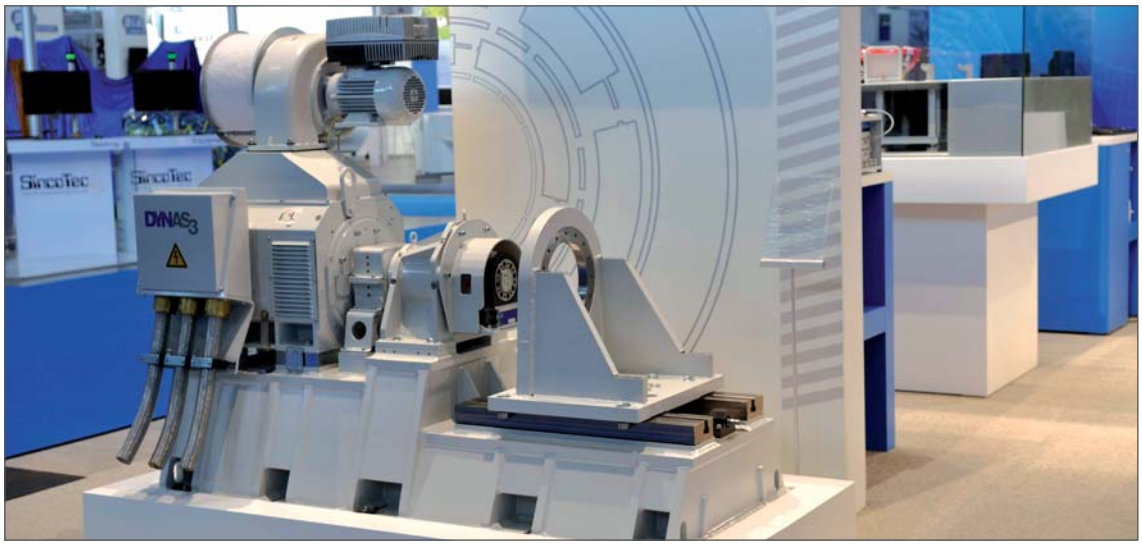
Wednesday 18 May 2011: all the fun of the fair

There is a buzz of activity at the HORIBA booth all day. Besides the new technologies, the tried-and-tested products which are already in use in HORIBA complete systems all over the world meet with great interest too.
There is a rapid increase in the number of people spontaneously deciding to take part in the traditional boat trip. At the end of the day, a total of 140 guests travel down the Neckar on the party raft "König Ludwig" and chill out in a relaxing, informal atmosphere after a strenuous day at the fair. Drinks and a barbecue put everyone in a good mood and round off this successful day at the fair. The weather is good too and there is some early summer sunshine.

The latest version of the market-leading MEXA-7000 emission measurement system met with great interest

Thursday 19 May 2011:

In spite of a long evening on the party raft and an accident with hazardous goods on the A8 Autobahn, which temporarily brought traffic bound for the fair to a standstill, HORIBA's booth at the fair is very popular with the visitors.
When the Testing Expo 2011 closes its doors at 15.00 and dismantling begins, HORIBA employees agree that this year's presentation at the fair was an all-round success and anything but "business as usual"!



Visitors to the stand could also admire the latest generation of $DYNAS_3$ HS 180 asynchronous machines, specially designed for testing E-motors

News

VULCAN Chassis Dynamometer

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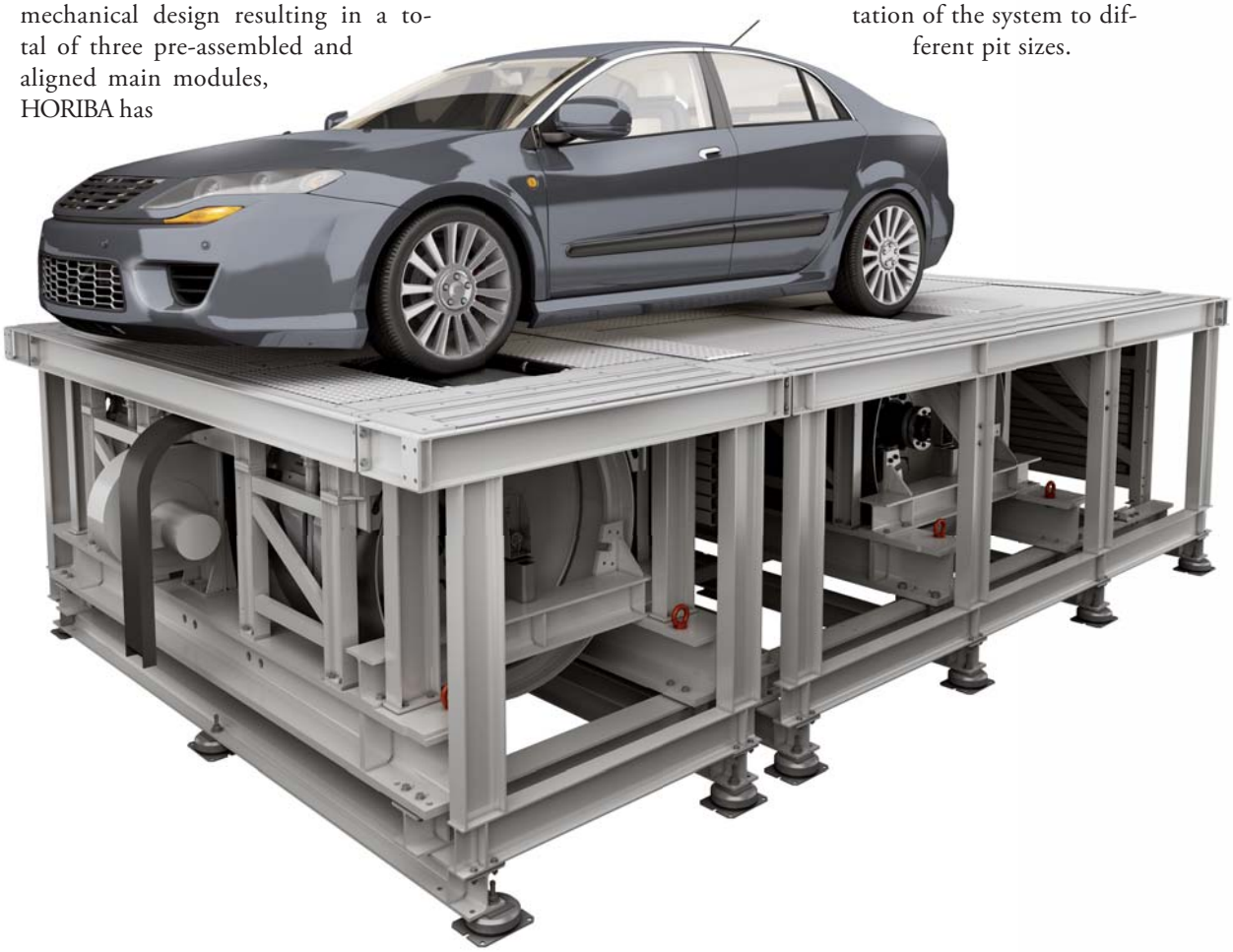
Based on years of experience and featuring numerous built-in diagnostic functions, the latest generation of HORIBA VULCAN Chassis Dynamometers is characterized by its robust and modular design, improved performance, increased flexibility and serviceability. Thanks to modularization of the mechanical design resulting in a total of three pre-assembled and aligned main modules, HORIBA has significantly reduced installation times. In addition, this modular design allows easy upgrades from 2WD to 4WD applications. Different AC power and roller inertias enable the system to cover a wide range of vehicles and test applications whereas a base-independent pit decking ensures simple adaptation of the system to different pit sizes.

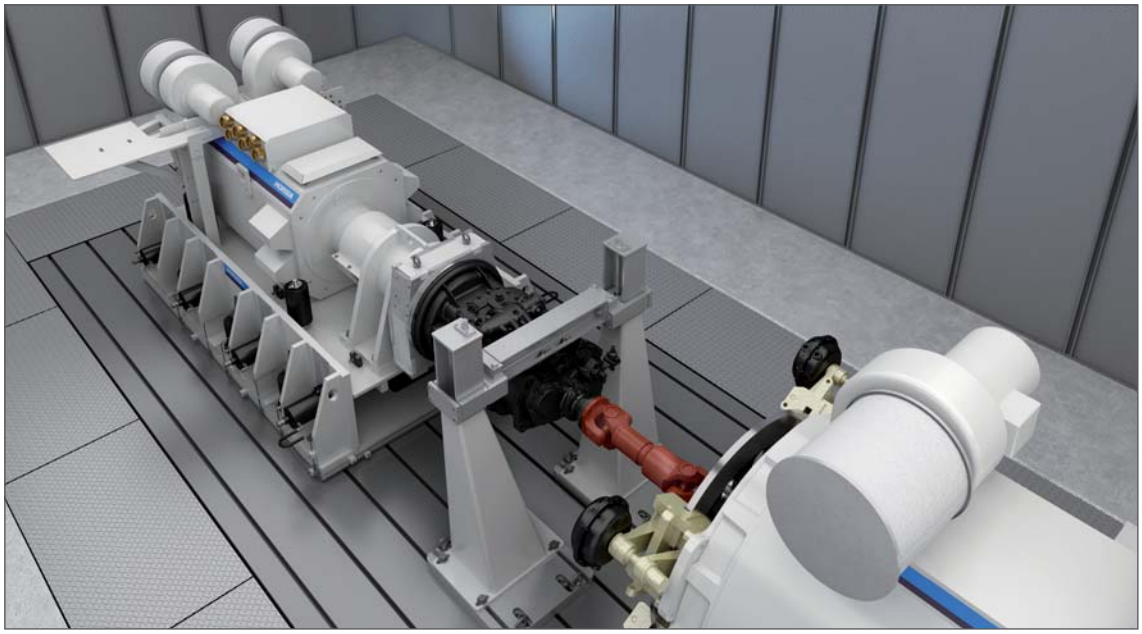


Robust design, improved performance, increased flexibility and serviceability: the latest VULCAN chassis dynamometer

SPARC VEHICLE Controller

The VULCAN system is equipped with the HORIBA SPARC VEHICLE Controller, including standard interfaces for emission host systems such as HORIBA's market leading VETS system. In addition, HORIBA has made a number of improvements to this controller, which now offers various new features.

TITAN Powertrain



TITAN Powertrain allows powertrain and engine testing to be conducted on one multi-configuration test stand

The new HORIBA TITAN Powertrain test system for heavy-duty vehicles is based on the proven HORIBA TITAN Engine platform and is characterized by its modular, flexible design attributes. It allows powertrain and engine testing to be conducted on one multi-configuration test stand, making it a powerful tool for steady-state and dynamic powertrain tests for virtually all components and configurations of powertrains. During the development process, HORIBA focused on offering maximum flexibility. The modular design maximizes the technical availability of the test stand and reduces downtimes during service and installation, whereas the flexible hardware and software system architecture realizes easy integration of customer-specific functions into the test system.

HORIBA offers several input and output propshaft and wheel output machines. In addition to the proven $DYNAS_3$ machines, the new $DYNAS_{PACK}$ – combinations of a $DYNAS_3$ machine and a shiftable test stand gearbox – are available too. These units provide for individual test stand configurations including tests of one or two rear axles and all-wheel-driven vehicles. A highly accurate calibration device for torques of up to 50,000 Nm adjusts the measuring flanges to achieve the highest possible calibration quality. A large variety of customized options is available. HORIBA offers a wide range of additional testing equipment such as NVH or climate testing facilities and provides powerful hardware-in-the-loop simulation.

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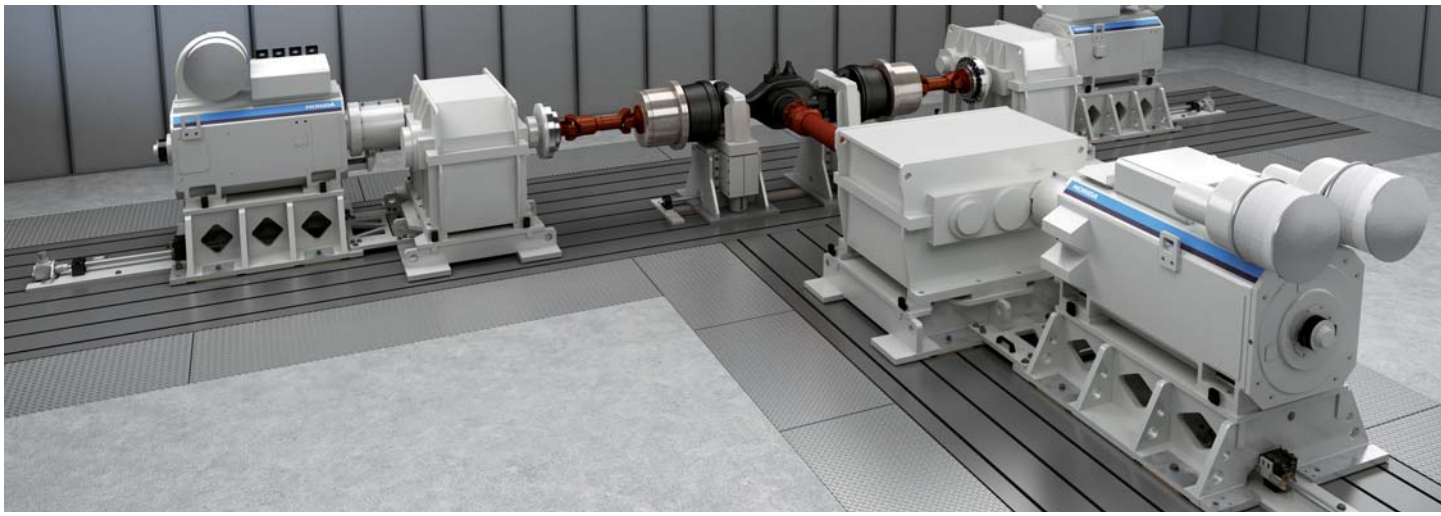

News

MEXA-7000 Version 4

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At the Automotive Testing Expo 2011, HORIBA has introduced the fourth generation of the MEXA-7000 emission measurement system. Version 4 is the result of consistent further development and improvements and offers numerous new hardware and software features. Like the previous MEXA generations, version 4 supports the full range of sampling requirements for raw and dilute exhaust as well as EGR and tracer gas measurements.

Version 4 of the MEXA-7000 offers numerous new hardware and software features

The wide range of possible applications results from the large variety of analyzers – all of them developed and produced by HORIBA. For the first time ever, HORIBA's two analyzers based on Quantum Cascade Laser Technology will be implemented into MEXA-7000 Version 4.

The modular design of the whole system allows the integration of two measurement lines in one 19" cabinet, which also incorporates a 17" monitor. Improved insulation and an optional glass door significantly reduce the noise level and make the system suitable for installation in the operator's room.

The MEXA-7000 Version 4 software was improved with regard to system security and user-friendliness. In addition to the newly implemented "System View" and "System Check" functions, the MEXA Suite is a completely new service tool which enables the user to report internal MEXA quality and maintenance checks.

FQ2100 Fuel Flow Metre

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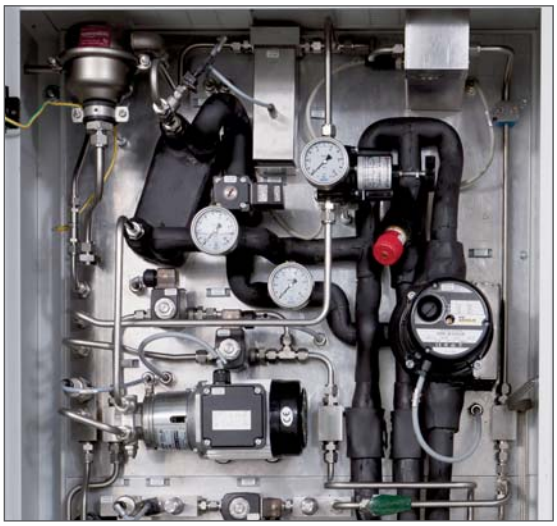
HORIBA is introducing a new system for measuring continuous volumetric and gravimetric fuel consumption, the FQ2100. In the standard measuring range from 0.2 l/h to 220 l/h, the FlexFuel-compatible system is characterized by its accurate measuring results at low fuel consumptions of small-sized engines as well as at maximum consumption rates of large-sized engines even when powered by alcohol-based fuels. The availability of standard interfaces ensures easy integration into test automation systems. All components included in the system are manufactured to proven industrial quality standards and are available from multiple sources. This guarantees the long-term availability of spare parts and short delivery times. The FQ2100 Fuel Consumption Measurement system can be applied to any engine, vehicle or powertrain test stand used for R&D, quality management and production and is an important tool for the development of internal combustion engines.



An important tool for the development of internal combustion engines is the FQ2100, a measurement system for fuel consumption

"Joy and Fun" at the family day in Darmstadt

Brilliant sunshine and temperatures of about 30 degrees – these were the perfect weather conditions that made almost 300 visitors flock to the HORIBA family day in early September. During a factory tour, the families of the employees from HORIBA's Darmstadt and Oberursel locations were given an insight into the company. After that, a quiz showed who had been able to collect the most information on HORIBA. A trial of strength with a "fairground strongman hammer game" decided who the winning group was.
A "bouncy castle", a make-up table and a painting station provided for boisterous fun and high spirits among the little ones. The children were also able to win lots of exciting prizes on the coconut shy and the wheel of fortune. The XXL kicker attracted all age groups, and of course the culinary field was well represented by the barbecue and the buffet.

The positive feedback given during and after the event shows just how much the people from HORIBA enjoyed the family day: **"It was a very nice event, and in my opinion it was a resounding success. If you weren't there you really missed something!"** – that's what one "thank you" e-mail had to say. The self-painted pictures now hanging at HORIBA's Darmstadt location are also a great souvenir of the event.
A fund-raising campaign allowed the HORIBA families to collect a total of € 1,030, which is to be donated to a relief project of SOS Children's Villages in Somalia.

HORIBA in the media

In the last months, a number of technical articles in the principal German specialist publications allowed HORIBA to demonstrate its position as an international technology leader in the field of applied measurement technology. In the articles, HORIBA employees present new developments and state-of-the-art measuring techniques, partly in conjunction with engineers of the car manufacturers Ford und Toyota.

Expertise in emission measurement technology

In the Motortechnische Zeitschrift (MTZ 5-2011); HORIBA presents the Quantum Cascade Laser (QCL) technology and its potential for emission measurement. Besides the mode of operation, the authors describe various fundamental analyses demonstrating the capability of QCL technology. One of the things confirmed by this evaluation program conducted by the developers was the very broad measuring range and the low detection limit of the QCL system.

The authors of the article entitled "Improved emission measurements for plug-in hybrid vehicles (PHEV)" in MTZ (6-2011) explain the patent pending PTTO (Post-Test Top-Off) technique developed by

In various principal specialist publications, HORIBA demonstrated its position as an international technology leader in the field of applied measurement technology

HORIBA. Plug-in hybrid vehicles can complete short test cycles with the internal combustion engine running for only about 20 % of the time required. This can lead to imprecise or even invalid emission measurement results. Whereas conventional constant volume samplers (CVS) over dilute the exhaust gases, bag mini-diluters (BMD) keep the dilution ratio constant for all exhaust gas volume flows, but the exhaust gas quantities they collect are often too small for exact measurements. The method described here reduces these drawbacks by increasing the sample bag volume and optimizing the bag dilution ratio.

Trailblazing studies

HORIBA's expertise was not only in demand for emission measurement; the company presented the latest research results in the field of mechatronic components and test systems too. In conjunction with Ford, HORIBA conducted a long-term study of a six-speed automatic transmission. The results achieved are presented in the article "Virtual engine dynamometers in the service life testing of transmissions" in a special edition of Automobiltechnische Zeitschrift (ATZextra: Automotive Engineering Partners) and in ATZautotechnology. The article describes a series of tests in which HORIBA replaced the internal combustion engine by an electric dynamometer and hardware-in-the-loop simulation in service life tests for transmissions. The DYNAS machine proved to have significant advantages over the internal combustion engine. Besides simplified handling in daily test operation, these mainly include shorter market introduction times for powertrains and test methods which are more environmentally sound.

In the July edition of ATZ (7/8-2011), HORIBA also published joint studies conducted with engineers from the Toyota Motor Company. The aim of the test series was to improve the reproducibility of 4WD fuel consumption tests. The analysis showed that the reproducibility of the results was impaired by the tire loss in particular. The authors came to the conclusion that the tire loss and with it the fuel consumption tests can be stabilized via the targeted manipulation of the roller surface temperature.

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