

Highlights:

Interview with Axel Wendorff,
New vice-president of HORIBA Europe

HORIBA at the SAE Congress 2010

ESPRIT



Dear readers,

As Vice-President of HORIBA Europe, I am very happy to present the new-style Esprit Newsletter to you. I have been in charge of the entire European business of Automotive Test Systems since 1 January 2010 and have set my sights high for HORIBA. Visitors to the SAE Congress in Detroit in April were able to acquire a first impression of our innovative power. The virtual battery system as well as completely newly developed measurement technology based on a Quan-

tum Cascade Laser (QCL) met with great interest. Our technologies for the optimization of drive units will give HORIBA new impulses to growth. We will be presenting these technologies at the Automotive Testing Expo in Stuttgart in June and would be happy to welcome you at Booth 1512 in Hall 1 and present our innovations to you. I look forward to hearing your suggestions and to having lively discussions with you.

Yours sincerely,

Axel Wendorff

HORIBA

Automotive Test Systems

HORIBA Extends Product Portfolio

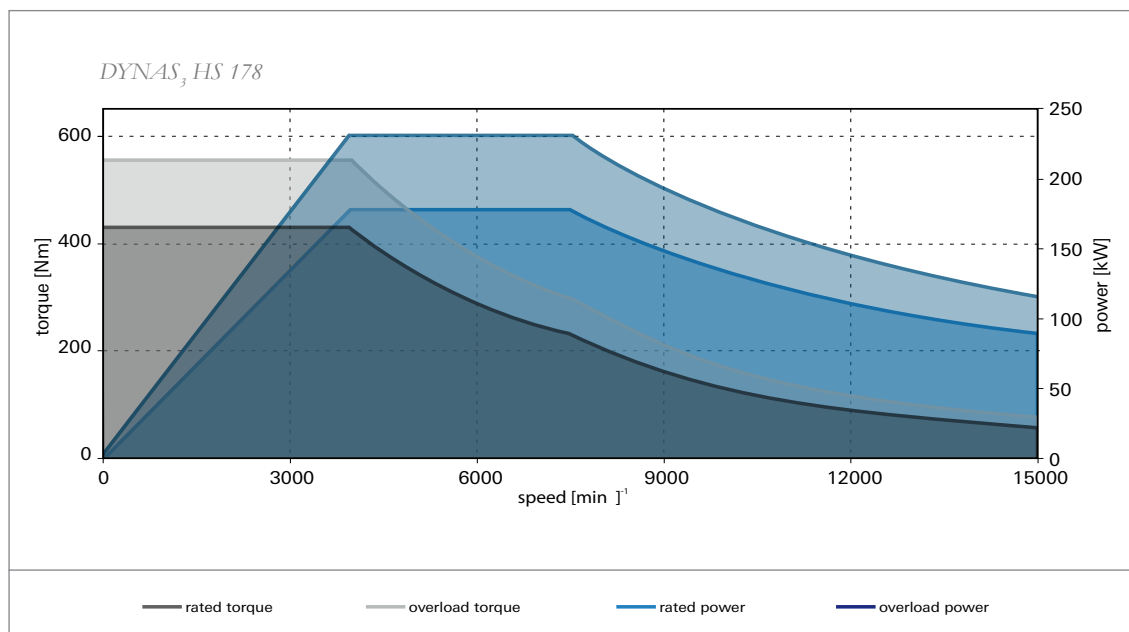
HORIBA extends portfolio in the domain of engine test stands with asynchronous machines

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The DYNAS₃ HS 178 machine is specially designed for the test of electric and hybrid engines. The machine is capable of very high speeds (max. speed up to 15000 rpm) and minimizes the torque ripple which is caused by the machine. The inverter system can be upgraded with a battery simulation, which provides the DC supply for the vehicle motor drive.

Basic absorbing data of the DYNAS₃ HS 178 machine:

- Rated power: 178 kW
- Rated torque: 430 Nm
- Overload torque: 560 Nm
- Rated speed: 3960 rev/min
- Max. speed: 15000 rev/min



Advantages of the speed controlled fan:

- 10 dB(A) fan noise reduction at 50% load of the DYNAS₃
- Reduction of energy costs, savings per year averaged 4500 kWh
- Reduction of filter/machine dirt

Speed controlled fan for DYNAS₃ machines

Another novelty is the development of a speed controlled fan for machines of the DYNAS₃ series which was released in the first quarter of 2010.

During a normal test cycle while the DYNAS₃ machine is running in partial load operation, full cooling power of the fan is not required.

The optional speed controlled fan delivers only the cooling power which is really needed and by this significantly reduces energy costs and noise.

Torque measuring flange

In the future the DYNAS₃ series will be equipped with a HBM T40 torque measuring flange. This technology allows shaft connections with very high masses and has a standard measuring accuracy class of 0.005%. The measuring signals are transmitted digitally from the rotor to the stator. For customers with very precise measuring accuracy requirements the HBM T12 measuring flange with an accuracy class of 0.003% is available.



The Systems Supplier You Can Trust

HORIBA Europe supplies four container test stands to MDC Kölledda for Daimler's volume engine OM 651 – the so-called "World Engine"

In late 2008, Daimler presented a completely newly designed four-cylinder diesel engine which was premiered in the C-Class. The OM 651 is used in various different model ranges and is the backbone of diesel engine production at Mercedes. The diesel engine is being produced by the 100 percent Daimler owned subsidiary MDC Power in Kölledda/ Thuringia. In the run-up to series production, it was necessary to make extensive investments in quality assurance. Among other things, MDC Power required four mobile test stands in containers for hot tests and quality assurance tests for the OM 651.

The largest ever order for HORIBA Europe

In September 2007, it was decided that HORIBA was to function as the overall systems supplier for these test stand systems. The order value amounted to over € 8.1 million, making it the largest ever individual order for HORIBA Europe. The list of requirements with which HORIBA was assigned made a comprehensive solution concept necessary. In cooperation with Siemens, TGS and STAR Engineering, the order was realized comprehensively and on schedule with numerous special solutions.

The special components of the container test stands

The dynamometer used is a DynoPack asynchronous machine made by Siemens or optionally a DYNAS₃ LI 600 synchronous machine from HORIBA. With its extremely low inertia, its output of 600 kW and its torque of 1200 Nm, this motor guarantees an extremely dynamic response behaviour. The engine mount from STAR Engineering and the dynamometer are designed for specimens mounted longitudinally as well as transversely as the OM 651 is mounted in both positions in series production.

Among other things, all temperatures, the oil level and the oil consumption can be directly read electronically. In addition,

the controller has been expanded by adding an option for operating the clutch, which is now operated directly in the powertrain during the test run. This ensures that all important parameters can be taken in at a glance and the principal functions carried out even in driverless operation. All test values can also be freely parameterized for long-term monitoring. Due to the general increase in importance of hybrid engines and electric motors, the entire test stand system is well prepared for the test options offered by these technologies and can be upgraded with minimal effort.



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In cooperation with Siemens, TGS and STAR Engineering, the order was realized comprehensively and on schedule with numerous special solutions.

Transport

The transport of the preinstalled test stands was a very interesting aspect of the large Daimler order. A wheel axle was mounted to each container for this purpose. The containers modified in this way were directly coupled to an articulated lorry instead of to a normal trailer, so they reached Kölledda literally "on their own wheels".

Our conclusion

The successful realization of the large order proves that HORIBA is a name you can trust as an overall system supplier too. The smooth delivery process shows that our wish to deliver overall systems in future has already been realized with great success.



HORIBA delivered four mobile test stands in containers for hot tests and quality assurance tests for the OM 651 to MDC Kölledda.

HORIBA Makes It Possible

Large engine test facility with major HORIBA components inaugurated
at KST Motorenversuch GmbH

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For 40 years now there has been close cooperation between KST Motorenversuch GmbH and Schenck/HORIBA, so those responsible at HORIBA gladly accepted the invitation to attend the inauguration of the new large engine test facility at KST. After all, HORIBA components had played a major role in the realization of the project.

Long years of successful cooperation

When the first KST engine test stand was set up in 1969, Schenck took part in implementation by supplying KST with a hydraulic brake. Right from the start, KST's field of activity included the development of engine lubricants. From 1980 onwards, KST also focussed on the development of the life span of engines and components, emission testing and road tests. From 2006 on, KST constantly expanded its range of services to include the fields of large engines, turbochargers, powertrains, exhaust gas certification and hybrid and electric drives. In all expansions of the range of services provided by KST, HORIBA proved to be a constant and competent partner, and it will be supplying major components in the future too.

Inauguration of the new large engine test facility

In late 2009, KST inaugurated the new large engine test facility consisting of four engine test stands with a size of 110 m² each. The new production hall doubled as a lecture hall for the occasion. About 300 guests including many from trade and industry as well as members of the public attended the reception.

The first of the festive lectures was held by Winfried Seidel, director of the Benz Museum in Ladenburg. He dedicated



The invitation to a ride in a historical Benz Gaggenau postbus from 1922 was accepted with much enthusiasm.

his lecture to automotive history, reporting on the first ever motorized tricycle. One of the highlights was a practical demonstration of the historical vehicle following his lecture. A number of papers were presented on subjects concerned with specific aspects of test stands. HORIBA employees Brigitte Hamer and Thomas Höhr, both qualified engineers, spoke on the special demands which hybrid vehicles make on test laboratories. Experts then gave the guests a guided tour of the new test facility. For the ladies, KST also offered a ride in a historical postbus, a Benz Gaggenau from 1922 – an invitation which was accepted with much enthusiasm. The inauguration of the large engine test facility was a resounding success which proved that, even in difficult times, some companies have the courage to make long-term investments to prepare them for the challenges facing them in future.



Experts gave the some 300 guests including many from trade and industry as well as members of the public a guided tour of the new test facility.



One of the highlights was a practical demonstration of the first ever motorized tricycle in the context of the inauguration.

Altitude Tests in the Low Countries

HORIBA supplies TNO Hellmond in the Netherlands with a test stand for commercial vehicles including an altitude and climatic chamber

How do you conduct altitude tests in the most low-lying country in Europe? HORIBA makes the seemingly impossible possible. A unique test stand for commercial vehicles developed by HORIBA allows the TNO organisation in Hellmond (NL) to conduct engine or full engine and powertrain tests at simulated altitudes of up to 4000 m above sea level and temperatures of between -40 and +55°C. The new high-tech test centre simulates variable environmental conditions on one single test stand.

The advantages of the test stand

Thanks to the new HORIBA test stand, emissions and outputs of commercial vehicles can be tested under a wide range of environmental and road conditions. The state-of-the-art technology ensures constant environmental and other conditions. In contrast to real road tests conducted at high altitudes, this rules out the falsifying external effects of weather and driver and the results and parameters can be reproduced whenever necessary. The specimen is not only subjected to differing climatic factors; driving uphill and downhill under a variety of load conditions can also be simulated. The engine outputs and the overall outputs of the trucks can be tested and compared here.

The system is also connected to four other test stands in the test centre in Hellmond via a STARS cluster server, making it easy to exchange data, information and test results.

Extensive measurement options

In addition, HORIBA installed the HDEET (Heavy Duty Exhaust Emissions Testing) application at STARS. This allows customers to conduct extensive test runs for the purposes of exhaust gas testing. This comprehensive tool allows various emission tests such as European Transient Cycle (ETC), European Steady Cycle (ESC) and European Load Response (ELR) tests to be conducted without problems. One special feature of this test stand is that the output of a truck engine on the one hand and the overall output

of a complete truck powertrain on the other can be tested under differing environmental conditions on the same test stand. After completion of the tests, it is possible to make a realistic comparison between the output of the engine and that of the entire powertrain. This will become more important in future as hybrid technologies are integrated into next generation powertrains.



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One special feature of this test stand is that the output of a truck engine on the one hand ...

Innovative trolley system

HORIBA developed a special trolley system to make it easier to mount the specimen onto the test stand. After the vehicle is put into the starting position in front of the test stand, the drive wheels are replaced by suitable adapters which are taken up by the trolley. Thanks to the use of rubberized rollers, shunting the specimen into its final position is facilitated considerably. As a result of its modular structure, the trolley system can be flexibly mounted to any commercial vehicle. Once equipped in this way, the specimen can be mounted onto the test stand extremely simply and the innovative HORIBA solutions allow a wide range of tests to be conducted.



...and the overall output of a complete truck powertrain on the other can be tested under differing environmental conditions on the same test stand.

“As a System Provider, HORIBA Automotive Test Systems Will Meet Even Complex Customer Requirements”

Interview with Axel Wendorff, vice-president of HORIBA Europe



„It is our declared aim to remain the market leader in the fields of automotive test stands and exhaust gas measurement technology.“

The 45-year-old mechanical engineer Axel Wendorff is a qualified expert who has held the newly created post of vice-president of HORIBA Europe since 1 January 2010. In this position, he is responsible for the European business of the Automotive Test Systems segment. Mr. Wendorff is a motor sports enthusiast who has had long years of experience in the development of engines and engine test stands. From 2004 to 2009 he was Chief Engineer at the engineering division at Mercedes-Benz High Performance Engines in Brackley, England. With the engine he and his team developed, the Brawn GP Formula 1 team won the Drivers' World Championship as well as the Constructors' World Championship in 2009. Furthermore, Wendorff won the Formula 1 Drivers' World Championship with McLaren-Mercedes in 2008.

Esprit: How would you describe the status of HORIBA today?

HORIBA is a supplier which is a market leader in the field of exhaust gas measurement technology in particular. In addition, since taking over Schenck Development Test Systems in 2005 we have been able to expand the field of testing systems in general and of engine testing systems in particular. Thanks to components such as DYNAS₃, STARS, SPARC and our reliable, tried and tested WT and DT brakes, HORIBA has experienced a significant upturn in the field of engine testing. Our DYNAS₃ dynamometers have turned into one of the great success stories of the HORIBA range since they were launched onto the market. Over 1000 units of this series are now in worldwide operation and we offer an extensive range of expansions and special components.

Esprit: What are the aims of your work as vice-president of HORIBA Europe?

It is our declared aim to remain the market leader in the fields of automotive test stands and exhaust gas measurement technology. For this purpose we will have to network the business divisions of HORIBA Europe in the medium term in a way allowing us to utilize to the full our technologies and synergies. Our customers will benefit greatly from this.

Esprit: What will this mean for your customers?

We will be in a position to offer our customers complete key turn solutions in future. All components of a test stand will come from our company and will be perfectly matched. Our closely knit supply and service network will also allow us to serve each customer in an optimum and individual way according to his requirements.

Esprit: Where do you see the major challenges to realizing your objectives in a sustainable long-term way?

Our greatest challenge is without doubt the progressive trend towards hybrid engines and electric motors. In particular the ongoing debate on climate change is increasing the demand for test stands suitable for environmentally sound technologies. This requires us to be constantly developing new testing methods and improving existing ones. It has been in the offing for a long time, however, so we are well-equipped to meet these challenges. Even today, we supply many of our test units with modified and newly developed components.

Esprit: What is the most exciting challenge for you in the newly created post at HORIBA?

First and foremost I must say that I am extremely proud to hold the position of vice-president of HORIBA Europe. In my long years of activity at various Formula 1 racing teams, I have amassed a wealth of experience in the fields of engine and test stand development. The post at the top of HORIBA Europe gives my work even greater scope than before. My task will be to permanently link the name of HORIBA with innovation and competence in the fields of automotive test stands and exhaust gas measurement technology and to expand our market leadership still further. Thanks to our innovative technologies and the competence of our employees, I am more than confident that this aim will be achieved.



„We will network the business divisions of HORIBA Europe in the medium term in a way allowing us to utilize to the full our technologies and synergies.“

HORIBA at the SAE Congress 2010

Revolutionary exhaust gas measurement technology based on a Quantum Cascade Laser fascinates numerous visitors

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At the SAE (Society of Automotive Engineers) World Congress 2010 held at the Cobo Center in Detroit in April 2010, HORIBA presented itself to an interested audience at its well-frequented booth. The numerous lectures held by our employees during the congress met with great resonance and many positive reactions. The event under the motto "Ecollaboration" was dedicated to the new age of mobility. HORIBA also showed sustainable solutions and examples of constant innovation at booth 442 with the aim of confronting, in cooperation with our customers, the challenges facing the development of environmentally sound technologies in future.

Innovative QCL measurement technique

One of the highlights at our exhibition booth was the presentation of the newly developed exhaust gas measurement technology based on a Quantum Cascade Laser (QCL), which allows various nitrogen compounds to be detected more precisely than before. With the targeted adaptation of the QCL technology to emission measurement, HORIBA is going new ways in the measurement of pollutant particles. The increasingly lower concentrations of pollutants in the exhaust gas push the existing testing and measurement technologies to the limit. Now QCL technology is able to detect very low concentrations of NO, N₂O, NO₂ and NH₃. In comparison with the measurement technologies used up to now, the innovative QCL solution from HORIBA is characterized by a significant extension of the measuring range, an

approximately 500 times higher resolution and more precise results, especially in the field of particularly low pollutant concentrations. The response time of the measuring instrument is far below the limit value prescribed by EURO VI and the measurable range is much wider than before, allowing all three established exhaust gas testing methods to be used via one single unit. It is irrelevant whether a spark ignition engine, a diesel engine or an alternative drive is used. The method is suitable for alternative fuels too. The QCL technology is being used for the first time in the newly developed MEXA-1400QL-NX emission measuring unit which is to be presented at the Automotive Testing Expo 2010 in Stuttgart from 22 to 24 June.

Virtual battery system from HORIBA

Another highlight from HORIBA is a virtual battery system which allows complex battery simulations. Not only the state of charge of the battery can be simulated here; various other parameters such as the age of the battery, driving cycles, environmental influences and the composition of the battery can also be varied in order to simulate the actual battery behaviour. The virtual battery system is available as a complete solution with precisely matched hardware, software and safety features. It can also be applied to existing battery systems, making it an ideal solution for the changing demands of the automotive industry. HORIBA received the SAE Automotive Engineering Award for its virtual battery system.



The numerous technical meetings and the vivid presentation of the new technologies made sure that the SAE Congress 2010 was conducted on a very high level.



HORIBA showed sustainable solutions and examples of constant innovation at the SAE World Congress 2010 held at the Cobo Center in Detroit.

Axel Wendorff, the new vice-president of HORIBA Europe, was extremely enthusiastic about the great resonance shown at the HORIBA booth. "I am very proud of our employees and of the number of innovative approaches we are presenting here. Our products allow us to expand our market leadership, and the sustained efforts of the industry to develop vehicles with less emissions will increase sales of our technologies now and in the future. The talks held here with customers and other interested persons make me look to the future with optimism," Wendorff explains.

The density of technological innovations shown at the SAE Congress was higher than ever this year, with sustainability and fuel efficiency playing an important role. The numerous technical meetings and the vivid presentation of the new technologies made sure that the SAE Congress 2010 was conducted on a very high level. A varied supporting programme and a number of evening events successfully rounded off the SAE World Congress 2010. If you didn't make it to Detroit yourself, we can gladly present our new products to you in a personal dialogue. Why not visit us at the Automotive Testing Expo in Stuttgart from 22 to 24 June 2010? You will find us at booth 1512 in Hall 1. We would be very happy to welcome you to our booth and present our products to you.

Here are the papers which HORIBA presented at the SAE Congress:

- › PM Emissions of Light-Duty Diesel Vehicles Retro-fitted with Diesel Particulate Filters
- › On-Board PM Mass Calibration for Real-Time PM Mass Measurement
- › Verification of a Gaseous Portable Emissions Measurement System with a Laboratory System using the Code of Federal Regulations Part 1065
- › Development of an Ultra-Low Concentration N2O Analyzer using a Quantum Cascade Laser (QCL)
- › Improved PHEV Emission Measurements in a Chassis Dynamometer Test Cell
- › Virtual Engine Dynamometer in Service Life Testing of Transmissions: a Comparison between Real Engine and Electric Dynamometers as Prime Movers in Validation Test Rigs
- › An Analysis of the Behaviour of a 4WD Vehicle on a 4WD Chassis Dynamometer - Influence of the Vehicle Loss on the Fuel Economy Test



Vice President Rex Tapp addresses a large audience at the HORIBA SAE Event.

The Electric Future of Driving

HORIBA develops test options for hybrid and electric vehicles

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Hybrid engines confront developers of engine test stands with new challenges. In comparison with conventional combustion engines, hybrid technology requires additional testing options and considerably more complex development and calibration options. Thanks to the logical development and improvement of the test instruments, HORIBA offers suitable solutions for components for hybrid vehicles.



Thanks to the logical development and improvement of the test instruments, HORIBA offers suitable solutions for components for hybrid vehicles.

Order from KATRI realised successfully

A major order from the "Korean Automobile Testing & Research Institute" (KATRI) proves that HORIBA is also efficient in the testing of engines for electric and hybrid vehicles and the associated power electronics. After extensive exploratory discussions, the Korean research institute selected a product based on the tried and tested HORIBA TITAN technology. It was delivered in early 2010 and HORIBA was able to hold its own against numerous well-known competitors.

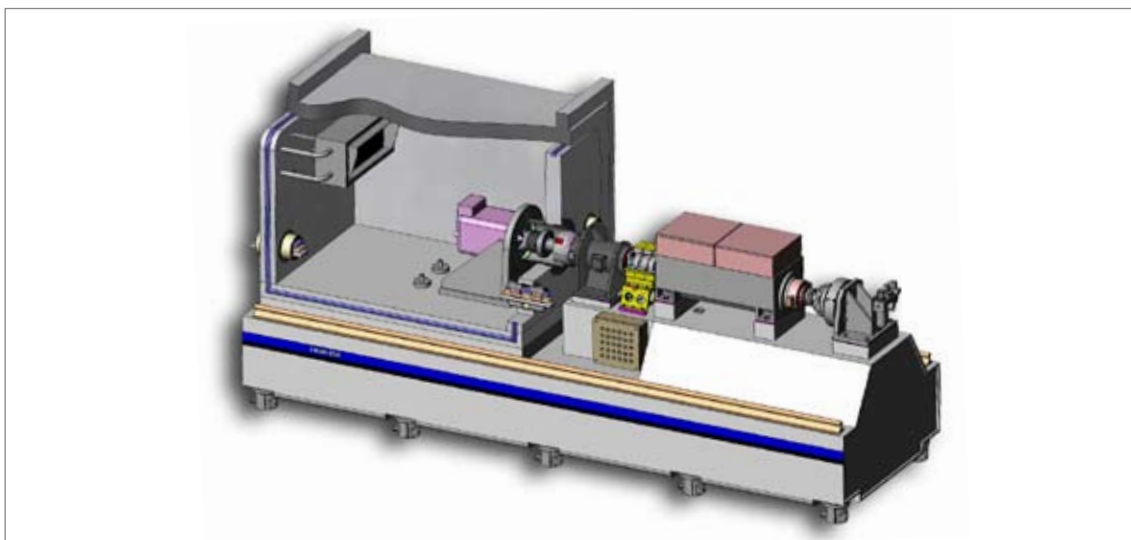
In order to meet the requirements of KATRI, HORIBA developed a tailor-made solution based on the newly developed DYNAS₃ HS 178. This also covers virtually all customer needs with its rated torque of up to 420 Nm (overload: up to 540 Nm) and its maximum speed of

15,000 rpm. HORIBA also provides a high-end solution for requirements going beyond the capacities of the DYNAS₃ HS 178. The high dynamics of the high-end synchronous machine are achieved through a very low inertia of only 0.06 kg/m². This system will also provide a torque of more than 500 Nm (overload: up to 660 Nm) at the same maximum speed.

Wide range of testing options and technical features

A DC power supply is able to simulate the static and dynamic behaviour of a battery system for electric motors and also allows motoring and regenerative operation of the specimen tested. The system provides a current of 600 A and a rated voltage of 600 V and has a rapid dynamic response. In addition, the presettable internal resistance parameters can be used to simulate differing battery behaviours. Complete simulations of battery models are available as an option. These allow various kinds and configurations of batteries, operating temperatures and states of charge to be simulated and tested in an excellent way. Another advantage is the very low power consumption of DYNAS₃. As one of the most important aims of the test runs is to determine the efficiency of the complete electrical drive as well as that of electric motor and inverter under differing conditions, the measurement of voltage and current must be extremely accurate. This is realized with the help of a precision power analyzer which provides extremely exact results.

However, not only the electronics required HORIBA to develop a large number of intelligent solutions. It also had to be guaranteed that the wide range of test specimens with their differing designs and outputs can be securely mounted to the test stand. The high speed ranges of the specimens tested (15,000 rpm and above) also make high mechanical demands in order to avoid torsional vibrations. Detailed modelling and torsional analyses allowed HORIBA to be successful in this sector too, supplying a product which meets all the requirements. In addition, all specimens can be tested in a climatic chamber at temperatures of between -40 and +150° C and humidities of between 10 and 95 %.



In order to meet the requirements of KATRI, HORIBA developed a tailor-made solution based on the newly developed DYNAS₃ HS 178.

Two Reasons to Celebrate

OSWALD's centenary and 10 years of successful cooperation with HORIBA

OSWALD Elektromotoren celebrated its centenary at their Miltenberg facility in 2009. This was not just an opportunity for HORIBA to congratulate OSWALD but also a reason to celebrate along with them.

How cooperation began

The successful business relationship between OSWALD and HORIBA started exactly 10 years ago. It didn't take long for us to find a competent and reliable partner for the development of our DYNAS₃ asynchronous machines. OSWALD took up the challenge and cooperated with the experts from Schenck on the DYNAS₃ machines, which have since become the system of choice for dynamic engine testing. Nearly 1,000 DYNAS₃ machines are now in successful operation worldwide – a success which would not have been possible without the outstanding cooperation between the two partners.

The development shows no signs of coming to an end either. In conjunction with HORIBA, work is continuing on modern powertrain technology for the hybrid test stands required for future applications of vehicle technologies in the automotive industry. OSWALD is currently working for numerous customers from a wide range of sectors, developing and producing drives for engine, transmission and vehicle test stands for HORIBA in particular.



OSWALD cooperated with the experts from HORIBA on the DYNAS₃ machines, which have since become the system of choice for dynamic engine testing.

The long years of research and development in the field of superconducting motors are a particular highlight expected to become a promising technology in certain special fields. In its research activities and its engine and coil construction, OSWALD is a partner to a number of well-known universities and institutes.

OSWALD currently employs 130 people at Miltenberg, developing and producing motors delivering torques of between 100 and 150,000 Nm and outputs of between 10 and 1,000 kW.



In its research activities and its engine and coil construction, OSWALD is a partner to a number of well-known universities and institutes.

The celebration

The weather was great on this festive weekend and so was the atmosphere, making the centenary celebration organized by OSWALD a resounding success. The invited guests, who included the management of HORIBA, employees, former employees and their relatives as well as members of the public from the region, celebrated stylishly and informally. A brass band, a ballet, a cabaret and an organ concert all contributed to the success of the event, which was held under the patronage of the manager Johannes Oswald and his father Bernhard Oswald.

Trendsetting technologies of the 15th and 20th centuries were presented in two exhibitions. Thus, models of the ingenious machine designs of Leonardo da Vinci were to be seen as well as state-of-the-art OSWALD engines and their applications in the form of images, videos and practical demonstrations. Laymen and experts alike were impressed by the level of technical development shown by da Vinci and OSWALD in their respective centuries.

HORIBA congratulates OSWALD on this enjoyable event and looks forward to further successful cooperation.

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Events 2010

Date	Event	Location
15th - 17th June	Diesel Emissions Conference	Frankfurt, Germany
22nd - 24th June	Testing Expo	Stuttgart, Germany
8th - 9th September	Diesel Emissions Conference	India
14th - 16th September	Testing Expo	Beijing, China
14th - 17th September	Thiesel Conference	Valencia, Spain
1st October	Turkey Seminar	ITU, Istanbul
12th -14th October	Diesel Emissions Conference	USA
26th - 28th October	Testing Expo	Novi, Michigan, USA
November	German seminars	Koeln, Frankfurt, Stuttgart

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