PALAS® PARTICULAR 2 | 2012

INFORMATION FOR CUSTOMERS AND PARTNERS OF PALAS® GMBH

PALASCOUNTS

Particle search in the European Transonic Wind Tunnel

Promo® 3000 and welas® used for test gas inspection

▶Palas® equipment is being used under extreme conditions in the most modern aerospace wind tunnel in the world. Our measurement devices help to ensure the reliability of test conditions at temperatures as low as -160°C, pressures of up to 4.5 bar and flow speeds of up to Mach 1.35. ▶**Page 2**

Further topics in this issue:

Dear readers,

▶Our products are intended to deliver reliable and reproducible results - even under extreme measuring conditions. That is why we like being faced with challenges that demand these particular properties. The most recent example is a project with European Transonic Windtunnel in Cologne, which is dealt with in the lead article of this newsletter.

When our devices contribute to the quality assurance and the delivery of reliable measurement results with such renowned institutions - where investment levels are in the billions - then this is both a privilege and an incentive for us. This means that our developments in recent decades have been worthwhile. At the same time, we can learn so much from these projects and thus further expand the scope of applications for our equipment. We are very pleased with the results and would like to thank ETW for their trust in us.

The biggest assets of an innovation-driven company such as Palas® are the qualifications of its employees. For this reason, we encourage and support our young and upcoming specialists and also take responsibility for their training. Through the cooperation recently agreed upon with the Baden-Württemberg Cooperative State University Karlsruhe, we can now even better reach this goal. We are convinced that both sides will benefit from this. The young people will gain the opportunity to start their professional working life, whilst we can use new ideas to the benefit of you - our customers.

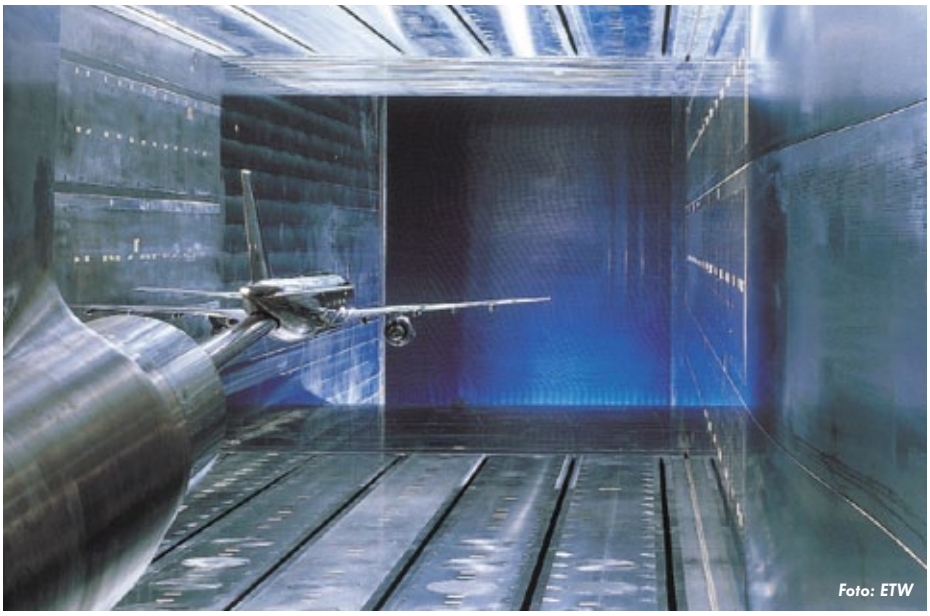
Yours sincerely,
Leander Mölter
executive director, owner
Palas® GmbH

Particle search in the European Transonic Wind Tunnel

Promo® 3000 and welas® used for test gas inspection

▶Temperatures down to -160 °C, flow speeds of Mach 1.35 and absolute pressures of up to 4.5 bar: Extremely harsh conditions certainly prevail in the ETW wind tunnel. At the same time, the system is one of the most sought-after places in the aerospace industry. Aircraft models can be tested under real-flight conditions in Cologne, thanks to the extreme conditions that can be generated in the tunnel. Companies such as Airbus and Boeing use this system for testing precisely scaled models of new developments long before the first prototypes are built.

For this purpose, nitrogen at -196 °C is injected into the wind tunnel as test gas. This nitrogen must be extremely pure, because particles as small as 2 µm can falsify the test results, if for example they stick to the wing leading edges. "These ultra-small particles generate turbulences, which in turn generate different air flows than should normally be the case," explains ETW representative Christian Kühn. This behaviour impairs the test results, which are determined by means of temperature-sensitive paint. However, the origin of these disruptive particles was unclear.



The European Transonic Wind Tunnel in Cologne, in which aircraft models are tested under real-flight conditions.

Palas® supplied equipment at its own risk

Several approaches to determine the source with optical measurement instruments failed. Then Mr Kühn came across the title story in the Palas® newsletter from early 2007 regarding cloud formation investigations at the former Research Centre in Karlsruhe, where welas® aerosol sensors were delivering reliable results even at temperatures of -90 °C. As a result, Mr Kühn contacted Palas®.

There he found a sympathetic ear: "We provided the equipment to ETW at our own risk. This was a good opportunity for us to test the capabilities of Promo® and welas® under these conditions," explains sales engineer Sven Schütz from Palas®. Initially, there were minor setbacks. A passive reflector detached itself in the sensor at -115 °C during the first measurements. Mr Kühn has particular praise for the cooperation with the Karlsruhe company in this regard: "When we had a setback, Palas® was always very quickly on site."

Also the resilience of the equipment and the measurement results impressed ETW, so it was decided to invest in an own measurement system. Following minor modifications, the measurements were even operational down to -160 °C.

Today, the aerosol spectrometer Promo® 3000 is used at ETW in combination with the welas® 2300 P and welas® 2500 P aerosol sensors. The measurements enable the determination of conditions that influence the test gas. As a precaution, a box has been constructed around the sensors at ETW, in which it is comparatively warm at -75 °C.

Interference factor ultra-small particles

These measurements enabled the identification of the actual interference factor: "We have seen that, during the start-up of the wind tunnel, there is something akin to a small cloud, containing only a few more particles than normally pass through the tunnel," Mr Kühn explains the cause of the interfering ultra-small particles. This caused wrong measurement results. As a consequence, the start procedure was changed, "so that the density of this cloud is reduced," explains the head of the test series.

The new measurement system is used today to check the measurement conditions in the Cologne wind tunnel. It is therefore possible to check the quality of the test gas at an early stage: "If there are too many particles in the tunnel, then there is no point in starting the measurements," explains Mr Kühn. With the Palas® equipment, ETW saves time and costs for its customers and simultaneously enhances the quality and reproducibility of the measurement results.

ETW - The world's leading edge wind tunnel

▶The European Transonic Windtunnel (ETW) in Cologne is the world's leading edge wind tunnel, in which aircraft models are subjected to testing under real-flight conditions. The non-profit company was founded in 1988 by a group of countries comprising Germany, France, the United Kingdom and the Netherlands. One year later, construction work started and was subsequently completed in 1992.

The cryogenic wind tunnel can be cooled down to a temperature of -160 °C. This enables aircraft models to attain Re numbers of up to Re=85·10⁶. This equates to the Re number of a large airliner.

ETW
EUROPEAN TRANSONIC WINDTUNNEL

The ETW is available to customers around the globe and carries out testing for companies including Boeing and Airbus.

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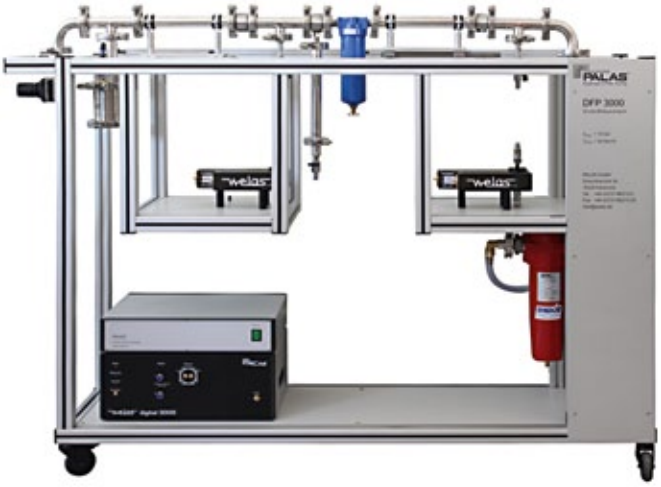
Fully automated filter testing with the new DFP 3000

▶The newly developed filter test system DFP 3000 enables users to characterise compressed air filters faster and more easily, in compliance with ISO 12500. At the heart of the new test rig is the further developed welas® digital 3000 P (see article on this page). In the DFP 3000, particle sizes and concentrations are measured at overpressures of up to 10 bar.

Additional innovations are integrated into the new filter test system: The fractional separation efficiency under standard conditions is determined with the new aerosol generator PLG 3000.

The new aerosol generator AGF 3000 is also integrated in the DFP 3000. Thanks to its particularly high aerosol mass flow, the duration of filter loading is reduced considerably.

Furthermore, filter testing takes place fully automatically because the mass flow controllers regulate both the total volume flow and the generator volume flows.



Filter test system DFP 3000

Further development: welas® digital 2000/3000 P and HP

Particle measurement at temperatures up to 250 °C and in overpressure of up to 10 bar

▶Palas® has further developed the products welas® digital 2000/3000 P and HP, and thereby refined their utilisation. The operational volume flow in the aerosol spectrometers is now also automatically regulated.

The welas® digital records the temperature, the absolute pressure and the flow velocities of the sampling volume flow. On this basis, an integrated mass flow controller automatically regulates the operational volume flow at the correct value. It is therefore no longer necessary for the user to constantly monitor the volume flow under changing operation conditions. This saves time and simplifies application.

The devices for the particle size and particle quantity measurement can be used up to temperatures of 250 °C, overpressure of 10 bar and are compatible with welas® aerosol sensors.

welas® digital 3000 HP

Furthermore, it is possible to connect the welas® digital 3000 with two welas® aerosol sensors at the light source. As such, particle measurements are possible at two separate sampling places, positioned up to 100 metres apart.

Cleanroom Award: RAS 3000 in the final round

▶In order to determine the protection degree in an operating room according to SWKI 99-3 and DIN 1946-4, the Reference Aerosol Systems RAS 3000 and RAS 3000 C generate a defined aerosol simultaneously at up to six different points. Moreover, the RAS 3000 C enables the calibration of up to six particle counters at the same time.

Palas® competed with both devices for the Cleanroom Award, granted by the Reinraum-Akademie GmbH Leipzig for the very first time. Out of 20 applicants, an international panel of experts including representatives from research, teaching and practice selected five finalists, including Palas®. These were invited to the Cleanzone in Frankfurt, in order to present their respective systems. Although Palas® did not secure the top spot in the public vote, selection for the final is certainly a pleasing accolade and confirmation of our work.

Second generation: DustView II

▶Dust formation can affect industrial and production safety, lead to production losses and harm the environment. In order to avoid dust formation as effectively as possible, it is first necessary to measure this reliably.

In comparison to the previous model, Palas® has made considerable improvements to the new DustView II, in particular with respect to user-friendliness. Operation of the DustView II is quick and easy by means of a 7-inch touch display, on which the user can evaluate the data directly and is no longer required to transfer data to an external PC. The measurement data is saved automatically, which enables conducting evaluations at a later point in time. In this way, up to ten different measurements can be compared with each other.

Reports regarding individual measurements or measurement comparisons can be stored as PDF or text files, or can be printed out directly. Furthermore, serial measurements allow the determination of a mean value on the basis of multiple measurements.

DustView II

Palas® supports Initiative for Young Scientists

Measurement device Fidas® mobile is used in the NanoShuttle for school visits

▶Since March 2012, a Fidas® mobile device has been part of the equipment used by the Initiative for Young Scientists [Initiative Junge Forscherinnen und Forscher e.V. or "IJF"]. Jürgen Spielvogel from Palas® personally delivered the device - which was acquired under favourable conditions - to the head office of the initiative in Würzburg.

The IJF was founded in August 2010 and has evolved from the Bavarian nanotechnology cluster with the objective to "raise school pupils' and young people's interest in MINT subjects," according to Heinz-Peter Sorge, events manager at the IJF. As such, the IJF visits around 75 schools with the NanoShuttle per year, and has already reached over 40,000 pupils and teachers. Using experiments, in which the pupils can actively take part in, as well as brief lectures, a connection is made between technology and everyday life. Additionally, at the experimentarium on the site of the foundation, pupils experience the opportunity of carrying out their own research projects under guidance. The Fidas® mobile offers valuable services in both cases. In this way, a practical link is made with complex subjects, as Annika Schirmer from the IJF is well aware: "When a personal reference is created, you gain more access to the pupils. The fine dust measurement allows one to do this very successfully, because it is released into the air that everyone breathes."

Jürgen Spielvogel, Palas® (left), with Christoph Petschenka, Managing Director of the IJF

Palas® sales partner UK: Andrew Chalmers

▶Andrew Chalmers has been our official sales partner for the United Kingdom since 2010. The physicist by profession and engineer by training has over 25 years experience in the development and validation of filtration products and systems. Mr Chalmers is a director of Filter Integrity Ltd (FIL), which was formed in 2010 and is located in County Durham in the North East of England.

FIL supports aerosol scientists and filtration product developers by providing both technical consultancy, validation support and specialised aerosol generation and characterisation instruments and equipment.

Mr Chalmers has been present at a number of trade fairs together with Palas®, for example at Filtech in 2011.

New colleagues in 2012

▶In 2012, **Celine Depuydt** and **Florian Lippert** (photo) joined the Palas® team. Mr Lippert, who studied process engineering in Mannheim, is stimulated by working in a small, internationally active company, which is the market leader in its field. His job involves the commissioning of filter test rigs and customer service. Ms Depuydt is employed in the field of print and online marketing. She obtained a diploma in English and Spanish translation in Ghent and European linguistics in Freiburg. She particularly enjoys working closely together with all of the company divisions, as well as her contact with the international customers.

Palas® is the practice partner of the Cooperative State University

▶Palas® is the officially approved partner of the Baden-Württemberg Cooperative State University Karlsruhe and will be offering a training position in the field of mechatronics for the first time in 2014. The trainee will study on an alternating three-month basis at the Cooperative State University and with Palas® respectively. As such, he or she will gain both theoretical and practical knowledge in equal measure during the training period and will be able to transfer seamlessly to an employment position upon completing the course.

During the studies the trainee will receive a standard salary, which will also be paid during the theory phases. 90 percent of the students of the Baden-Württemberg Cooperative State University Karlsruhe are employed by their training partner. We hope that this will also be the case with us. The course starts on 1 October 2014.

▶ PALAS® AGENDA

Palas® attends regularly conferences and exhibitions. The up-to-date details can be found on our website:

www.palas.de/en/exhibition.

We already booked a booth at the following events:

- **▶TerraTec 2013, Leipzig/Germany 29. – 31.01.2013, booth no. F34**
- **▶Powtech 2013, Nuremberg/Germany 23. – 25.04.2013, booth no. 5-156**
- **▶IDEA 2013, Miami Beach/USA 23. – 25.04.2013, booth no. 1355**
- **▶Gala 2013, Munich/Germany 03. – 05.09.2013**
- **▶Filtech 2013, Wiesbaden/Germany 22. – 24.10.2013, booth no. F6**

Please reserve:

- **▶27th Palas® Aerosol Technology Seminar Karlsruhe/Germany, 16.09. – 17.09.2013**

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