Palas® Particle Technology

Palas® Particular

Nr. 1 – B | 2007 Information for customers and partners of Palas® GmbH

Dear Readers,

▶ At first sight, perhaps you did not notice it at all: The Palas® Logo changed a little bit. Instead of „Aerosol Technology" we now indicate in our logo uniformly the addendum „Particle Technology". This way, we want to emphasize that our company offers today solutions and services for the entire range of the particle measurement technology.

In this issue of our newsletter, we will inform you also about the wide application range of the welas® system. welas® PRO, with which measurements are possible also in areas difficult to access, was presented to the public for the first time at POWTECH 2007.

Furthermore, we are particularly proud of the fact that welas® would supply reliable results even in the polar stratosphere at -90°C. This was found out by the Forschungszentrum (Research Centre) Karlsruhe in a practice test. I wish you an inspiring reading and am looking forward to our next contact!

Leander Mölter
Managing Director Palas® GmbH

In this issue

Clouding tests at the Forschungszentrum Karlsruhe

welas® measures at lowest temperatures in the cloud simulation chamber

▶ During a test at the Research Centre Karlsruhe (FZK), the aerosol spectrometer welas® had to bear up a lot. The result however was impressing: the system would supply reliable data also in the polar stratosphere at extreme temperatures of -90°C!

The employees of the Institute for Meteorology and Climatic Research, Atmospheric Aerosol Research (IMK-AAF) at FZK simulate clouding processes. The study of the formation, the occurrence and the behaviour of clouds supplies valuable cognitions related to their influence on the climatic happening, e.g. on the global warming. For the simulations, the IMK-AAF operates an aerosol and cloud chamber, in short AIDA (Aerosol Interactions and Dynamics in the Atmosphere).

welas® sensor under the AIDA aerosol chamber: the chamber is located within a coolable housing. A sample from the aerosol chamber is taken out continuously through the vertically running stainless steel tube.

Aerosol particles as condensation nuclei for water and fog droplets

Aerosol particles play a key role in the clouding process. At certain temperatures and pressure ratios they serve as so-called condensation nuclei, at which water vapour condenses to cloud or fog droplets. „We are for example interested in finding out how ice crystals develop in cirrus clouds", explains Ottmar Moehler from FZK the work of the cloud researchers. „Particles required for the formation of these ice clouds in large altitudes are for example sulphur, sulphates, soot from airplane engines and mineral particles. We create in the AIDA temperature and pressure conditions as they exist starting from six kilometers altitude and insert then such aerosol particles." One question of such experiments is, under which conditions do thin or thick cirrus clouds form - these have a warming respectively cooling influence on the climate. „During these experiments, we have to measure in particular the particle number", says Moehler. „For this we have been using the welas® system for years."

Endurance test in the refrigerator box

During the tests for the formation of cirrus clouds, temperatures of down to -80°C are standard in the AIDA chamber. „These low temperatures are a big challenge", explains Moehler. Not every measuring instrument plays here along. welas® proved itself also under these conditions. „It is a big advantage of the sensor that we can measure reliably directly in the cold environment: at the same temperature as in the „cloud", without additional heating units - and that calibration-free and without readjusting", so Moehler. After the welas® sensor already had proven its stable operation mode at very low temperatures, the scientist and the Palas® engineers wanted to know it exactly: in the polar stratosphere temperatures of down to -90°C can occur. According to Moehler, these conditions can be simulated in the AIDA. „We put the sensor into a refrigerator box and cooled the box down to -90°C." The sensor passed the endurance test with flying colours: even at these extreme temperatures, reliable measuring data could be read out.

Palas® filter test rigs convinced truck manufacturer

Successful measurements at Donaldson Filtration Solutions

Measurement technology of Palas® measures in close tolerances - once more, this was proven in tests in connection with the characterisation of oil separators at the Donaldson Coordination Center B.V.B.A. in Belgian Leuven. Comparative measurements in the laboratory with the test rig HMT-1000 and at an engine test rig with welas® particle measurement technology resulted in a large compliance of the respective results.

▶Donaldson is one of the leading providers of filtration systems world-wide. One field of activity is the development of closed crankcase ventilation systems. In reciprocating piston engines, these contribute to the protection of the engine and environment: with the combustion process, so-called blow-by gases reach the crankcase by passing the piston rings. The gases are contaminated by oil, fuel and soot particles and can create an unwanted overpressure in the piston chamber. The blow-by gases are diverted over crankcase ventilation. For reasons of environmental protection, the ventilation may not happen outwards. Instead, the gases are led through a closed circuit again into the intake area of the engine. In order to preserve the engine components, the oil portion in the blow-by gas must be reduced as far as possible by using an oil separator. This is done with the help of a blow-by gas filter.

Donaldson tested oil separators in laboratory and practice

Particle measurement technology of Palas® was used at a parallel test of oil separators and filters under practice and laboratory conditions. During the ATS seminar in October 2006, Jos Symons from Donaldson EMEA reported on this test to the interested audience.

„The functionality and lifetime of the oil separator and blow-by gas filter were examined", describes Symons the measurements accomplished in the laboratory and in-situ.

On the one hand, the Donaldson developers accomplished laboratory measurements with the welas® system 1000 with heatable cuvette and the dilution system KHG-2010, both being integrated in the HMT-1000 test rig.

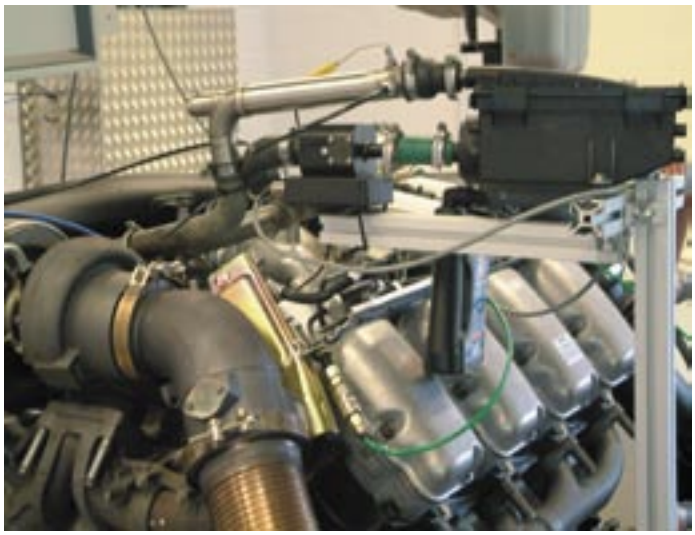
On the other hand, measurements were carried out with the in-situ particle measurement technology welas® 1000 and KHG-2010 directly at an engine test rig of a truck manufacturer.

High compliance rate of in-situ and laboratory measurements

After the mass flow of the gas, the temperature of the gas and filter as well as the particle concentration and particle number distribution in the blow-by gas had been characterised, the particle size distribution and concentration and the separation efficiency were measured with the test system in the laboratory as well as at the test rig of the truck manufacturer, at different positions of the engine. The result of the measurements: the oil separators show a high efficiency. The measuring data showed a high compliance rate regarding the particle size distribution of the oil droplets and the separation feature. „The comparable results show that the Palas® measurement technology can be used for representative measurements", so Symons. „An additional advantage of the welas® system is the fact that we measure the blow-by gas concentration in real time and can read out and represent directly the particle sizes and distribution."

Good results led to interesting follow-up orders

In consequence of the successful measurements, Donaldson got from the truck manufacturer the order for the supply of separators. The used equipment convinced



Engine test rig for the characterisation of oil separators at Donaldson Coordination Center B.V.B.A. in Belgian Leuven

the truck manufacturer, too – meanwhile, he bought the blow-by measurement technology from Palas®.

„The test system HMT-1000 has been used for approximately four years for the characterisation of oil separators on the Leuven site", reports Symons on the companies' experiences with Palas® technology. „Because of the good results supplied by this system we recommended it to our headquarters in the USA. There, similar measurements are accomplished for utility vehicles for the American market."

The evidence for the reliability of the measuring instruments was supplied by Palas® as well: With the delivery of the new test system to Donaldson USA, Palas® compared the new system with the well-proven one in Belgium: The maximum deviation in separation efficiency was about 3 per cent.

▶ Palas® Customers

Donaldson Filtration Solutions

▶The Donaldson Company, Inc. headquartered in Minneapolis, USA is one of the world-wide leading manufacturer and provider of filtration systems and spare parts for industrial and diesel engines. The range of covered markets goes from air cleaning in plants, purification of compressed air and gas, dust and smoke removal over power supply, disk drive filtration to off-road vehicles and trucks.

The head office of Donaldson EMEA (Europe, the Middle East, Africa) is situated in Belgian Leuven. Here, nearly 2,500 employees develop, manufacture and distribute filtration solutions.

In Leuven, the Engine Department develops products for the filtration of blow-by gas, air, liquids and lubricant as well as exhaust systems and systems for the exhaust after-treatment.

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welas® PRO measures also in areas difficult to access

Measuring system for process control presented for the first time at POWTECH 2007

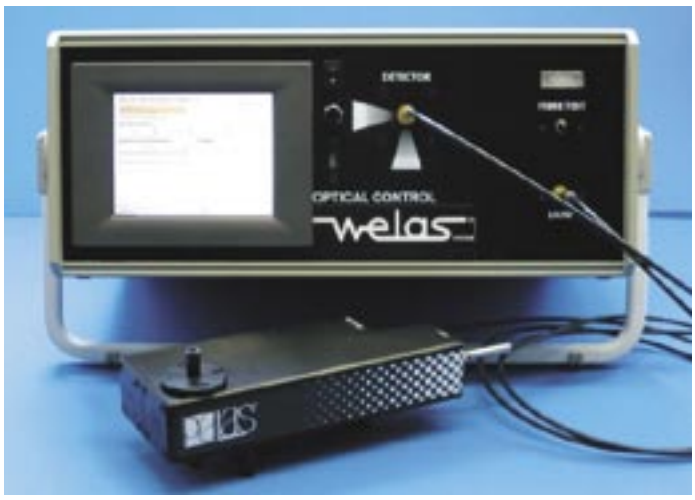
▶A new version of the welas® system, which has proven itself in practice in many cases, has been developed. With the new system welas® PRO, which was introduced to the interested specialists for the first time at POWTECH 2007, new applications within the range of process control are made accessible.

With this system, continuous automated measurements are possible also in areas inaccessible or difficult to access so far. With welas® PRO, measurement results can be displayed immediately online on the 6.5" touch screen of the integrated microcomputer. Thus, an additional PC or laptop becomes redundant. On the integrated screen, the continuous recordings over the time, the particle size distribution as well as 24 statistic values related to concentration and size distribution can be comfortably read off with a time resolution of alternatively 1 second, 10 seconds, 60 seconds or 120 seconds.

The electronics is placed in a 19" plug-in housing. Table housing is available on request. The equipment has two external interfaces (RS232 and RS485) for the control and the readout of data. Thus, welas® PRO can be integrated into existing process control systems without any difficulty. The data transmission is effected as standard by means of Modbus RTU. On request, also Profi-bus and CAN-bus are possible.

Optical fibre technology opens up inaccessible application areas

The welas® PRO system is particularly suitable for measurements in areas unreachable or difficult to access so far.
The control unit and particle sensor are connected with each other via optical fibre technology. The sensor can be installed in up to 60 meters distance from the electronic evaluation unit.
Thus, the spectrum of possible applications goes from measurements in explosive areas over particle counting in jet mills to control of emissions, e.g. during the monitoring of inlet and outlet air in tunnels.



welas® PRO - with integrated microcomputer and 6.5" touch screen

Furthermore, depending on the requirement, different additional options are possible, like for example resistivity against aggressive media, heating up to 120 °C or pressure resistance up to 10 bar overpressure.

welas® system - modular and flexible

The welas® particle measuring instruments are characterised by the broad spectrum of possible applications. The modularly built white-light-aerosol-spectrometer-system can be equipped with different sensors. Depending on the requirement, the simultaneous and independent measurement both of particle sizes and particle quantities is possible in size ranges from 0.18 up to 40 µm. Particles in liquids can be measured, too (welas® 2100FL).

Efficient particle collection with sampling head SIGMA-2

Co-operation between German Meteorological Service (DWD), the University of Freiburg and Palas®

▶A meeting between Dr. Eckart Schultz from the Department of Medicine Meteorology of DWD in Freiburg and Palas® Managing Director Leander Mölter in the year 2005 represented the initial ignition for a successful co-operation in the area of particle measurement. "Dr. Schultz asked me, how, at particle measurements, we want to collect the coarse particles >10 µm as completely as possible", reports Leander Mölter on that meeting. "Indeed, this was a problem. It turned out that with the passive collector SIGMA-2 a device was available being especially suitable for the sampling of these coarse particles." This was the result of comparative measurements with the EU reference equipment for the collection of the breathable dust PM10, the so-called Wide Range Aerosol Classifier (WRAC). The following agreement was suggesting itself: through the co-operation between Palas® GmbH and DWD, the welas® system from Palas® should be optimised by using the SIGMA-2 as air inlet.

Key question: how to get the coarse particles into the measuring instrument

The collecting characteristics of these coarse particles and the key question, how to get them into the measuring equipment, were analysed by using pollen with a diameter of approx. 20 µm. These questions were subject of Felix Kohler's diploma thesis at the Physical Institute at the University of Freiburg, Department for Molecular and Optical Physics. The thesis was supervised by the head of the department, Professor Helm, in co-operation with Dr. Schultz from DWD; Palas® rendered financial and technical assistance.

Within the framework of this diploma thesis, different air intakes for the welas® system were examined: the sampling head of the passive collector SIGMA-2 could be proven to have the best collecting characteristics for coarse particles. Thus, the usage of the passive collector SIGMA-2 as air inlet for the welas® renders possible a representative particle size and particle number measurement and a complete collection of coarse dusts, e.g. in stables. The newly appointed degreed physicist Felix Kohler will present the results of his investigations at this year's ATS seminar taking place from 14th to 16th October in Karlsruhe.

SIGMA-2 sampling head in use

Brisk interest and new customers from the Far East

FILTECH 2007: Good response to Palas® offer - outstanding organisation

▶With more than 2,200 participants, FILTECH 2007 (from 27th February to 1st March in Wiesbaden) offered an intensive survey of forward-looking filtration and separation solutions. „What has to be pointed out is the high number of specialised visitors", balances Martin Schmidt, Palas® Sales Manager.

Besides visitors from Russia and China, this year also numerous specialists from Taiwan, India and the Near East visited the Palas® exhibition booth. „Some prospective customers already had informed themselves about our product range and business activities in the run-up to the exhibition and came to our booth for selective discussions", says Schmidt. "Thus, we could initiate the sales of a welas® system to Taiwan directly from the exhibition. Furthermore, the high number of interesting new contacts was remarkable." But, this event was not only for Palas® a success. Many discussions reflected the good economic situation and the willingness to invest. Altogether, FILTECH 2007 registered a considerable increase in visitors – not least due to the good organisation. „The conception, preparation and realisation of the exhibition and congress are extraordinarily good", praises Schmidt. „Mike Taylor of the British Filtration Society, who brought FILTECH and POWTECH into being, as well as the Technical Committee of the VDI have really been doing an excellent job."

Palas® „local marketing"

▶Also the support of Palas® enables the Karlsruhe Trade Fair to offer its visitors a comfortable shuttle service. Since the beginning of this year, we have been represented with our logo on the exhibition corporation's VW and thus express our solidarity with the location Karlsruhe.

Collaboration in working groups and committees

▶High quality, exactness in each detail and the continuous further development of our products and services are the fundamentals of the Palas® business philosophy. Therefore, we co-operate closely with research facilities and universities and thus contribute to basic research.
Beyond that we are also actively involved in numerous working groups and committees, and bring in our knowledge and experience from many projects into the advancement and definition of standards. For a small company this is not understood, since this work requires much time and manpower.

Palas® is an active member of the following committees:

- ▶VDI - Association of German Engineers
- ▶KRdL - Society for the Promotion of the Commission Air Pollution Prevention
- ▶GAeF - Association for Aerosol Research
- ▶SRRT - Swiss Association for Clean Room Technology

▶ Palas® Agenda

Palas® will participate in the following conferences and exhibitions (excerpt). We are looking forward to meeting you there!

▶ISSW26
15.07. – 20.07.2007
Göttingen, Germany

▶ETH 2007
13.08. – 15.08.2007
Zürich, Switzerland

▶5th Asian Aerosol Conference
26.08 – 29.08.2007
Kaohsiung City, Taiwan

▶3rd International Symposium on Nanotechnology
29.08 – 01.09.2007
Taipei, Taiwan

▶Particulate Matter in and from Agriculture
03.09. – 04.09.2007
Brunswick, Germany

▶Gala 2007
04.09. – 06.09.2007
Rostock, Germany

▶EAC 2007
09.09. – 14.09.2007
Salzburg, Austria

▶INTC 2007
24.09. – 27.09.2007
Atlanta, USA

▶21st Palas® ATS
14.10. – 16.10.2007
Karlsruhe, Germany

▶AFS 2007
15.10. – 18.10.2007
Ann Arbor, USA

▶VDI Fachtagung
23.10. – 24.10.2007
Basel, Switzerland

▶Clean Rooms Europe
11.03. – 13.03.2008
Stuttgart, Germany

▶10th WFC
14.04. – 18.04.2008
Leipzig, Germany

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