Palas® Particular
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Dear Readers,

▶ Investments in research and development are a central economic indicator. Therefore, Palas® started the year 2006 very optimistically for investments are made again. We never sold as many filter test stands and particle measuring instruments as in the year 2005. It is particularly pleasing that also in Germany the demand increased again noticeably. So, in this up to now best year of our company's history, the turnover with customers from Germany lay with 51 per cent over the export proportion. Palas® products are used today in over 20 countries. The largest foreign market are for us the USA with 16 per cent, followed by France, the Netherlands and Japan.

Thank you for your confidence in our products. We promise you that at Palas® you can rely also in future on quality, innovation and reliability.

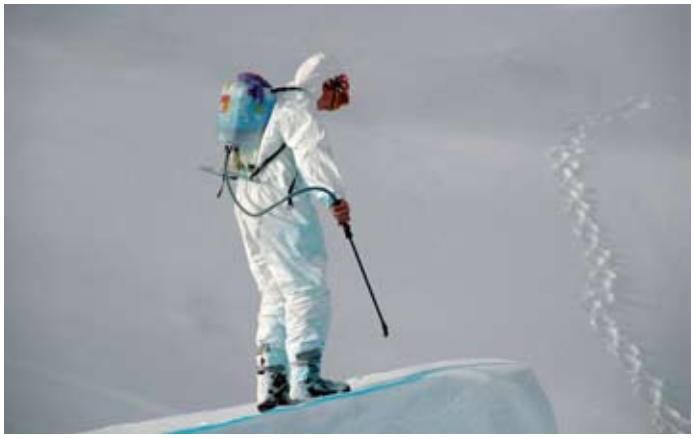
Leander Mölter
Managing Director
Palas® GmbH

In this edition:

Testing of protective clothing under practice conditions

Palas® develops variable test stand to test protective clothing materials for the Military-Scientific Institute of the German Federal Armed Forces

▶ Protective clothing must fulfil their function reliably in practice under all circumstances. In order to test the quality of the materials used for this purpose, Palas® developed the APM-2005 for the Military-Scientific Institute of the German Federal Armed Forces. This **A**utomatic Test Stand for **P**ermeable **M**aterials is particularly versatilely applicable and makes the testing of different materials possible under almost practice conditions.



Practical tests for protective clothing and other materials

The challenge with the development of this new test stand concept consisted of the fact that the test medium should not be simply only flowed against orthogonally, thus frontally. As in reality, the air should also circulate around the material – completely or from different angles – or be also purposefully directed past the material.

The result is a particularly versatile test stand with a removable filter holder which can be modified purposefully for the respective application. At the test stand developed for the German Federal Armed Forces a piece of approx. 30 cm x 30 cm of the protective clothing material to be tested is inserted in practice into that test stand and flowed against and/or around under defined conditions with a velocity of 1-5 m/s. The flow rate can be variably adjusted from 60 to 600 m^3/h. An even distribution of the particles over the duct cross section in the medium holder is guaranteed for all adjustable flow rates.

Thus, it is possible to test reliably also the permeability of particularly critical points, like for example seams or zippers. The medium is inserted in practice fast and simply into the test stand. The technical set-up of the medium holder ensures a close-to-reality incident flow of the sample. Even a special sample holder for the „trousers leg incident flow" is available. Instead of materials such as those used for protective clothing, it is also possible to test filter media or even complete filters with this concept.

Test stand can be operated with different aerosol generators

A further advantage consists in the fact that the test stand can be operated with different aerosol generators. According to requirements the materials can be tested with droplets, salts or dusts. The generator can be exchanged at any time and thus the application scope can be individually extended.

The heart of the test stand APM-2005 is the well-proven particle measuring system welas® 3000. With this system one can measure quasi simultaneously in raw gas and in clean gas the particle number concentration and the particle size distribution. Thus, the raw and clean gas particle concentrations and the fractional separation efficiency can be determined reliably. The Palas® test stand software proven in practice enables an automatic control of the volume flow as well as of the assigned aerosol generator and an automatic collection of the measuring data of the two particle sensors.

Apart from the raw and clean gas particle concentrations and the fractional separation efficiency, further measuring data, such as differential pressure, barometer pressure, temperature and relative humidity, can be seized with the hardware and software. Just as for extensive series of measurements, such a fast comparison of different measurements is possible.

Quick filter testing with MFP-3000 S

▶ In the field of air filter development, time is worth cash money, too. The automotive manufacturers develop new models within ever shorter cycles. The installation space available for air filters under the engine bonnet becomes ever smaller. At the same time, the service intervals of the filter systems are to become permanently longer.

Therefore, in the air filter development of the company MANN + HUMMEL GmbH in Ludwigsburg, Germany, engineers work with high pressure on new, more efficient filtration solutions in order to supply the customers from the automobile industry with suitable systems.

At first, the developers from Ludwigsburg get the specifications for an installation space from their customers. „Then it can happen that the installation space changes in the course of the development, so that one must re-consider how to get a filter element adjusted to the engine performance inside the modified installation space", says Dr. Nikolaus Moser, director of the air filter element development at MANN+HUMMEL. Up to now, first of all a complete filter element had to be always manufactured for the testing. That was not only complex and time-consuming, but also very expensive. „Now we do not need a complete filter any more – a piece of the filter medium is sufficient. We push it simply into the new test stand and within short time we have the first results about the medium."

This becomes possible with the new filter test stand MFP-3000 S which was developed by the company Palas® particularly with and for MANN+HUMMEL. For Andreas Beck – head of the air filter test laboratory – who conceived this test stand together with the Palas® technicians it was among other things a condition that the filter testing can be done also gravimetrically, thus by weights. Here, constant air conditions are a precondition for comparable measurement results. Therefore, the test stand had to be modified from pressure to suction operation. „Our air filter test laboratory is air-conditioned. We have here – according to the test standard ISO 5011 – permanently an air humidity of 50 per cent and an ambient temperature of 23 degrees. Now, we suck over the test stand this air-conditioned air on the filter medium. At first, we condition so that we have constant initial conditions. Then, we find out with the loading the fractional separation efficiency (separation degree) as well as first information on the service life which can be expected."

„Large benefit for MANN+HUMMEL"

After one and a half years of development and a half year of testing, the new test stand has been in continuous use since July 2005. „Palas® agreed to do this development in co-operation with us and MANN+HUMMEL benefits from having such equipment", praises Dr. Moser this partnership.

Dr. Nikolaus Moser, Director of the air filter development at MANN+HUMMEL and Andreas Beck, Head of the air filter test laboratory

The more efficiently the engines become, the more effectively must they be protected against foreign substances. That is the task of the filter manufacturers. Even finest particles act as emery paper between the piston walls and can cause sensitive damages. Andreas Beck explains that the air filter in the VW beetle still had a separation degree of 98 per cent, today's standard media are of the order of 99.5 or 99.8 per cent. „However", Dr. Moser says, „for us is interesting: What goes actually through, how large are the improvements?" And they are enormous. Today's filter media are around the factor 10 more efficient than 40 years ago.

And the filter efficiency will continue to rise. In Ludwigsburg, one experiments with numerous new filter media. „Firstly, we want to keep the investment low and we manage this with such a filter test stand", explains Dr. Moser. The newest development at MANN+HUMMEL is the following: compact air filters from high performance filter media. „So we get then into ranges of 99.9 per cent of separation." Cadillac is one of the first automotive manufacturers that installs these so far most progressive air filters into standard models.

Foto: MANN + HUMMEL

Filter production at MANN+HUMMEL

▶ Palas® Customers

Company Portrait MANN+HUMMEL

▶ The MANN+HUMMEL group was established in 1941 in Ludwigsburg, Germany. Within the range of automotive initial equipment, MANN+HUMMEL develops, manufactures and sells filter and suction systems as well as other components for the automobile industry. The car spares market is served by the trademark MANN-FILTER with filter elements of initial equipment quality. For the general industry, the company develops and manufactures industrial filters and facilities for the engine building as well as devices and systems for the material handling in the plastics processing.

With world-wide 41 locations and approximately 9,300 employees MANN+HUMMEL belongs to the large companies in the automobile supporting industry. In the year 2005, the company had a turnover of approx. 1.35 billion Euros, about 3/4 of it from the customers from the automobile industry and the car spares market.

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Palas® test stands – reliable and reproducible

▶„Count, what it is countable, measure, what is measurable, and what is not measurable, make measurable.“ At all times Palas® orientates itself at this principle of Galileo Galilei, the ingenious mathematician, physicist and astronomer of the Renaissance.

By „make measurable“ Palas® basically understands that the won measurement results are comprehensible and understood. The results obtained with a test stand must be also comparable, regardless of the fact whether the test system is located in Asia, the USA or Europe. A condition for this is that the test systems and single components, such as aerosol generators, particle measuring instruments and dilution systems are reproducibly in the same quality.

According to our claim of quality, this means that the deviation of the measurement results should preferably not amount to more than 5 per cent when using homogeneous filter materials. Test systems which do not fulfil these conditions do not supply comparable and concomitantly no meaningful results.

Between 1999 and 2004, round robin tests were accomplished with different test stands according to standard. The results of these tests were disillusioning: Depending upon comparative measurement there were result deviations of up to 70 per cent.

In general, Palas® regards such round robin tests as meaningful. However, in our opinion it is problematic that in the different standards the necessary specifications of the test stands are not described enough in detail. Therefore, it can occur that standards do not lead necessarily to comparable results.

For this reason, we accomplished internal comparison tests for Palas® test stands. The results speak for themselves: The deviations amounted to less than 5 per cent, whereby they were of the order of 4 per cent in the lower particle size range (0.3 µm) and of only 1 per cent in the upper range (4 µm). These very good results could be obtained at different types of Palas® test stands at different customers (MFP, MMTC, HMT, test stand for cabin air filters). Additionally, also at test stands which were built by the customers themselves with Palas® test components (in one case combined with an APS, aero-dynamic particle sizer) one obtained comparable positive results!

Filter test stand MFP-2000 in use at the company Internormen

That means: Only with clear measuring components (generator, dilution system, aerosol spectrometer) and with the correct aerosol-physical test set-up one can obtain reproducible and thus economical results.

Should you be interested in the single measurement results, we will gladly forward them to you on request.

+++ up-to-date+++up-to-date+++up-to-date+++up-to-date+++

First VSG-3000 in use

▶The first diesel soot generator of the series VSG-3000 S, which is manufactured by Palas® under license of the DLR Stuttgart, Germany, is in use at the company BOSCH. The automobile supplier ordered a special development: The new soot generator, which generates real soot particles from a combustion process, is integrated into a test stand with which exhaust sensors are tested. The burner meets a heated soot tube into which the sensors to be tested are inserted at an adjustable work temperature of up to 300°C. In the burner maximally up to 2.2 g/h soot particles are generated. Via software controlled mass flow controller the burner is supplied with the fuel gas, an ethene-air mixture. The burner flame is optically controlled.

Test stand VSG-3000 S

This test method is very practical. At the same time it saves effort, place, time and money since the compact soot generator replaces a large engine test stand which had to be used so far for these tests. Furthermore, the VSG-3000 S works with a higher reproducing accuracy.

BRU – Balance Refill Unit

▶ The balance refill unit (BRU) is a complement to the powder disperser BEG-1000 according to VDI 3491 part 8. With the BRU one can dose and disperse dust without interruption over a long time.

Due to the continuous dust dosage long term tests are possible without problem. During these tests one can accomplish for example also an ageing of the filter media.

The new development consists of a reservoir, one shaking gutter and two balances. In practice, one determines the dust content of the dosing unit by means of a balance below the aerosol generator BEG-1000. If one falls below a certain value, the shaking gutter pumps automatically as much dust from the reservoir until the quantity adjusted before is reached again. The reservoir comprises up to 60 l of dust.

The second balance determines the dosed quantity from the shaking gutter. Thus, with the help of the two balances one can determine exactly how much dust was already dispersed. With the refilling unit one can accomplish practical tests for example at engine air filters which are tested with very high loading also over long time. The BRU works satisfactorily in practice and saves time and money at long term tests.

BRU Balance Refill Unit

Applications, e. g.

- ▶cement industry
- ▶filter testing according to ISO 5011 (engine air filters)
- ▶filter testing according to VDI 3926 / cleanable filter media
- ▶applications at which one doses continuously

New employees and modified structure of the sales department

Palas® — training facility for the first time

▶The Palas® sales department has a new structure. Since January the sales department is divided into two divisions: technical sales and marketing. Martin Schmidt remains manager of the technical sales division. Patricia Kessler accepted the management of the marketing/PR division.

Within the development division we also got strengthened by two new employees: The graduate engineer Martin Abele is among other things responsible for the construction of the welas®-systems and of the new generator VSG-3000. Furthermore, Roman Joachim works in our team as physics laboratory assistant since January 2006.

Since September 2005 Palas® is also a training facility: Julia Rösch trains as office clerk.

Expansion of sales

With regard to sales Palas® cooperates world-wide with distributors which represent the company without exclusive contract on the respective markets. This network is to be extended. For this reason, we look world-wide for more engaged resellers.

From our resellers we expect technical competence and a high engagement. They should have good contacts on the market and be available as competent on-site contact for our customers. Palas® offers apart from fair conditions intensive free training courses and instruction related to the single devices. The resellers and their work are broadly supported by Palas® with know-how and materials.

Roman Joachim, Patricia Kessler, Martin Schmidt, Julia Rösch and Martin Abele

▶20th Palas® ATS 2006

Opening of ATS 2005 by Palas® managing director Leander Mölter and Prof. Dr. Ing. K.G. Schmidt, IUTA e.V. Duisburg

▶From **15th to 17th of October** 2006 Palas® is going to organise its **20th Aerosol-Technology-Seminar (ATS)** in Karlsruhe, Germany. On the occasion of this round anniversary we will offer the seminar participants a special program. Apart from competent scientific papers you may expect a festive social program with music, show and entertainment.

If you want to book your place right now, just send us a short e-mail to mail@palas.de.

Collaboration in technical committees

▶Palas® works actively in the following technical and standards committees. In some committees we are involved as appointed/permanent member; in others we are active in advisory capacity.

- **GVC technical committee particle measuring technology** (L. Mölter)
- **Room air filter** (M. Schmidt)
- **HEPA/ULPA** (L. Mölter)
- **Cabin air filter** (L. Mölter)
- **Compressed air filter** (L. Mölter)
- **Tank ventilation filter** (M. Schmidt)
- **Blow-by oil separator** (M. Schmidt)
- **Vacuum cleaner and vacuum cleaner filter** (L. Mölter.)
- **Cooling lubricant separator** (S. Schütz)
- **Engine air filter** (M. Schmidt.)
- **Determination of the particle number concentration and number size distribution** (L. Mölter)

▶ Palas® Agenda

Palas® will be present at the following conferences and exhibitions. We are looking forward to your attendance!

- **EMChIE 5th European Meeting on Chemical Industry and Environment**
  03.05. – 05.05.2006
  Vienna, Austria
- **ACHEMA**
  15.05. – 19.05.2006
  Frankfurt/Main, Germany
- **Symposium „Product Design in the Particle Technology“**
  22.06. – 23.06.2006
  Pfinztal, Germany
- **ETH Zurich**
  21.08. – 23.08.2006
  Zurich, Switzerland
- **GALA**
  05.09. – 07.09.2006
  Braunschweig, Germany
- **7th International Aerosol Conference**
  10.09. – 15.09.2006
  St. Paul, USA
- **International Nonwovens Techn. Conference**
  25.09. – 28.09.2006
  Houston, USA
- **European Conference on Filtration and Separation**
  12.10. – 13.10.2006
  Compiègne, France
- **Palas® ATS**
  15.10. – 17.10.2006
  Karlsruhe, Germany
- **Filtrex**
  24.10. – 25.10.2006
  Munich, Germany
- **AAAS – Advanced Atmospheric Aerosol Symposium 2006**
  12.11. – 15.11.2006
  Milan, Italy

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