

POWDER

NEWS



ASTALOY CrL LAUNCHED AT PM²TEC 2002 WORLD CONGRESS

Disney fantasy, technical facts, family fun, global contacts and a good reception for the newly introduced Astaloy CrL were just some of the ingredients that made the PM²TEC 2002 World Congress in Orlando a great success.

North American Höganäs Inc. was one of 107 exhibitors at the Metal Powder Industries Federation-sponsored PM²TEC 2002 World Congress on Powder Metallurgy & Particulate Materials. The congress, held between June 16-21 at the Walt Disney World Dolphin Hotel in Orlando, Florida, attracted more than 1,600 visitors.

Ralf Carlström, Sales Director of North American Höganäs says: "Our booth attracted a lot of attention with its futuristic design.

Centrally located projectors showed visual material on screens around a full 360 degrees to exhibition visitors."

"On the product side, the high point was the introduction of the new P/M material, Astaloy CrL (see page 2). Up to now we have been fairly low-profile on this material, but this was the ideal opportunity to inform potential customers about technical performance and potential, and it generated a lot of interest," says Ralf.

Also on display at the booth was the new SMC-based brake servo motor, a collaborative project between Höganäs AB and Aisin Seiki of Japan (see page 4).

Bravo Orlando!

"Overall, the congress was very well organized, and the facilities at Walt Disney World work very well for an event of this size," states Ralf.

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A world congress, a global product launch

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The World Congress provides opportunities not only to meet customers, but also colleagues. "This was a chance for Höganäs AB's subsidiaries from around the world to get together, and we held a marketing meeting prior to the congress. There was also a senior management meeting in conjunction with the congress, so I think the week in Orlando was used very effectively."

Unique opportunity

According to Ralf, the greatest value of a World Congress is that it is a unique opportunity "to meet a lot of people, make a lot of contacts and strengthen our image as a provider of new technology."

Presenting new R&D findings plays a vital role in highlighting leading-edge know-how. The program of technical presentations at PM²TEC 2002 attracted a total audience of around 900 people. Höganäs AB and North American Höganäs made no fewer than 16 presentations.

CUSTOMER EVENING WITH AN AFRICAN THEME



North American Höganäs invited customers and their families to "Dive into an ocean of Family Fun" at an African themed evening on June 19. The highly successful evening, attended by 590 guests, took place at the Harambe African Village complex in Walt Disney World's Animal Kingdom Theme Park.

A real success

Billed as a "Sunset Festival", the event was packed with festivities including Swahili cuisine, the irresistible rhythms of modern African music, a special 3-D film, and exclusive evening access to some of the attractions at the Animal Kingdom.

"Although we started with rain, the weather soon improved and the evening was a real success enjoyed by everybody," concludes Ralf.

Astaloy CrL makes chromium a COST-EFFECTIVE CONTENDER



Astaloy CrL, launched at the PM²TEC 2002 World Congress, is a new water-atomized powder that opens up new possibilities for cost-effective pre-alloying with environmentally-friendly chromium.

"Chromium is a low-cost, recyclable material for pre-alloying that can offer high hardenability. Astaloy CrM showed that the highest level of properties could be achieved with chromium, and new Astaloy CrL will make the advantages of chromium cost-effective for a broader spectrum of uses," says Caroline Larsson, Technical Marketing Manager at Höganäs AB.

Whereas the high-alloy Astaloy CrM, launched by Höganäs AB in 1998, is optimized for heavy-duty, high-performance components, Astaloy CrL has been developed to offer pre-alloying with low-cost chrome in a wide range of applications that do not require the highest level of properties.

Astaloy CrL (Fe-1.5% Cr-0.2% Mo), a water-atomized, pre-alloyed powder, would be an appropriate choice for components such as gears, hubs and sprockets for automotive applications and power tools.

"The new powder could be described as a leaner version of Astaloy CrM. It can be tailored to different high strength and hardness requirements, making it particularly suitable for medium-range demands," says Caroline, who was a member of the steering group on the three-year Astaloy CrL project. "Our target was to develop a cost-effective material in the medium-strength range, but the real challenge was to develop and optimize a production process to provide good compressibility and make it possible to pre-

alloy efficiently with chromium for the intended performance range."

What are the performance characteristics of Astaloy CrL? "Compressibility is very good because it is annealed to a low-oxygen content of 0.15%. It also offers especially good fatigue strength and wear resistance at higher carbon contents. Wear resistance is actually better than nickel/molybdenum powders. It has excellent dimensional stability, as different carbon contents and density variations have little effect on the material. Astaloy CrL is also highly suitable for surface densification."

"Sintering causes only minimal changes," continues Caroline, "which makes it easier to produce components with tighter tolerances. High temperature sintering and accelerated cooling rates offer considerable improvements in properties."

Environmental benefits

Because it is nickel-free, Astaloy CrL is good for the working environment. It is also environmentally-friendly, as chromium can be recycled in the scrap phase of P/M parts.

Astaloy CrL was officially introduced in June at the PM²TEC 2002 World Congress in Orlando. Caroline says: "We were able to give visitors to the stand all the technical information they required. Since then we have sent out a large number of samples to interested potential customers, so I am very satisfied with the response so far."

A BRIGHT FUTURE FOR P/M IN AUTOMOTIVE ENGINES



Competition is intensifying between the technologies vying to provide tomorrow's automotive engine components. By offering lower costs and special tailored properties, P/M will be among the winners, according to Claes Kuylenstierna, a leading expert on automotive materials.

Claes Kuylenstierna, head of the New Automotive Materials group at Volvo Material Technology in Gothenburg, made a thought-provoking presentation at the PM²TEC 2002 World Congress in Orlando entitled; "Future Development of Engines and the Influence on the P/M Industry".

Claes has worked at Volvo Material Technology since 1985. His New Automotive Materials unit is one of several groups that monitor advances in different technologies and work closely with Volvo designers on development projects.

"One of the things I wanted to get across in my presentation was that there are going to be no easy victories in the contest between competing technologies. This kind of competition is good for the automotive industry, as it means processes are under continual improvement. Those working on one technology cannot afford to relax or it will be overtaken by another technology."

"P/M technology faces competition from castings, sheet metals, plastics and forgings," continues Claes, "but I am convinced P/M is going to be an important future technology. P/M technology is already well established for certain processes and the kilo-per-automobile use of P/M looks like it will continue to increase."

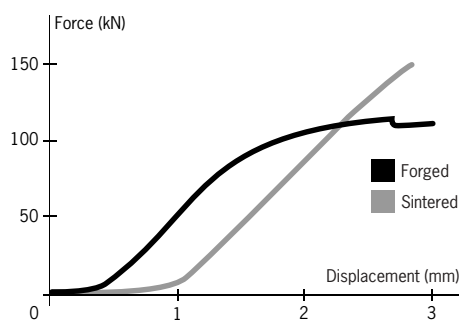
In the presentation, he outlined four general requirements central to the future development of engines: a high focus on emissions, efficiency and fuel economy, reliability and low costs.

From these demands, four consequences were apparent for tomorrow's engines: the introduction of new systems for emission control, increased top pressure, less lubrication of the valve train because of reduced oil consumption, and a higher stress level on components due to weight optimization.

Claes feels that P/M has a lot to contribute to engines in this future scenario. He pointed out the factors that would be crucial to P/M's success – cost savings, special properties, the use of magnetic materials and improved lubrication and wear properties.

Superior properties

To illustrate the properties that can already be achieved with P/M, the presentation included results from comparative tests between forged and sintered yokes for an injector.



Comparison testing of forged and sintered injector yokes revealed the sintered component had superior properties.

One injector yoke was forged, air-cooled, precipitation-hardened and machined. The other was warm compacted and sintered using Astaloy CrM. "Our injector yoke tests showed that even better properties were reached with sintering than with forging," says Claes. "These kind of results are very promising for P/M's future."

Another promising aspect of P/M is the sheer range of combinable processes that can be applied. Claes sees the following processes as being of special interest: local densification, warm compaction, high speed

compaction, compound technologies, case hardening, vacuum sintering and high temperature sintering.

"Depending on the application, P/M technology now has the processes to create new components that do not exist today. The versatility is there to create high loaded or moderate loaded parts. I think there are good possibilities in gear production where processes such as warm compaction and local densification can be combined. It is not just the range of processes now available, but the way they can be combined that offers so many possibilities."

Customization will become increasingly important emphasizes Claes: "The ability to make P/M components with built-in lubrication and wear resistance means a high degree of flexibility to tailor-make parts. Being able to mix and add elements will be a big advantage in the future."

Cutting costs

Cost will be one of the most decisive factors for P/M's success. One of the main conclusions of the presentation was that PM technology will contribute to cost savings for the engine producers of tomorrow.

"Forging requires a lot of machining, but sintering and the net shape process reduce the requirement for machining, and thus cut costs," says Claes. "In many cases, moving from a forged part to a P/M part means cost savings and I am convinced that there will be more successes for P/M in the future due to lower costs, continuing improvement in performance characteristics and new processes."



Claes Kuylenstierna, head of the New Automotive Materials group at Volvo Material Technology.



Automotive breakthrough for SMC technology in Japan

Soft Magnetic Composite (SMC) material is at the core of a new ABS brake servo motor produced by the Japanese automotive subcontractor, Aisin Seiki. It is the first SMC-based electric motor for an automotive application in large-scale production – an important breakthrough for SMC technology.

Aisin Seiki's first SMC-based motor is designed to drive the oil pump in an automotive ABS brake system. It replaces the conventional laminate-based unit previously used in the ABS brake system of a well-known Japanese automobile. Aisin Seiki, a major subcontractor primarily serving the automotive industry in Japan, supplies complete ABS brake systems.

Lighter and more compact

The new motor, a result of a three year development project, shows how the 3-D design potential of SMC technology can be

harnessed to produce a lighter, more compact alternative to steel plate laminate-based electric motors. The SMC-based motor offers comparable performance, but is 36% smaller in height and weighs 17% less. As the motor is "under the hood", where space is at a premium, these savings are of considerable importance.

Using SMC materials facilitates the design of more complex parts, so the new motor contains fewer components. Design improvements included an increase in the area facing the magnet, leading to an 8% improvement in the magnetic flux. More efficient winding of the copper wire reduced the length of wire required, and by eliminating sharp edges, the copper winding was made tighter.

3-D design benefits

Mats Persson of Höganäs AB says: "The Aisin motor is a real breakthrough in terms of incorporating SMC technology in large-scale production of an electric motor for the automotive industry. However, the most important aspect is that this motor really shows what you can achieve with SMC technology. This project started with a blank piece of paper and the motor has been desig-

ned from the point of view of gaining maximum benefits from using isotropic materials. This collaborative project between Höganäs AB and Aisin Seiki has truly succeeded in exploiting the 3-D design benefits of SMC materials to make the new motor lighter and more compact."

Höganäs AB & SMC technology

Höganäs AB has been a driving force for many years in the development of SMC materials. The isotropic properties of these materials make 3-D design innovations possible for various electrical machines. This applies particularly to motors, which represent a massive potential market – some four billion electric motors are manufactured every year.

Aisin's motor is the latest in a growing number of SMC material applications to go into production. One of the most important parts being produced today is a vital component in the Bosch "common rail system" for the injection of fuel in diesel-driven automobiles.

Höganäs AB is currently involved in more than 20 projects with manufacturers of electrical machines, primarily motor producers.





COLDSTREAM'S NEW NICKEL POWDER PLANT goes on stream

The Coldstream Division's new nickel powder plant in Belgium began commercial production on schedule in early September. It has sufficient capacity to meet the expected growth in demand for self-fluxing powders over the next five years.

For the Coldstream Division, shifting production of self-fluxing nickel powders from Sweden to Belgium proved to be a smooth transition. Coldstream specializes in high-alloy metal powders, and by starting up the new plant it has doubled its capacity to produce self-fluxing powders.

Michael Bockstiegel, Marketing Manager of the Coldstream Division says, "The aim was to replace the existing plant in Sweden. We wanted not only to transfer equipment and materials from Höganäs AB, but also knowledge and expertise." Production tests at the new plant began at the start of July, when the nickel powder plant in Sweden was closed down for good. There were several weeks of fine-tuning before the plant opened for commercial production on September 2.

"Our intention has been to reach the same

level of quality as the previous plant, and our tests show that this has been achieved – customers will not notice any changes in quality," states Michael. "The tests also showed that the plant will live up to our capacity expectations – to double output of self-fluxing powders from the Höganäs plant's 1,500 tons to 3,000 tons a year."

Located at the existing Coldstream site in Ath, Belgium, the new plant shares a building with the division's other two gas-atomization plants. Coldstream uses gas atomization, water atomization and micronization processes to produce high-alloy metal powders with high added value that have applications in P/M, thermal surfacing, welding, brazing and filters.

A successful joint effort

The new plant project, which took just one year from go-ahead decision to initial production tests, went very smoothly according to Michael: "The project, headed by project manager Jonas Larsson and engineering manager Vlad Sabau, was a real joint effort involving our engineering department at Höganäs AB and production engineers in Sweden and Belgium."

"Naturally, the building of the plant caused Coldstream some logistical problems, but I am pleased to say that overall we managed

to maintain quality and meet delivery times throughout the changeover and transition period," emphasizes Michael.

Fast growth rate

"Coldstream is a developing division and has been growing at a fast rate," says Michael, "There has been considerable investment in the process side to create the capacity for growth and this new plant represents the final stage in the current expansion plan."

The new plant will be used exclusively to produce self-fluxing nickel powders and has been custom-designed using highly specialized techniques specifically for that purpose. It will be able to produce over 100 different grades.

Demand for self-fluxing powders, used primarily in the glass and oil industries, as well as in chemical and mining applications, has increased in recent years and growth is expected to continue in Europe, but particularly in the USA and Asia.

"This plant is very important for Coldstream's continued expansion," concludes Michael, "as it gives us the capacity to meet the projected increase in demand for self-fluxing powders over the next five years."

NEW PLANT

boosts capacity in South America



Höganäs Brasil Ltda is to consolidate its leading position in the South American metal powder market with a new annealing and mixing plant in Jacareí, Brazil.

The new plant taking shape in Jacareí, 80 kilometers north of São Paulo, is the next stage in Höganäs Brasil's plans for expansion and improvement. The company operates in the entire South American market, where demand for iron powder has grown steadily in recent years. Höganäs Brasil mainly serves the automotive industry and its component suppliers in Brazil, a country that produces over one million vehicles annually.

Rolf Andersson, Technical Manager at Höganäs AB, who has overall responsibility for the Jacareí project in its final stages, says: "As the South American market is growing, we needed greater production capacity. The new plant will give us higher capacity, better quality and the possibility to make advanced customer mixes, all factors that will further strengthen our position in the South American market."

Leading producer

Höganäs Brasil was formed in 1999 when Höganäs AB bought Belgo Brasileira, the leading producer of iron powder in South

America and a significant producer of aluminium powders. The purchase was part of Höganäs AB's co-ordinated establishment strategy for North and South America. Belgo Brasileira, based in Mogi das Cruzes, some 40 kilometres north of São Paulo, was renamed Höganäs Brasil.

Rolf says: "In 1999, the company was producing 12,000 tons of iron powder annually through atomization using a relatively expensive annealing method and the intention from the start was to improve on this. Extending the existing building for annealing and mixing was not a viable option, so it was decided to look for a new site. After careful study, an industrial plant in Jacareí was selected."

Excellent infrastructure

The Jacareí plant, 40 kilometres from Mogi, was built by ICI and had been previously used by a subsidiary of BASF to produce dyes for the textile industry. Covering a total of around 250,000 sqm, the site is close to the São Paulo – Rio de Janeiro motorway and has excellent infrastructure for utility supplies.

The site is big enough to accommodate a complete plant with scrap metal holding area, atomization, annealing, powder mixing, storage and outgoing goods facilities. "In the first phase," explains Rolf, "we will focus on annealing and the mixing hall.

Construction work on the first stage will be completed in November. By using a num-

ber of the existing buildings, we have been able to keep construction costs down."

Work on setting up the new furnace – which was previously used in Höganäs – will start in October. And, if all goes according to plan, production at the new plant will begin in February 2003 using atomized raw powder transported via road from Mogi.

Maximum automation

"We have tried to make the new plant as automated as possible – a staff of 10 to 15 is envisioned when production starts," says Rolf. "Control equipment has an increasing significance for our process and the new plant's control system will be hooked up to Höganäs in Sweden, so assistance can be given if and when required."

Rolf praised the dedication of all those in Sweden and Brazil who have been involved in the project: "It is a pleasure to work with the skilled and enthusiastic Brazilian staff, who are working hard to create a high-class production plant."

Looking ahead, Rolf says: "In quality terms, the new plant will match our production in the rest of the world. Capacity in South America can be increased to meet the expected growth in demand. But, if we are going to achieve that increase, we must first expand our melting capacity, and that will be the next project in Brazil in a few years time."



A NEW DISTRIBUTION CENTER down Mexico way

Since June 2001, a new distribution center in Queretaro has given Höganäs AB the capability to serve the entire Mexican P/M market, efficiently and rapidly.

The decision to establish a distribution facility in Mexico shows Höganäs AB is intensifying its commitment to the North American market and is a vote of confidence in Mexico's future. Mexico has an expanding P/M market. A 1999 agreement between Mexico and the European Union paved the way for increased trade in addition to the country's traditional business links with the USA.

Situated in the city of Queretaro around 200 km north-west of Mexico City, the new warehouse is ideally located for nationwide reach. Ramon Martinez of Höganäs Iberica

says, "Our warehouse can guarantee supplies of our wide product range either from Stony Creek in the USA or Sweden to customers throughout Mexico."

"The warehouse is outsourced to one of the leading logistics companies in Mexico," Ramon continues. "It is intended to serve the whole Mexican P/M industry and also has the potential to expand into other applications such as welding, ChemMet and friction."

Rapid access to products

"Having a distribution center gives customers quick access to our products and it also spares them from the administrative and customs paperwork related to imported goods," says Ramon. "It facilitates just-in-time delivery to the industry, allowing companies to reduce their inventories."

The new center is the result of successful co-operation between Höganäs Iberica and North American Höganäs. Höganäs Iberica

staff took the initiative in setting up the center backed by advice and support from North American Höganäs, in particular Rune Pettersson, who was then VP Materials Management.

"We have developed a marketing and sales strategy for the Mexican market," says Rune. "It is not possible to give Mexican customers an acceptable delivery service without a local distribution center, and a vital part of our strategy is to achieve a leading position in the Mexican market."

Rune says the center greatly enhances customer service: "Shipments can now reach them in less than 48 hours. This will greatly improve their flexibility and allow them to respond to the fast-changing demands of their customer base."

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POWDER PEOPLE A MEETING

of metallographical minds



Christina Brehmer

Christina joined the Höganäs R&D department at the start of this year as a development engineer specializing in surface chemistry.

A graduate of the Lund Institute of Technology, she is a chemical engineer oriented towards organic chemistry and biochemistry. Her previous company was Perstorp Construction Chemical.



Fabrice Duteil

On July 1, Fabrice began work in a new role as Area Marketing Manager, Direct Sales Markets, focusing mainly on the markets in Australia, Africa, Southeast

Asia and the Middle East. He was formerly a member of the marketing department's technical service team. Fabrice, a graduate engineer who focused on materials technology at the Luleå University of Technology, also has a Licentiate in Technology from the University of Linköping.



Ian Howe

Ian, who formerly worked as an Area Marketing Manager, joined Technical Marketing on August 1. He will focus on the newly launched Astaloy CrL plus Astaloy CrM,

as well as QA support. He has a Masters degree in Engineering from the UK's open University and four years' experience working at a P/M part producer.



Ola Persson

Ola took up his position as a buyer in the purchasing department on September 1. He has a Masters degree in social sciences from the University of Lund and was

previously with Ericsson Mobile Communications.



In 2000, the P/M School created a new section: the Höganäs AB Metallography School. Ten courses have now been run, including two in the USA, at Stony Creek.

Lasting three days, the Metallography course, 30% theory and 70% practice, is designed to provide training in sample preparation and accurate interpretation of metallic microstructures.

Björn Lindqvist, Principal of the Metallography School, also teaches the theoretical part of the course. "It is aimed primarily at customers with metallography facilities and those who intend to get such equipment. The objective is to help customers see the power of metallography for problem solving. The more they know about metallography, the more they can solve quickly in-house. It also means we will be considered as a competent, co-operative partner when dealing with more complicated tasks."

"Classes are deliberately small," says Björn. "Seven participants is a good size. In a small group you can have an open discussion – either on samples they have brought with them or samples we have provided."

Introducing metallography on-line

The metallography on-line concept is being introduced on Metallography School courses at Höganäs AB and has created a lot of interest among the students. "This is going to be important for metallography in the future," emphasizes Björn. "We demonstrate it by rigging up two computers and then showing and discussing samples on-line."

"The next step is to set up an on-line link with the lab at Stony Creek. Eventually, it will mean that we can discuss samples on-line with customers and find solutions to

problems faster, minimizing disruption of production."

Björn held the first Metallography School in the USA at Stony Creek in November 2001. "Six participants from five different companies attended the course. The content was very well received and they soon realized that the course provided a forum where they could exchange experiences. We learned there is also a big interest in this field among major US customers." There are now plans for two courses a year at Stony Creek.

At present, four courses are scheduled annually at Höganäs AB, two in the spring and two in the autumn. "On request, we also offer this course on-site for remote markets," says Björn. "In the USA, we use the Stony Creek lab, but in other remote markets we are prepared to use local facilities such as at universities or research centers."

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