

POWDER

NEWS



A positive atmosphere FOR ASTALOY CRM SALES

Sales of Astaloy CrM are surging and production capacity is to be increased to keep pace with demand. Technical support from Höganäs AB to ensure close control of the sintering atmosphere has played a key role in the increasing adoption of chromium materials.

“Even though it is a relatively new product, Astaloy CrM has sold extremely well and we are taking measures to meet rising demand,” says Ralf Carlström, Marketing Manager for P/M Applications at Höganäs AB. “An investment in our production facility at Höganäs in Sweden will triple our capacity. The increased capacity will be in place in early 2004.”

Höganäs AB introduced Astaloy CrM in 1998. It was the first material designed to deliver the environmental and low-cost benefits of chromium in the mass production of powder components. Astaloy CrM, a water-atomized iron powder pre-alloyed with 3% chromium and 0.5% molybdenum, is tailored for high-performance parts.

“Chromium offers an attractive combination: high strength, good fatigue properties, good ductility and tight tolerances, but it is excellent hardenability that really opens up possibilities for high-performance applications,” explains Ralf.

Astaloy CrM is now being used in commercial production for powder components that require high strength and wear resistance, such as transmission applications. Although it is being selected for new parts, there has also been a shift towards Astaloy CrM from traditional materials in existing highly loaded components.

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CHROMIUM MATERIALS TAKE OFF

Capacity increases announced to meet growing demand for Astaloy CrM.



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Inside the new fine powder plant at Höganäs.



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Today's chromium materials are the result of Höganäs AB's search for a low-cost environmentally friendly alternative to the traditional alloying elements; copper and nickel. Chromium, the subject of intensive R&D within Höganäs AB since 1993, was a promising candidate. Not only is chromium a more cost-effective solution than nickel and copper, but it is ultimately easier to recycle in the scrap phases of P/M parts.

However, chromium was considered a difficult material for P/M because of sensitivity to oxidization during processing. Höganäs AB's research succeeded in pinpointing the optimum processing atmosphere to prevent chromium oxidation. This technical breakthrough paved the way for the Astaloy Cr range.

Atmospheric control

Ian Howe, Manager for Technical Market Support and formerly Chromium Product Manager at Höganäs AB says: "More and more manufacturers are now convinced that these materials provide exceptional performance at low total cost. As a guideline, chrome materials can generally offer the same performance as traditionally alloyed materials, but with a 20% saving."

"However, one potential obstacle for component makers is that processing and sintering with chromium materials requires a different approach than traditional P/M materials. During sintering of chromium materials, there has to be closer control of the atmosphere."

Technical support from Höganäs AB is underpinning adoption of chromium materials by helping component manufacturers attain the atmospheric control they need to get required results.

Educating customers

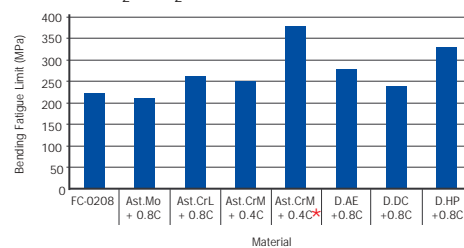
"We place a lot of emphasis on educating customers on the different process required for Astaloy CrM and CrL," continues Ian. "We have a dedicated Chrome Team of five people who all have hands-on knowledge of processing. Team members visit customers on-site, assess their current equipment and help them every step of the way to develop process solutions for chromium materials."

Höganäs AB added a second chromium material to its product portfolio in 2002. Pre-alloyed with 1.5% chromium and 0.2% molybdenum, Astaloy CrL is a leaner version of Astaloy CrM. It is particularly suitable for medium-range demands such as gears, hubs and sprockets in automotive and power tool applications.

Astaloy CrL has created a great deal of interest since it was launched, and Höganäs AB is now cooperating with many of its customers in the development phase of future powder components based on this material.

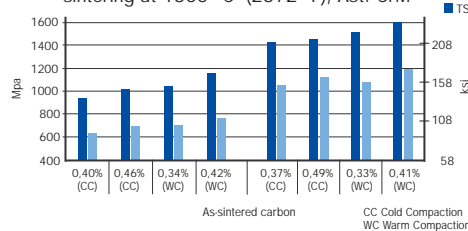
Ralf Carlström sees a bright future for chromium materials: "They have been a tremendous success so far and we continue to work intensively on these materials, so we can offer even better properties. We foresee continued growth for chromium materials as the market continues to adapt to the processing conditions needed to achieve optimum results."

Fatigue limits in plane bending (2 million cycles, R = -1) for PM steels with density 7.1 g/cm³ sintered at 1120° C for 30 minutes in 90N₂/10H₂

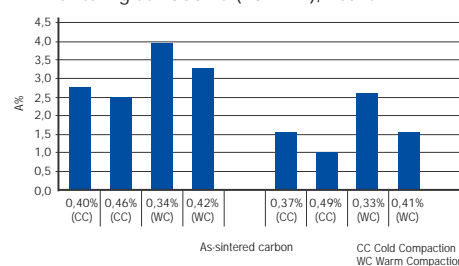


*High temperature sintered (1250° C) and sinter hardened (3° C/s)

Tensile and yield strength obtained after sintering at 1300° C (2372° F), Ast. CrM



Elongation obtained after sintering at 1300° C (2372° F), Ast. CrM





New plant in Höganäs FOCUSES ON FINE POWDER

Höganäs AB has made a major investment in a new fine powder plant designed to meet the growing demand for tailor-made, specialty powders.

The expanding market for fine powders – iron powders that require advanced screenings – will be served by the new screening plant, which has been built as an extension of the existing powder plant on the Höganäs site.

Started in autumn 2002, the fine powder project has proceeded according to plan, and the plant has been running smoothly since the first lot of 17 metric tons was delivered in March this year.

“We really needed this new plant,” says Per Engdahl Marketing Manager Non-P/M Applications at Höganäs AB. “We foresee a very attractive market for these specialty iron powders, and the fine powder plant is an asset unique to Höganäs AB.”

The particles of conventional iron powder range from 0 to 200 µm (0.200 mm). With the screens in the fine powder plant all types of particle size can be produced, including fractions smaller than 45 µm (0.045 mm).

Precision control on such a microscopic scale is very difficult without a specialised production line. With the new fine powder plant, Höganäs AB now has the capability to carry out all types of sieving and produce fine iron powders that meet tight particle size distribution specifications.

Tailor made powders

“This new plant has extended the service that we can offer our customers,” explains Per Engdahl. “In the powder plant we produce high-quality, large-volume base powders. And now, in parallel, we can also produce specialty powders tailor-made to meet customers’ specific requirements.”

The fine powder installation represents not only a major investment in equipment, but also a major reorganisation of the powder plant. A new department has been created that focuses exclusively on handling specialty iron powders, while the rest of the plant will maintain its emphasis on high volume products.

Production of fine powder is largely automated. It is envisaged that the fine powder plant will operate unmanned some of the time.

There has been a very favourable response from customers who have been on inspection

tours of the new plant. “I feel proud showing off the fine powder plant to customers,” says Per Engdahl, “It gives a highly professional impression.”

Future expansion

Significantly, the plant is dimensioned to allow for future expansion, with space available for additional production lines and other equipment.

“The expansion capability built into the plant is further proof that Höganäs AB believes in fine powders,” concludes Per Engdahl, “We reckon that the investment will pay off handsomely within a very few years and we expect to double the present volume in the next three or four years.”

Specialty powder applications

Fine iron powders can be tailor-made for uses such as:

- Carrier cores, powders for printers and copiers
- SMC materials for magnetic applications
- Food enrichment
- Fine chemical compounds
- Electronics components

New Brazilian plant starts production

Higher capacity at the newly opened Jacareí plant is central to Höganäs Brasil Ltda's plans for growth in South America.

The new annealing and mixing plant in Jacareí, 80 kilometres north of São Paulo, Brazil, was officially inaugurated on July 2.

Sten-Åke Kvist, President of North American Höganäs and Chairman of the Höganäs Brasil Ltda board has been closely involved with the Jacareí project from the start: "It has been a very successful project. We now have a top class plant producing powder that matches the quality of our plants around the world. The Swedish and Brazilian project team members and all the suppliers involved should be proud of the plant they have created."

This new plant is crucial for Höganäs Brasil's plans for development and expansion. Future growth is considered to be reliant on three factors: higher capacity, consistent high product quality and the possibility to make advanced customer mixes. The Jacareí plant has been designed to meet these needs.

President of Höganäs Brasil, José Pizarro, says: "The function of the new plant is to

efficiently produce annealed powder with the same characteristics of Höganäs AB's global quality. The new plant also gives us a considerable increase in capacity. This will enable us to meet significant growth for both annealed and premixed powders."

Höganäs Brasil serves the whole of South America and is the market's dominant player. The company was formed in 1999 when Höganäs AB acquired Belgo Brasileira, which was based in Mogi das Cruzes. Demand has grown steadily in recent years and the chief customer segment is the automotive industry and its component suppliers in Brazil, a country that produces over one million vehicles annually. An increasing number of US and European companies are opening manufacturing plants in Brazil, which has heightened the need to provide global quality powders.

In addition to the highly automated annealing unit and mixing station, the Jacareí plant also has a well-equipped laboratory. The head office of Höganäs Brasil has recently moved from Mogi das Cruzes to Jacareí.

Strengthens position

"Our goals are to develop the Brazilian market and the South American market as a whole," emphasises José Pizarro, "The

high technology and performance of the new plant will help us achieve these objectives. The plant was a good investment that will certainly strengthen Höganäs Brasil's position as market leader in South America."

Mixing and annealing has been switched to the new plant from Höganäs Brasil's original plant at Mogi das Cruzes some 40 kilometres north of São Paulo, as the site's location close to residential areas made it unsuitable for expansion.

Supplying raw materials

The Mogi das Cruzes plant remains in operation, producing unannealed material for the welding market, as well as aluminum powders. However, the main role of the smelting and atomizing unit at Mogi das Cruzes is to supply raw material for Jacareí.

The Jacareí site, close to the São Paulo – Rio de Janeiro motorway and with good infrastructure for utilities, has a total area of around 250,000 m² – big enough to eventually accommodate all the facilities of a complete plant.





ISO 14001 keeps environmental issues in focus

With the ISO 14001 certification of North American Höganäs, the Höganäs Group has now successfully introduced the environmental management system at all its high-volume production sites.

For Höganäs AB, certification in accordance with the ISO 14001 environmental management system is a clear way of demonstrating its position as an environmentally aware company. Certification work has been intensive for several years and 2003 has seen a number of important steps in the steady progress towards ISO 14001 certification of all Höganäs AB production units.

USA

North American Höganäs was ISO 14001 certificated in April. Certification covers the two major production sites at Stony Creek and Niagara Falls, plus the mixing station in St Marys. The rebuilding project for Stony Creek placed a great emphasis on minimising environmental impact. Best available technology was used in the installation of highly effective cleaning equipment for both air and water.

Brazil

The Mogi das Cruzes plant of Höganäs Brasil Ltda was certified in July.

Sweden

Reflecting the Group's long-term commitment to ISO 14001 certification, Höganäs AB in Sweden, originally approved in 2000/2001, became the first entity to renew its certificate. The joint environmental management system for the Höganäs and Halmstad sites was recertificated in October.

Höganäs India Ltd was the first subsidiary after Sweden to gain certification, in

late 2002. The company has worked hard in 2003 on further environmental improvements.

"It is important for a Group like Höganäs AB that our production units have a certificated environmental management system. There is no legal requirement, regarding an environmental management system, but certification in accordance with ISO 14001 shows our environmental awareness. In addition, it is expected that in the future the automotive industry will require that suppliers have introduced an environmental management system," says Arne Lundin, Höganäs AB's Environmental Manager.

Worldwide support

Based in Höganäs, the Environment Department headed by Arne Lundin comprises of three environmental engineers, Katarina Edlund, Pernilla Nydahl and Cecilia Svensson. The department supports Höganäs AB production units around the world in the introduction and running of the ISO 14001 management system.

The basic requirement for certification is that production units follow the relevant legislation in the respective countries as well as the Höganäs Group's environmental policy.

"Initially, there is a lot of assessment work to identify environmental aspects and areas for improvement," explains Cecilia Svensson. "It is also important that the production unit's management and staff receive training about the system, legal requirements, routines, work instructions etc."

A major part of the environmental management system is concerned with continuous improvement, which means setting goals and action plans for issues such as emissions to air and water, chemical handling and waste.

"Production of metal powders can affect the environment and it is important to handle environmental issues in a proper way," states Cecilia. "Even though Höganäs AB worked with environmental issues and made a lot of investments before the environmental certification, having a management system in place means there is more focus on environmental issues in everyone's day to day work. And that is a good thing for the company, as well as for the environment."

Making a difference

Höganäs AB works actively to minimise the environmental impact of its production activities. Recent examples include:

- Sponge iron unit (Höganäs) – a new waste handling unit has considerably lowered the plant's discharge of water into the sea.
- Distaloy production unit (Höganäs) – filters have been installed to reduce emissions from off-burning of hydrogen gas.
- Stony Creek – advanced cleaning equipment for air and water has been installed.
- Höganäs India – ventilation in the annealing plant has been improved and measures have been taken to reduce noise.
- Halmstad – a treatment plant has been installed to reduce discharge of process water.





A WORLD OF POWDER possibilities

Iron powder is a truly versatile product. Beyond automotive components it is being used in a multitude of useful and unusual applications.

Fighting anemia

More than one billion people, mostly in third world countries, suffer from iron deficiency and anemia. In fact, anemia is considered one of the world's most serious health problems, and prevalent even in industrially developed countries. Very pure iron powder is used as a dietary supplement, either in the production of iron-enriched foods or the manufacture of vitamin or mineral supplements. Höganäs AB iron powder for this application is so fine that the largest particles are no more than 1/20 of a millimetre.

Purifying gases

Recent research by Höganäs AB has shown that sponge iron is a promising material for the removal of sulphur from gasified fuels and waste. This way, most of the sulphur can be removed before the gases are used for production of electrical energy or liquid fuels. Gasification of fuels and waste is a rapidly growing technology, which enables less pollution and higher energy efficiency in waste treatment as well as in regular energy production.

Saving seagulls

Millions of seagulls die each year as a result of oil spills at sea. The conventional treatment uses detergent in the scrubbing of birds' feathers. Australian researchers at

the Victoria University of Technology Melbourne have shown that oil binds to iron powder. The use of iron powder with a magnetic comb removes both the oil and the iron powder from birds gently and effectively, without destroying the natural water resistance of their feathers. Victoria University is developing suitable field equipment that rescue teams can use to help birds at disaster scenes.

Removing heavy metals

Increasing efforts are being made to safeguard the environment from the negative effects of industrial wastewaters, particularly those containing heavy metals. Iron powder contributes to wastewater treatment by helping in the recycling of copper, nickel, silver and other precious metals as well as removal of mercury. Iron powder can also provide a simple and cost-effective way to remove trace amounts of arsenic from drinking water.

Preserving food

With increasing internationalization, fruit, vegetables and food products are transported over greater distances and must be stored for longer periods. Oxygen is a menace for stored food, causing it to lose freshness, flavour and important nutrients. An oxygen-absorbing "active pack" solution is now widely used in Japan to retain the freshness of foods such as pastas, pizza and peanuts. This small sachet contains a number of ingredients including iron powder. The powder rusts during product storage and effectively absorbs all oxygen in the packaging, effectively keeping the contents fresh for as long as possible.

Magnetising paint

Pure iron powder can be used as a magnetic additive in paint. Mixed with a primer under a conventional top coat, it gives walls and other painted surfaces a magnetic attraction. The imaginative possibilities of magnetic paint are especially appreciated by schools and institutions, and by children who can have a wall in their room to stick magnets on. The magnetic potential of iron powder can also be applied in laminates, plastic films, cartons...

Inspiring poetry

Dave Kampell discovered a new way of applying iron powder – Magnetic Poetry – and it made him a millionaire. As a songwriter, Dave used to write down snatches of lyrics on paper strips. Unfortunately, his allergy-induced sneezes used to send the words flying. So he decided to attach the words to small magnets that fitted well on the fridge. When his friends started eagerly rearranging the words, he knew he was on to something. He produced 100 kits with 100 magnetised words and sold them in three hours. The company has since sold over 2 million Magnetic Poetry kits.

Revitalising sheep

Many farm animals cannot keep mineral supplements in their stomachs long enough to be absorbed. Iron powder, a heavy, natural material, can be mixed with the mineral supplement. This added weight makes it possible to keep the supplement in the animal's stomach until all nutrients are absorbed. Many of Australia's 125 million sheep get a vitamin supplement via iron-weighted capsules.

POWDER PEOPLE

Marketing team changes

Hans Söderhjelm, who served as Marketing Manager for P/M at head office for over 10 years, took over the new position of Vice President of Sales and Marketing for North American Höganäs in August. His appointment is part of a major reorganisation of the sales organisation in the USA. Four market sections, reporting to the Vice President of Sales and Marketing, have been created headed by Market Managers **Ryu Goto** (P/M), **Dean Howard**, (Friction & Sales Service) and **Trevor Towns** (OIB – Other Iron Business).

“The structure has been reorganised to further strengthen our sales and support to our customers,” say Hans. “As a Group, we have to grow and the main market is in the US, so its very challenging to be here and work to increase our market share in North America.”

Moving in the opposite direction, from the USA to head office, is **Ralf Carlström**. After four years as Sales Director at North American Höganäs, he is now Marketing Manager for P/M based in Höganäs. He says of his new role: “It’s a very stimulating change. I have to take a wider perspective now as I am responsible for worldwide customer support, sales and marketing. However, even though conditions may differ between regions, the need for high quality products and services is the same everywhere.”

New representative in Southern Africa

Ray McCullough is Höganäs AB’s new representative in Southern Africa. His company Fe Powder Supplies (Pty) Ltd, based in Johannesburg, took over the responsibility in September. Ray has extensive experience in the South African market on the technical marketing and sales side including 15 years as manager of Eutecticx Castolin, a company involved in supplying welding and coating powders.

The representative role consists of providing support for Höganäs AB sales to its seven major clients, which are mainly in the welding, powder metallurgy and aluminum industries, as well as reselling Höganäs AB products direct to the friction industry for brake pad manufacturing, and the market in general.

“Our job as representative for Höganäs AB is to ensure a smooth transition for existing customers and the next step is to assess the

market and push to increase market share,” says Ray. “Both the friction and chemical & metallurgy sectors hold a lot of promise. We are also keen to expand the business into neighbouring countries beyond South Africa.”

Clearer support structure

In August, technical customer support was divided into two new sections – Product Support and Technical Market Support. This move is intended to create a clearer structure by concentrating efforts in two distinct areas of customer support.

Product Support, previously Technical Service, is concerned with issues relating to specific products. “Our job is to coordinate between marketing and production, and relay signals between them,” says **Olle Thornblad**, manager of the new Product Support department, which will have a staff of seven. Olle has a wealth of technical customer support experience, having worked in this area for Höganäs AB since 1977.

The nine-strong Technical Market Support team is headed by **Ian Howe**, who previously worked on Technical Marketing focusing on Astaloy CrM, Astaloy CrL and surface densification. Ian has a Masters of Engineering degree from the Open University in the UK and four years of experience at a P/M component producer.

“Technical Market Support is mainly involved with helping customers solve product/process-related problems on site,” explains Ian. “Our aim is to provide efficient and problem-free use of our products.”

Chemical Metallurgical

Ricardo Canto Leyton took over the position of Application Manager for Chemical Metallurgical at the start of November. After completing his studies in Materials Technology at the Luleå University of Technology, Ricardo joined Höganäs AB in 2001 as a development engineer and worked mainly on high alloy materials.

“I find my new role exciting as Chemical Metallurgical is a broad area with many different applications,” says Ricardo, who is looking forward to being more involved with customers and using his languages skills. In addition to Swedish and English, he is also fluent in French and Spanish.



Hans Söderhjelm



Dean Howard



Trevor Towns



Ryu Goto



Ralf Carlström



Ricardo Canto Leyton



Ian Howe



Olle Thornblad



Ray McCullough



TECHNICAL PRESENTATIONS



Höganäs AB continues to lead the way in R&D. Latest findings were revealed in technical presentations at major conferences during the year. The presentations are available at www.hoganas.com "News Center" until the end of February 2004.

2003 SAE World Conference in Detroit, USA, March, 2003

- The SMC Technology – From Idea to Reality

PM²TEC 2003 International Conference on Powder Metallurgy & Particulate Materials in Las Vegas, USA, June, 2003

- Effect of Sintering Time and Cooling Rate on Sinterhardenable Materials
- Improved Final Component Consistency Using Flexbag Handling Systems
- Close Dimensional Stability at High Production Rates
- Influence of Microstructure on the Fatigue Performance of PM Steels
- Process, Quality and Properties of High Density P/M Gears
- Efficient Low-Alloy Steels for High Performance Structural Applications
- Sinter-Hardening and Heat Treatment of Materials based on Astaloy CrM

- High Density Sintered Stainless Steel
- Dimensional Control Using Chromium Alloyed Materials versus Conventional P/M Alloyed Materials
- Comparison of Fatigue Properties of Heat Treated Gears Obtained by Double Pressing, Sintering and Warm Compaction

EURO PM2003 in Valencia, Spain, October, 2003

- Chromium-Alloyed PM Steels with Excellent Fatigue Properties Obtained by Different Process Routes
- Rolling Contact Fatigue Design Aspects of Surface Densified PM Components
- Soft Magnetic Iron Powder Materials AC Properties and their Application in Electrical Machines
- Microstructure Enhancement for Fatigue Improvement
- Ferritic Stainless Steel for High Density Applications
- Press Capacity Improvements Utilizing Starmix Powder

SMMA 2003 Fall Technical Conference "New Technologies for the Motors and Drives Industry" in Nashville, USA, November, 2003

- Design Concepts for Electrical Machines using Soft Magnetic Composite Materials

PTECH2003 "Fourth International Latin-American Conference on Powder Technology" in Guarujá, Sao Paulo, Brazil, November, 2003

- Properties of Cr-Alloyed P/M Materials
- Lubricants for Compaction of P/M Components

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