

A magazine from the Sapa Group #1 2006

Shape



Big in Japan

**SAPA GOES FOR
GROWTH ON THE
JAPANESE
AUTOMARKET**

sapa:

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New shapes for aluminium profiles

After serving as a Sapa Board member since 2001, I have now moved into the operational management side. In June I took over as President and CEO of Sapa.

During my years on the Board, I have met many employees and visited several production plants. My impressions from all my contacts with Sapa are favourable. During my time on the Board, Elkem and Orkla have entered the scene and Sapa was de-listed from the Stockholm Stock Exchange. They have been highly eventful years.

We are now in a period of new challenges. We are conducting a number of programmes to increase Sapa's profitability. We started the journey with the introduction of Genesis, Sapa's version of the Toyota Production System. We will introduce Genesis in all Sapa companies as part of efforts to standardise and enhance the efficiency of operating processes and to involve all employees in the changes that are needed to continuously rationalise costs and improve productivity.

We are now halfway into 2006, and I have noted a sense of optimism in the markets where Sapa is active. I look forward to starting with an ambitious agenda from the very first day. Sapa operates in an industry characterised by overcapacity and sharp fluctuations in the price of our basic material, aluminium, but Sapa has a tradition of implementing rapid measures to offset changes in market conditions. I hope that we emerge stronger from the weak business trends of recent years, and remain

one of the very best companies in our industry. I know that customers appreciate Sapa, competitors admire us and all our employees are proud to work for the company. We have knowledgeable and creative employees, and we have the resources that will continue to make Sapa a competitive business partner for our customers in the future.



Lennart Evrell

**Lennart Evrell,
President and CEO**



Ocean's giants taking shape

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sapa
Shaping the future

Sapa is an international business group that develops, manufactures and markets value-added aluminium profiles, profile-based components and systems, and heat-exchanger strip in aluminium. Sapa has sales of approximately EUR 1.6 billion and some 8,200 employees throughout Europe and in the United States and China.

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All clear for glass

The Dutch company Safety Level has 40 years' experience of glass and metal constructions for the building industries. Safety Level selected Sapa as a business partner for its Trans Level One banister system.

"Sapa translated our ideas into aluminium profile solutions, and also integrated several functionalities in the product," says Bert Wijbenga, founder of Safety Level. The banister system can be used on all kinds of concrete and steel flooring. Compared to a traditional steel solution, the aluminium profile system is lighter to handle, the surface treatments are applied before delivery and there are no visible nuts and bolts.

"But most important, Trans Level One is the first certified banister system without pillars. This feature gives architects more freedom to work with glass in their buildings," Wijbenga says.



The Trans Level One banister system is used at airports, etc.

The development phase – from sketch to finished product – was only four months including the obligatory certifications.



S16 – fuel lines for new generation of car engines

Deliveries of the first S16 fuel lines to Volvo Car Corporation started during the spring. The fuel pipes will be installed in Ford's new generation of petrol engines, in all Volvo cars and in some other car models, including Jaguar and Landrover.

Sapa has produced the fuel pipes used by Volvo for many years, but the difference now is that Sapa is responsible for assembling the part.

"We have invested in a completely new plant in Vetlanda to handle all the production stages and manage all the parts we have to purchase," says Håkan Muhr, key account manager at Sapa Automotive.

The investment includes a new processing line, new assembly equipment and a "clean room" with a sterile environment where all assembly takes place.

After assembly, Sapa delivers the fuel pipes to Ford's engine plant in Bridgend, in the United Kingdom, where the engines are produced. The company expects to reach full production toward year-end 2007. The agreement will generate revenues of approximately 95 million euros over seven years, making it one of the largest orders ever booked by Sapa.

"For us, it's a long-term agreement with high volumes. We have projected deliveries of fuel pipes until 2013, but they could extend even further into the future. Engine models are not replaced that often," says Håkan Muhr.

Gecco joins Sting

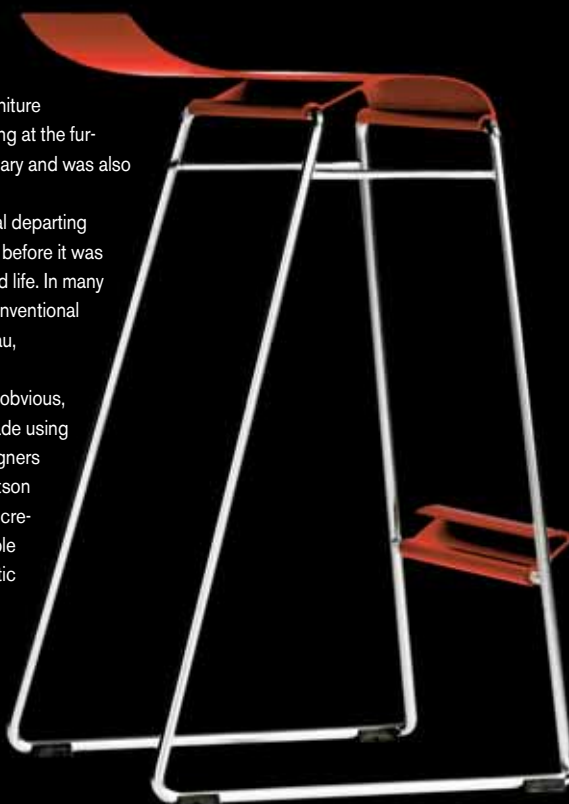
Gecco is a new barstool that follows the success of Sting, a widely acclaimed and award-winning product launched in 2003 by the Blå Station furniture company. Gecco had its premier-showing at the furniture trade show in Stockholm in February and was also shown at the trade show in Milan.

"The barstool concept was the natural departing point. Architects were asking for it even before it was designed. Barstools have led a secluded life. In many cases, designers have simply used a conventional chair with longer legs," says Johan Lindau, President of Blå Station.

The kinship between the barstools is obvious, as both have a smart design and are made using the extrusion press technique. The designers behind the new Gecco are, Fredrik Mattson and Stefan Borselius. Their goal was to create a barstool, which offered good flexible resistance and a more distinctively artistic expression than Sting. The name, of course, alludes to the gecko.

"If you detach the profile from its context, it looks like a lizard with its long tail," they say.

Gecco is stackable and available in two heights. The seat consists of 370-millimetre deep and 2.5-7-millimetre thick profiles anodised in red, black, orange and other colours.



Sapa aims high in Vetlanda

With its combination of high capacity and diversified production, Sapa Profile's new plant for vertical anodising is globally unique.

"We're now able to meet market demand for anodised aluminium profiles," says sales manager Jan-Evert Johansson.

Although about half of Sapa Profile's aluminium profiles are anodised today, the trend is clear. Market interest in surfacetreated and, thus, anodised aluminium is growing.

"In certain areas such as building and interior design, there is a discernible trend towards making metals more visible. Anodising creates a durable surface that's easy to clean, but the treatment also provides the profiles with an extra dimension. The surface becomes metallic and takes on both gloss and lustre," says sales manager Johansson.



Jan-Evert Johansson

Sapa has launched a special campaign to explain to customers the different alternatives available for surface-treated aluminium profiles. Supported by various activities, the company's sales personnel

will demonstrate how anodising, lacquering and mechanical surface treatment are used to enhance different decorative and functional effects on the profile's surface.

"The campaign will be part of our total offering and a part of the profile school," Johansson continues.

TO MEET ANTICIPATED demand for anodised aluminium, a new anodising plant has been built in Vetlanda, Sweden. In addition to increasing production capacity, the new facility enhances the quality of anodised surfaces. Packaging solutions have also been improved, according to Johansson.

"The ultramodern plant also meets our own and our customers' environmental demands," he relates about the largest – and highest – investment in Sapa's history. The 26-metre-high anodising plant has already become a new landmark in Vetlanda.

"The building is taller than the city hall," says Torbjörn Bardh, manager of the construction project, with a smile. But there is a >>

Vertical anodising – how it works

The profiles are inserted manually into the holders of one of the 120 bars, after which the process is totally automated. The bars are raised so the profiles are suspended vertically. The surface treatment process starts with the cleaning of the profiles in a degreasing solution. The profiles are then impregnated in a soda lye to create a smooth matte finish.

After repeated rinsing, an oxide layer is created in a sulphuric acid solution. With the help of continuous current of about 14,000 amperes for each bar and a tension of about 20 volts, an oxide layer build-up is created. The heat developed in the three anodising vats requires a cooling effect of three megawatts.

The aluminium profiles are then rinsed in both regular and de-ionised water. The oxide layer's pores are sealed in the final stage of the process – a 98-degree water bath called after-sealing. The finished surface thus takes on its final properties. A few thousand plastic balls floating on the surface retain the heat in the after-sealing solution.

Finally, the profiles are placed in a horizontal position, cut, checked and packaged automatically for transport.



Project manager Torbjörn Bardh in front of strips of aluminium profiles that are ready for anodising. These particular profiles will be used in a wardrobe system from Ikea.



The profiles are anodised through immersion in the 24 vats – all eight metres deep.

» good reason for its height. The plant is Sapa's first facility for vertical anodising, which offers many advantages, including better anodising quality and improved environmental considerations.

"The quality improvement results from better exposure of the material in a vertical anodising process, which leads to more consistent surface thickness. The chemical runoff is improved when the profiles hang upright, thus also reducing wastage. Moreover, plant workers do not have to perform monotonous heavy lifting jobs," says Bardh.

THE ACTUAL BUILDING work was completed in less than two years. Since Sapa was constantly involved in its design and functions, the plant is tailor-made for the company's needs. A Japanese supplier provided some assistance, mainly by contributing expertise regarding some of the machines used in the plant.

"The result is a plant like no other. I believe it's globally unique, since it combines diversity in anodising different products with high production capacity," says Bardh.

TEXT: DAG ENANDER
PHOTO: MAGNUS GLANS



Torbjörn Bardh

Hard facts about anodising plant

Surface area: Production premises about 6,000 square metres, personnel areas about 360 square metres.

Capacity: 1,000 square metres of aluminium profiles per hour.

Production: Three shifts (round the clock) five days a week; can be increased as required.

Maximum profile length: 7 metres.

Maximum number of profiles per bar: 120 (one per bar insert clamp).

Maximum weight of bar insert clamp: 50 kilos.

Vat height: 8 metres.



Lighter lorries save money

Bed frames and fuel pipes are examples of aluminium parts in modern lorries. But there could be more, many more.

“Many lorry manufacturers have still not discovered the advantages of aluminium,” says Niclas Hagert, marketing co-ordinator at Sapa Automotive.

ALUMINIUM PARTS ARE installed in lorries, but often in inaccessible places. For this reason, Sapa Automotive has produced an exploded view that shows where the aluminium parts are actually installed in today’s mass-produced lorries.

“It was nearly 10 years ago that Scania started to consider aluminium parts in their lorries. At our profile academy, we worked together to examine every part of one of their lorries and looked at which parts would function and become better in aluminium,” says Hagert.

Scania’s competitor Volvo has now also recognised the importance of aluminium in their lorries, but in the rest of the world, most lorry

manufacturers continue to choose the traditional steel material. Some lorry components cannot be made using aluminium, since they have special physical requirements, but there are still a large number of steel components that can be replaced with aluminium.

ACCORDING TO HAGERT, the economic advantages are the most important.

“For a large transport company, the fleet’s operating costs are often much greater than purchase costs. A lighter-weight lorry uses less fuel, which reduces operating costs,” he says.

Money can also be saved in the actual production process. Tools used to build alu-

minium parts and components are cheaper than corresponding costs for steel structures, since serial volumes for lorries are usually lower than volumes for passenger cars. Some passenger car models comprise more than two-thirds aluminium.

It would be difficult to achieve such a high percentage in lorries, even though passenger cars are the trendsetters.

“As we continue to develop our competence as a supplier of parts for lorries, we will create more alternatives for all our customers. We would like to attract more lorry manufacturers as our customers,” says Hagert.

TEXT: DAG ENANDER

PROFILE



Lennart Evrell

has extensive experience from the engineering industry and a keen interest in sailing. In August, he became Sapa's new CEO.

For the past 10 years, Lennart Evrell has been President and CEO of Munters, a global leader in humidity control products and services. In August, he started his new assignment as President and CEO of Sapa. He is no stranger to Sapa's business operations, however, having served as a Board member since 2001.

"I see only advantages from having been a member of the Board. I have learned a great deal about Sapa through meetings with people in the organisation. I am convinced that my experience as a Board member will make it easier for me to get into the company's operations."

DURING EVRELL'S TENURE at the helm of publicly listed Munters, the company's turnover trebled and its share value rose from SEK 80 to SEK 260. He describes Munters' development as a result of "hard work and a clearly defined direction."

"It's extremely enjoyable working in an organisation when things turn around. I joined Munters during a period of turbulence and negative business development. Since then, the company has progressed favourably. Munters is in good shape today and, after 10 years, it's only natural for me to look elsewhere and seek new challenges."

Evrell says that Sapa – and the entire industry – is facing major challenges today.

"It's a tough market that requires continuous quality and productivity improvements.

At the same time, the situation is creating new opportunities, which include acquisition potential. Primarily, Sapa has to prioritise organic growth. We have to generate healthy profitability in our proprietary operations before we can focus on growth driven by acquisitions. It is only by demonstrating the company's own strong position that we can become a suitable owner of acquired operations."

IN 2005, WHEN analysts and mutual fund managers rated their confidence in the stock market's 90 largest companies, Munters ranked third and was No. 1 on the stock exchange's O List. Evrell believes the main reason was the consistency of Munters' external communications.

"It's important to explain what is happening, both internally and externally. Even if a company cannot be totally candid about all aspects of business, it should strive to be completely transparent in the areas that sound business permits. We have to explain complicated situations so that external interests can understand what we mean, both in good times and bad."

Evrell lives with his family in Saltsjöbaden, south of Stockholm. Sailing is one of his greatest leisure interests, and he often participates in ocean races with "Aida", a First 40.7 craft. His son Henrik is often onboard as a member of his crew.



Lennart Evrell in brief

Age: 52.

Resides: Detached house in Saltsjöbaden.

Family: Wife Lena, children Henrik, 23, Katarina 20, and Marianne 16.

Background: Degrees in Engineering and Business Administration.

Has held leading positions in ASEA Robotics, Atlas Copco Assembly Systems, Gustavsberg and Munters. Member of the Sapa Board since 2001.

Latest book: *Oil*, by Gunnar Lindstedt. "A very interesting book about global oil production."

Latest movie: DVD of the TV series *Twin Peaks*. "A totally fantastic series."

Car: Audi A6.

Favourite food: "A rare steak grilled on the jetty on a summer evening."

What you didn't know about Evrell: "I'm wicked on a skateboard. The first boards came to Sweden when I was studying business administration at Uppsala University. I was probably one of the first in Sweden to learn how to ride one."

TEXT: CARL HJELM
PHOTO: MAGNUS GLANS

Big brother watching you

The Swedish Road Administration's new cameras serve two purposes: saving lives and blending in with the traffic environment. Unitraffic, the manufacturer, selected aluminium profiles to achieve the right form.

DURING 2006 THE SWEDISH Road Administration plans to install 700 new traffic surveillance cameras on the most accident-prone roadways in Sweden, from north to south.

An elliptical camera box made with aluminium profiles and containing a completely new camera technology will replace the old square, stainless-steel box camera.

"When the Road Administration contacted us, they emphasised that design was just as important as the camera technology. They wanted a camera box that was appealing to the eye and blended in with the traffic environment," says Jan-Anders Andersson, project manager at Unitraffic, manufacturer of the cameras.

Unitraffic contacted Sapa. The companies studied sketches and concluded that extruded aluminium was the best choice. This material fulfils the Road Administration's specific design requirements, and aluminium meets the demands for impact safety while also offering excellent anti-corrosion properties.

"For the actual camera box, we used five different aluminium profiles. They are processed with a number of holes and then anodised," says Andersson.

"You could say this project definitely opened our eyes to aluminium."

Several functions are also built into the profiles. One of these is the casing lock.



The Swedish Road Administration's new surveillance cameras are impact and theft proof.

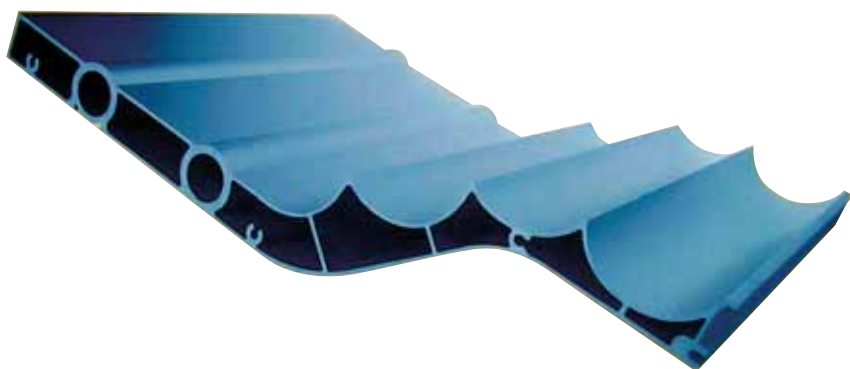
"The lock is an aluminium profile that locks the door to the camera box along its entire length. As a result, the door does not have any weak points where the casing can be broken into," explains Andersson.

Every camera contains a radar system that monitors and measures a vehicle's speed. A new feature enables the cameras to be activated from a single site. According to calculations by the Road Administration, more than 100 lives would be saved every year if all motorists stuck to speed limits.

"We know that surveillance cameras intimidate drivers. People automatically slow down when they see the cameras along the roadways," says Andersson.

Unitraffic is a leading supplier of technologies for traffic and speed surveillance in Scandinavia. The company has more than 30 years of experience in providing police and road maintenance authorities with technical solutions for increased road safety.

TEXT: NALJEN STÄHLSTRÖM



Topline collaboration

Nefit, a Bosch-owned company, produces high-efficiency boilers and is the best-selling brand in the Netherlands. And yet, the company exports more than half of the total production of its plants in Deventer and Buinen. This year, Sapa Aluminium in Hoogezaand will deliver side panels for 10,000 Topline HR boilers. The 500-millimetre-wide profiles are extrusion-pressed and cut to specific sizes at Sapa RC Profile's plant in Lichtervelde, Belgium. The production unit in Hoogezaand will mount the panels to create an end product that is designed for assembly at Nefit.

"Meticulous collaboration is required between the two Sapa companies, since the product must meet the specifications of Nefit's assembly line. The entire production process would be jeopardised otherwise," says Rob Hogendorf, sales manager at Sapa.

The side panels are subject to rigorous demands. Since the profiles, measuring 13.4 kg/m, have small margins for deviation, tough demands are placed on expertise during the extrusion process. Final inspection is also important, as the water and gas lines are expected to last for at least 20 years. There is also a special focus on finishing procedures, such as cutting, cleaning and packaging.



Side panels for Nefit's boilers.

Focus on lorries

The IAA is one of the most important trade fairs for the automotive industry, since it focuses on automakers, sub-contractors and end consumers. This year, the spotlight is on commercial vehicles, such as lorries, buses and other utility vehicles.

"Sapa Automotive will be well-represented. Our primary goal is to establish contacts with the two largest lorry manufacturers, MAN and Mercedes," says market coordinator Niclas Hagert.

Sapa's stand will display a large number of aluminium parts and components for lorries. Other products expected to attract attention will also be shown on the 70-square metre stand.

The Association of German Automotive Industries (VDA/Verband der Automobilindustrie) arranges the IAA annually. Every second year, the focus is on passenger cars, and the exhibition is held in Frankfurt. The date for this year's trade show is September 21–28 in Hannover.

Cryoquip chooses Sapa

Cryoquip is a leading international manufacturer of vaporisers and equipment for the gas industry.

The company's heat exchangers are the largest component made of aluminium profiles, and Cryoquip has chosen to cooperate with Sapa.

"Cryoquip came to us after the company experienced delivery problems with press moulds," says Paul Bunning, account manager at Sapa Profiles in the United Kingdom.

Heat exchangers are used in the gas industry throughout Europe.

More sun on the balcony

The Swedish company Windoor develops and manufactures balcony glazing systems, balcony railings and window renovation systems for the northern European market.

Based on a patented technology, the company's Alfa and Bravo balcony glazing systems are produced using aluminium profiles. Alfa is a combined sliding glass and folding system, while Bravo offers the folding function. "The folding function makes it easier to clean the windows,

and the entire balcony can be opened, which is not the case with a sliding glass system," says Anders Johansson, technical manager of Windoor and development manager for the products.

The profiles used in Alfa are elliptical to make them stronger without creating an ungainly impression. Because of the resistance of the profiles, the systems can also be used in ground-floor doors and doors exposed to high winds.



A hot market for heat exchangers

With a burning interest in aluminium and more than 30 years' experience in the industry, Yoshiyuki Eguchi knows how foreign companies can succeed in Japan. Focusing on high quality and a long-term business philosophy, he will help Sapa gain ground in the growing automotive industry.

ON A SPRING AFTERNOON, the lobby of the Dai-ichi hotel in Tokyo appears as the nexus of Japan Inc. Waiters in tuxedos serve tea to men in sharp suits who are shaping the country's industrial future. Amid the din of regional dialects, it's a strain to hear the soft, thoughtful comments of Tokyo-born Yoshiyuki Eguchi.

But it is worth the effort. Eguchi – who has probably visited more countries than anybody else in the room – spins anecdotes about setting up aluminium smelters with former presidents Mobutu of Zaire and Suharto of Indonesia. What really fascinates him is aluminium. After studying metallurgy at Tokyo's elite Waseda University, and holding several management positions in the aluminium industry, he joined Sapa Heat Transfer as a senior advisor in Asia about a year ago. With schoolboy joy, he draws diagrams showing why a pioneering heat exchanger – lighter, stronger, better – will continue to drive Japan's auto industry ahead of overseas competitors.

THOUGH EGUCHI SAYS output in Japan will continue to stabilise at about 10 million units per year, from a peak of 15 million about 15 years ago. Japan's big three automakers – Toyota, Nissan and Honda – actually produce more outside Japan, including plants in the United States, China and Thailand. "This is the big change in the last 10 years," he says. "More outsourcing overseas."

Eguchi says Japanese companies con-

quered foreign markets through management flexibility and superior quality. To break into Japan, foreigners require patience and sufficient investment to provide ample maintenance and spare parts. "It's not easy



Yoshiyuki Eguchi in short

1942: Born in Tokyo.

1965: Degree in metallurgy at Waseda University in Tokyo.

1965: Joined Sumitomo, final position: general manager Aluminum division.

1991: Moved to Reynolds Metals Company, vice president in charge of Japanese Business.

2000: Joined Corus as senior advisor in charge of automotive material.

Languages: Speaks Japanese, English, French and Bahasa Indonesia.

Hobbies: Climbing and skiing.

Car: Drives a Nissan Laurel on weekends, and takes the train to work on weekdays.

for an outside supplier to source into here," he admits. "If you wish for success with Japanese customers, then quality is number one." Selling a quality Volvo or Audi is not enough. "Many Japanese love German cars, but the maintenance cost and parts are too expensive here," he says. "For most Japanese, the car is just a tool for transport. So they want higher reliability and lower maintenance costs. Americans have to improve their quality first. Europeans have quality cars, but need to improve their services. If a German company could establish a good parts supply network in Japan, they would do better."

EUROPEAN BRANDS COMPRISE only 4 percent of the Japanese market, according to Reuters. While half of Europe's vehicles run on diesel, Japan has only one model, the Toyota Landcruiser Prado, on sale amid 200 petrol-fuelled models. This autumn, DaimlerChrysler's Mercedes brand is set to roll out a diesel E-Class. Volkswagen and Peugeot might also follow suit. Eguchi says their success could depend on timing and the size of their investment. "Not many stations supply diesel oil. You're OK in Tokyo. But if you drive to the north, you can't find them. You have to have a whole system in place, or else fit into the existing Japanese system. If investment in services such as spare parts, mechanics, and fuel supplies is too small, it won't work."







Twelve Japanese carmakers produce around 10 million vehicles each year. Toyota, Nissan and Honda are the biggest.

» These investments must reverberate into the future. “The long-term view is the key to the success of the Japanese auto industry. Even if things aren’t going well, Japanese companies can spend money now for ten years later. GM’s current struggle actually began about ten years ago due to lack of spending. That kills a company, actually. For example, Denso [a Toyota group company] is continually making an effort to improve quality every year and every month. After five or ten years of efforts toward improvement you can see the difference in quality.”

ACCORDING TO EGUCHI, many American companies try to meet “the industry standard”, because the industry is larger than one customer’s requirements. But Japanese companies such as Toyota or Denso are trying to set their own standard, above the industry’s. “Japanese customers are not satisfied with industry standard products. They want Toyota standard products. With Sapa, I’m trying to find a way to reach the customers’ standard, not just the industry standard.” Sapa understands this nuance of Japan better than others.

“Sometimes American and European automakers aren’t trying to understand. They’re only sticking to their tradition. But you can’t just be proud and say ‘our product is the best in the world, you have to sell it.’ Sapa is more flexible. They listen and try to understand. That’s the difference. I feel that Sweden is very similar to Japan in many ways. They are quality-minded people.”

With its focus on the automotive industry, Sapa Heat Transfer has an advantage over larger companies who supply various industrial sectors, says Eguchi. “Sapa is in a unique position of being very specialised toward making heat exchangers.

Larger American companies make everything. The heat exchanger division is only a tiny portion of their operations, and they can cancel production without any major impact. You can’t be sure that they will still be producing heat exchangers ten years from now. But for Sapa, heat exchangers are our core business. Sapa is a long-term supplier. So buyers can rely on Sapa.”

TEXT: CHRIS JOHNSON
PHOTOS: JUN TAGAK

Hard facts about the auto industry

- Japan’s 12 automakers built 10.8 million vehicles in 2005, up from 10.5 million in 2004, according to the Japan Automobile Manufacturers Association. Exports from Japan increased 1.9 percent to 5.05 million units, the highest level since 1992. It is the fourth consecutive year that the carmakers built more than 10 million vehicles annually at home.
- According to Toyota, it had increased output in Japan by 15.7 percent in December, the fastest pace in 2005. Toyota said in January that it expected a 10 percent increase this year in U.S. sales. Last year, the company sold a record 2.26 million cars and trucks in the United States. (Source: Bloomberg News)
- Toyota, Honda and Nissan Motor sold 28.2 percent of the vehicles purchased in the United States last year, up from 26.2 percent in 2004.



Large order for solar panel profiles

Scanmodule, a manufacturer of solar panels, has signed a multi-year agreement with Sapa Profiles in Sweden for delivery of frames and corner profiles for a total value of about 4.3 million euros.

“Our logistics solution enables delivery of the profiles in a frame package on one pallet, as opposed to two pallets used in the past. It requires less space and makes assembly easier,” says Nicklas Martinsson, key account manager at Sapa. The profiles may be likened to over-dimensioned parts of a picture frame. The entire solar panel is secured in an aluminium structure that is anodised to withstand the rigours of weather and wind.

The choice of Sapa was based on several factors. Scanmodule analysed such factors as the delivery reliability and volume capacity of different companies. Their specifications

required that all profiles must always maintain the same high quality standards.

“We believe Sapa is the best choice to meet our demands,” says Tommy Strömberg, business unit manager at Scanmodule.

Scanmodule is a subsidiary of the Renewable Energy Corporation, a Norwegian solar energy company that stands alone in the world with complete coverage of the entire production chain in solar energy – from polysilicon refinement to the production of solar cells and solar panels. The company is undergoing rapid expansion and its shares will soon be listed on the Oslo Exchange as the eighth largest company in Norway. According to Scanmodule’s calculations, the global solar energy market has grown by about one-third annually over the past five years.



Giant of giants.

The new Wembley Stadium, which will be inaugurated in September, will not only be a landmark in London but also the largest football arena in the world, with seating capacity for 90,000 spectators. Sapa Profiles in the United Kingdom has supplied aluminium partitions for the new Wembley.



Inside and out. Axelle is a roofing system for conservatories and greenhouses developed by Sapa Building Systems in France. Compared with other materials, larger roofing structures can be built with aluminium profiles, without compromising structural strength. Thinner beams also improve natural lighting.

Coffee, please. Sapa Profiles in Portugal will deliver aluminium profiles for 60,000 espresso machines during 2006 for the Nexpresso brand. The profiles are anodised and delivered ready for assembly. Swiss-based Eugster/Frismag conducts production in both Switzerland and Portugal.



Heat Transfer growing in Shanghai.

After two years work with the expansion of the plant at Sapa Heat Transfer Shanghai, the first strip was rolled in the new cold-rolling mill in March. The entire expansion is scheduled to be finalised in August this year.

The cold-rolling mill is part of an investment totalling 14 million euros, which will double capacity to 45,000 tonnes.

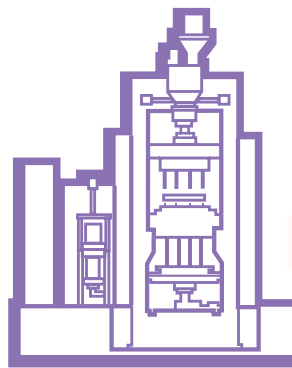
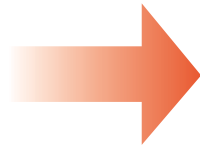
“The new capacity is really needed. China’s automotive industry is flourishing again, with forecasts indicating new sales records,” says Torbjörn Sternsjö, managing director at Sapa Heat Transfer Shanghai.

The expanded facility will be inaugurated in conjunction with the company’s 10th anniversary in September.

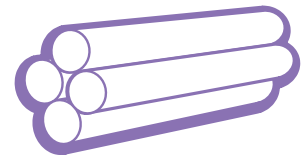
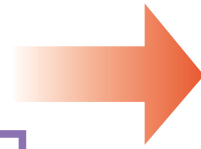
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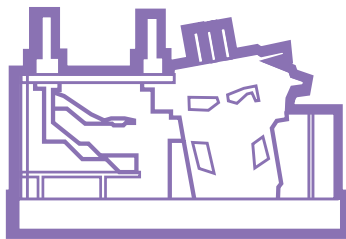
Powder



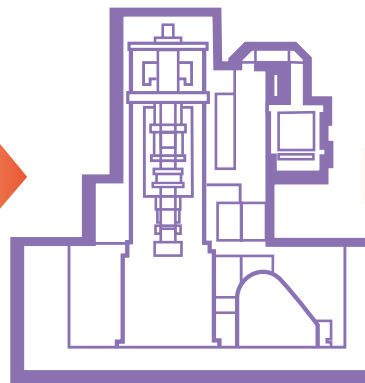
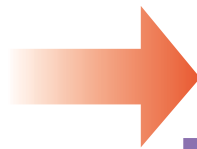
Pressing of powder



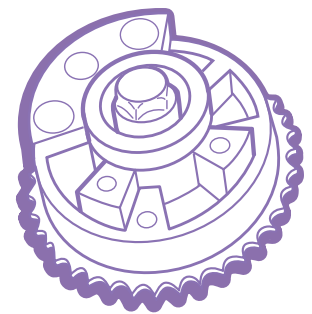
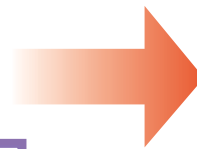
Extrusion



Saw



Calibration



Assembling

Powder – core in unique method

Sapa Profily in Slovakia is using a new, cost-effective method that makes it possible to extrusion press aluminium profiles with a high silicon content. The plant delivers components to the German automotive industry.

Since November 2004, Sapa Profily in Slovakia, formerly Alufinal, has been delivering aluminium components to the German automotive industry based on a unique production method. A few years ago, the same components were produced in steel, but with the new production process, the basic material can now be replaced by aluminium, thereby reducing weight.

The method used by Sapa Profily in its production operations is based on extrusion pressing of rapid-set powder billets consisting of hypereutectic aluminium.

“It’s the first time this method has been used in series production,” says Peter Oslanec, production manager at Sapa Profily.

The aluminium profiles are largely produced in accordance with the standard extrusion-press principles. The greatest difference is that the raw material is not solid, consisting instead of a compressed powder.

The aluminium alloy used in the process has

a much higher than normal silicon content. The advantage is greater material strength and less expansion than other alloys when heated. As a result, the material is suitable for products exposed to high temperatures, for example in automotive engines. Extrusion pressed aluminium alloys with a high silicon content create certain problems, since the tools wear out quickly. One solution is to use billets made of rapid-set compressed powder.

“This is a unique extrusion press method. We process the material in a number of stages, the moulding blank is formed through coldisostatic pressing and heated in a special way, but all subsequent stages are basically a standard process. This makes our method less expensive than other production methods,” says Oslanec.

The process was developed by the companies involved in production, with support from a research project at the Slovakian Academy of Sciences. Initial testing of the new extrusion press method started in the late 1990s and,



April 2004, the former Alufinal started development. In November 2004, the plant delivered its first finished aluminium profiles.

New solutions to reduce vehicular weight, as exemplified by the extrusion press method used by Sapa Profily, are becoming increasingly important in the automotive industry.

“For carmakers that want to reduce weight, this is an interesting method. Aluminium can replace a large proportion of the parts and components now produced using steel. I see significant opportunities for this production process in the future,” says Oslanec.

TEXT: CARL HJELM

ILLUSTRATION: ANDREAS OLOFSSON



Buoyant construction method»



It started with a conceptual meeting in the autumn between Sapa and Leirvik Module Technology, which produces the living quarters for offshore oil platforms. The collaboration yielded results immediately. This summer, Sapa will deliver the first profiles for new and improved living quarters for the world's largest oil platform.

Leirvik Module Technology of Norway started producing living quarters for oil platforms in 1975 and is one of the world's leading suppliers in this area today. Leirvik MT has worked with aluminium since 1988, when Sapa also started to deliver aluminium profiles to the company. The project then focused on living quarters for Saga Petroleum's "Snorre A" oil platform, at that time the largest aluminium structure ever built for the oil drilling industry.

Early last autumn, Harald Bruås, salesman for Sapa Profiler AS in Haugesund, Norway, contacted Leirvik MT.

"I suggested a meeting to discuss a smarter, new design for living quarters on oil rigs. The timing was perfect, since Leirvik MT was looking for a more cost-effective solution," he says. Bruås and Jarle Myklebust, project manager at Leirvik MT, soon agreed to launch a project for developing new alumi-



Gustav Lundkvist

nium profiles using friction welding as the construction method.

"Our goal was clear. We wanted to build aluminium modules at the same low costs as steel modules. Or even lower," says Myklebust.

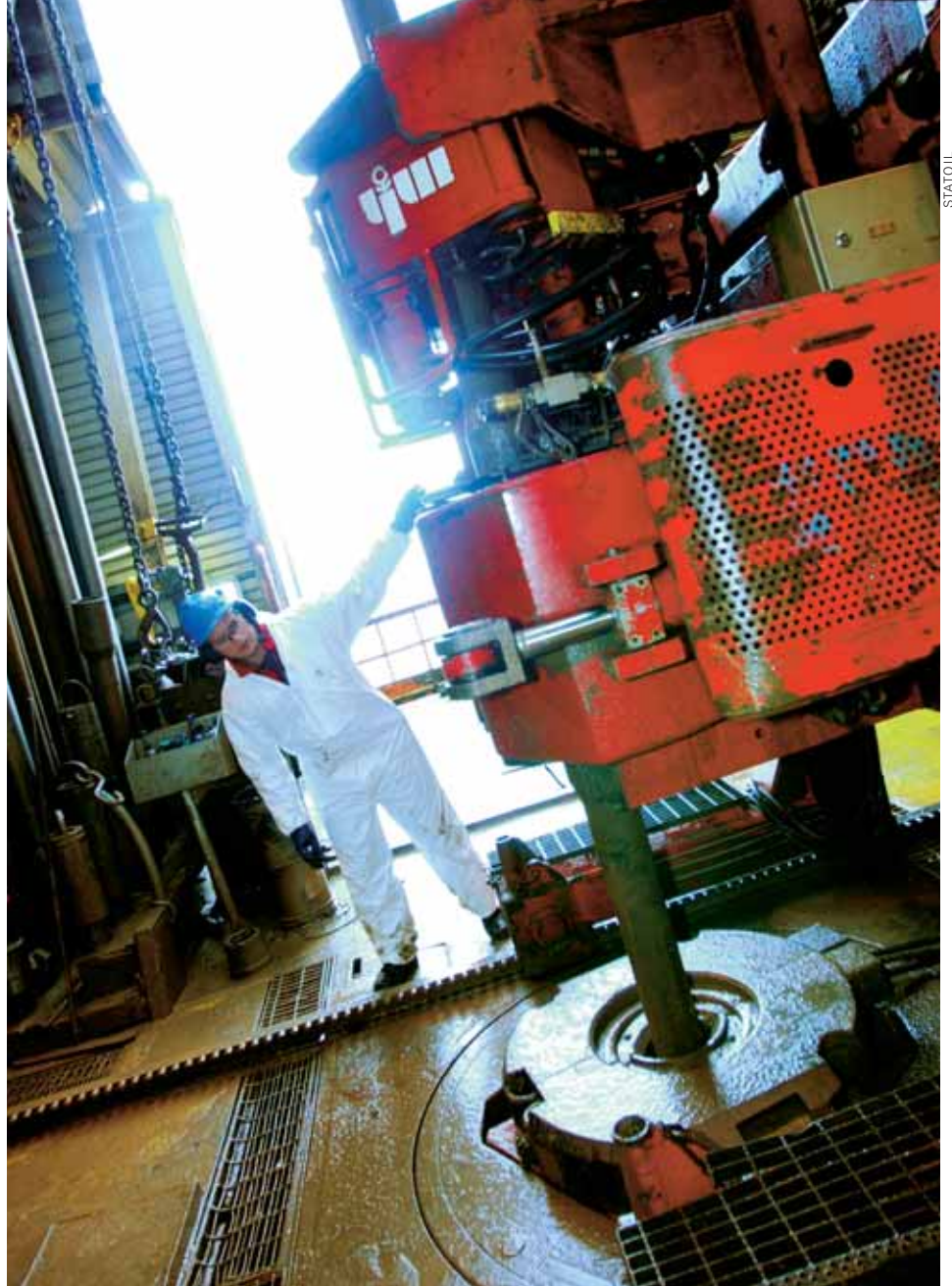
On October 25 last year, the first meeting was held between representatives of Sapa's technical service department and Leirvik MT in Norway, to study the details of the project. Based on the



STATOIL



About 140 people will work on the world's largest oil drilling rig, with a deck surface covering nearly 6,500 square metres. Gullfaks A in the North Sea (left photo) belongs to the older generation of platforms.



STATOIL

old design solution, they discussed how a more effective and smarter solution would look.

SHORTLY THEREAFTER, LEIRVIK MT received an order from the energy supply company Aker Drilling for living quarters for two new oil platforms. The platforms are scheduled for completion in February and October 2008. The oil drilling rigs, designated H6e, will be the largest in the world to date, and the most technically advanced in their category. The living quarters, which will accommodate 140 people, can be described as a virtual hotel, with single rooms, a gymnasium, locker rooms, dining rooms, TV lounges and offices.

The autumn and winter months were characterised by intensive development work at Sapa, in close co-operation with the customer. "We met regularly and maintained close contact to consider different ideas. Eventually, a completely new design concept emerged,"

says Gustav Lundkvist, an engineer at Sapa.

The concept calls for aluminium profiles that will be joined using the Friction Stir Welding (FSW) method to form finished panels. The panels will be assembled easily to create ceilings, walls and floors with the help of specially designed profiles.

"Sapa already produces friction-welded platforms, which eliminates the need for a substantial part of the welding operations previously handled by Leirvik MT in its own plants. The new solution makes the modular living quarters easier to assemble. The entire process is much more labour-effective," says Bruås.

IN MID-WAY THIS YEAR, all the blueprints had been completed, and in May Sapa started producing the components, including the friction-welding operations. In July, the first friction-welded panels will be delivered to Leirvik MT.

"Our co-operation with Sapa has been excep-

tionally interesting and extremely rewarding. In the development stage, Sapa contributed its skills and expertise in profile design and friction welding. This marks the first time we have a complete solution, with all profiles delivered by the same supplier," says Myklebust.

Compared with steel as the material, Myklebust only sees advantages with aluminium. The utilisation of aluminium yields substantial weight savings. Aluminium also lowers maintenance costs, since the surface does not need to be painted or treated.

"Aluminium is a fantastic material. Because of its flexibility, it can be formed to meet different shape requirements, and our own ideas set the only limits for what the material can achieve," he says.

TEXT: CARL HJELM



Creative forms

And you thought only gold and silver were used to make jewellery. Well, think again. One of the hottest materials in designer circles is – aluminium.

Louise Nippierd is one of Norway's, and perhaps Europe's, most interesting jewellery artists today.

Artistic expression is part of the explanation, and choosing aluminium as the material is another.

"When I understood what could be accomplished with aluminium, the possibilities literally flowed over me. I saw all possible colours and shapes before my eyes. Aluminium is also an environmentally friendly material, 100 per cent recyclable, and that also appealed to me," says Nippierd.

Her highly imaginative jewellery, created in a special process with sulphuric acid and dye baths, is like nothing you will find in a conventional jewellery shop.

Instead of traditional jewellery designs, Nippierd creates body sculpture with names like "Delightful Deliverance" and "Hungry Heart". They look like gigantic, shiny metal rings connected to each other from the neck to the navel. And when she creates finger rings, they are designed as exploding aluminium darts that look more like a Ninja throwing star than something you might want to give on Valentine's Day.

Nippierd's body sculpture may be regarded as a statement in the public debate on body fixation and the image of ideal beauty projected by fashion magazines. The jewellery covers the female body like armour or shields – with spikes pointing inward, as if in protest against anorexia, or outward, as if to protect.

"I don't think I've ever met a woman who hasn't dieted," she says.

IN THE EARLY 1990S, when Nippierd attended the National College of Art and Design in Oslo, her intention was born to work with large, almost turgid jewellery. But the choice of a more traditional metal never occurred to her.

"I think gold and silver are dreadful. The only metal I came in contact with was aluminium, it appealed to my heart. It's a fascinating material that I can bend with my fingers. And it smells great."

What attracted Nippierd most, however, and many other artists who work in aluminium today, was the possibility to colour the metal through anodising. The method also attracted Bess Kristoffersen, one of Denmark's most successful designers.

"Given my a background in textile art, it's



BeoCom 2 from Bang & Olufsen features engraved aluminium.

fantastic to discover that you can actually make paint stick to aluminium. The process requires a great deal of patience, but the rewards are tremendous," she says.

Kristoffersen recently designed a telephone



“Secret Sorrows” body sculpture designed by Louise Nippierd.

for Bang & Olufsen, BeoCom 2, by engraving aluminium in different directions, creating a glimmering pattern that changes character depending on the light. The telephone is available in a limited quantity and sold exclusively in the United States.

And if you thought large sculptures were cast only in stone, bronze and iron, take a closer look at the aluminium sculptures cast in sand moulds by Norwegian artist Geir Hjetland.

“I want to work on the edge of what is possible in purely technical terms,” says Hjetland, about his several metre-high sculptures.

In his private life, Hjetland also has a history in the material.

“My entire family worked at the aluminium plant in Høyanger, so I literally have aluminium in my blood.”

TEXT: NALJEN STÅHLSTRÖM
PHOTO: ALF BÖRJESSON

Louise Nippierd, Norway

Education: College of Art and Design, Oslo.

Merits: Nippierd started working with aluminium in the early 1990s. She has had several large exhibitions in Oslo and London, and has won many awards and grants.

www.nippierd.com

Bess Kristoffersen, Denmark

Education: Danish School of Design.

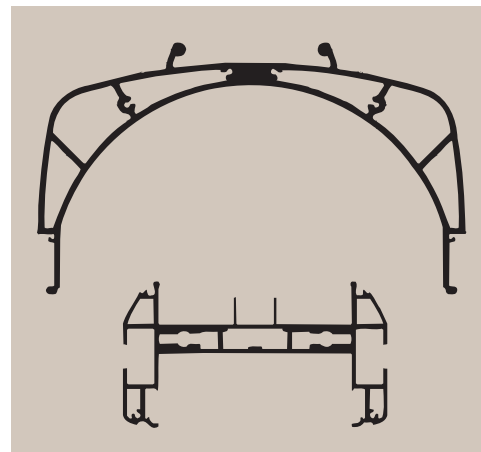
Merits: Acclaimed for her aluminium jewellery and design collaboration with companies such as Bang & Olufsen and Georg Jensen. Exhibition scheduled to open in Copenhagen early this summer.

www.besskristoffersen.dk

Geir Hjetland, Norway

Education: Vestlandet Academy of Art and the Art and Design College in Bergen, Norway.

Merits: Acclaimed for his large, moulded aluminium sculptures and decorations in public buildings. Has participated in personal and large group exhibitions in his home country.



Treble laser-beams indicate when the patient is positioned correctly in the X-ray machine.

The aluminium profiles protect the built-in electronics.

ProMax for better teeth

Using laser beams and sophisticated robot technology, dental X-rays have become safe and exact.

Planmeca of Finland manufactures sophisticated dentistry equipment that includes ProMax, an X-ray device sold in all parts of the world. ProMax is different from traditional X-ray equipment, both in terms of design and function.

When a patient's teeth and jaws are X-rayed with ProMax, treble laser beams are used to indicate when the patient is placed in the correct position. Using the latest robot technology, columns and arms are placed in the optimal position. The digital X-ray images are transmitted in just a few seconds to the dentist's display screen and processed using advanced computer technology. The images can be enlarged, and it is possible to adjust the brightness and contrast for more accurate diagnostics. The technology provides dentists with detailed images that make it easier to

analyse, formulate plans and follow up complicated procedures, such as dental implants – which required referrals to specialised X-ray facilities in the past.

THE FRAME OF THE CONSTRUCTION consists of two telescopic aluminium profiles – 140 centimetres long and 28 and 24 centimetres wide – which are entwined with each other. Weight is extremely important to the design, since the X-ray equipment is shipped from Finland to virtually all parts of the world, and reloaded several times in transit.

“I knew from the start that aluminium profiles would be the basic material in the design. With aluminium, we get both low weight and high strength,” says Kari Malmén, industrial design manager at Planmeca. Planmeca has capitalised on the opportunities provided by

the extrusion pressing technology and integrated several functions in the profiles.

“Behind the flat exterior surface there is a telescope function, as well as design features that have enabled us to conceal and protect the electronic and mechanical components. And naturally we have built functions into the profiles that facilitate assembly,” he continues.

“The surface is also important, for hygienic and purely aesthetic purposes. The profile surfaces are provided with a high-gloss finish in the extrusion press, eliminating any need for mechanical processing before the lacquering stage.” Planmeca handles all final assembly work at its own plant in Helsinki.

“It's important for us that Sapa offers strict tolerance limits, even though we work with relatively large profiles and complicated forms. The tolerance parameters are important, in that they facilitate assembly and provide reliable functionality and quality,” says Malmén.

TEXT: LARS-GUNNAR LINDÉN

Project on a high level

Damp and construction problems required the complete renovation of Silvertop Towers in Antwerp.

THE SILVERTOP TOWERS are a prominent feature of Antwerp, Belgium. In 2003, the Flemish Minister of Housing approved a renovation of 608 subsidised flats in the 20-floor-high towers. Only the concrete skeletons of the original structures were retained. Despite its considerable cost, 37 million euros, renovation was still less expensive than a new construction.

Simec, a customer of Sapa RC System, has supplied aluminium window frames for the flats and aluminium curtain walls for the shop areas. Due to the visually repetitive nature of the building structure, it was desirable to find a system that would allow the work to be performed as uniformly as possible. It also had to be cost-effective, due to budgetary limits.

“The challenge was to find a standard solution that could be used everywhere and could also accommodate the variations in the structural skeleton,” says Henk Janssens, project team manager Belux at Sapa RC System.

Other requirements included sound damping. The living quality of the new units had to be considerably better than previously. Thus, a comprehensive study of the window



New window frames give Silvertop Towers better soundproofing and thermal insulation.

unit construction was carried out to avoid acoustic leaks.

“Tests using a sample window under realistic conditions yielded good results, despite the exterior wall not yet being finished. The ultimate acoustic damping will thus be greater than specified,” he says.

The selected window frames are Confort 50, a thermally broken two-chamber system.

The windows are flush with the surface of the exterior walls, and the window arrays align with the grid of the decorative zinc panels and copy their colour.

“The first of the three Silvertop Towers is almost completed and may even set an example for new renovation projects in the subsidised housing sector,” says Janssens.

Profile school/Deflection

Different products have varying deflection limits. The Shape Profile School advises you.

A windowpane cracks if the frame's deflection exceeds $L/200$, where L represents the length of the longest side. A living-room floor that bends by more than $L/400$ is viewed as wavy. This makes it particularly important to check the tension, especially if the permitted deflection is considerable.

An aluminium structure is usually designed in a way that minimises deflection. The deflection of a beam depends on a number of factors: the material used in the beam, the geometry of the beam's cross section, the size and expanse of the load and bearing conditions. A common request is to use aluminium to replace steel in existing struc-

tures. The question that is then asked is how large and heavy will the aluminium beam become? When making such a replacement, the material used in the beam and the geometry of the beam's cross section are affected. In this case, the material is characterised by the elasticity module, E , and the geometry of the moment of inertia, I . For two equivalent structures, E times I must be equally large.

Since the E for aluminium is 20,000 Mpa and the E for steel is 210,000 Mpa, the I for the aluminium must be made three times larger than the equivalent amount in steel. This can be done

Steel IPE 200
22.4 kg/m



Aluminium
11.0 kg/m



in various ways. A common example is to use a standard steel beam as the point of departure, such as an IPE of 200 with a moment of inertia of 1,943 cm^4 . Accordingly, an equivalent aluminium beam would require the following:

$I = 3 \times 1,943 = 5,829 \text{ cm}^4$. The figure shows the steel beam and the aluminium beam, which is 40-percent higher. They have the same rigidity, but their weights differ significantly.

In other words, it is worth noting that the material provides a better effect far from the deflection centre than it does close to the centre.

AND FINALLY...

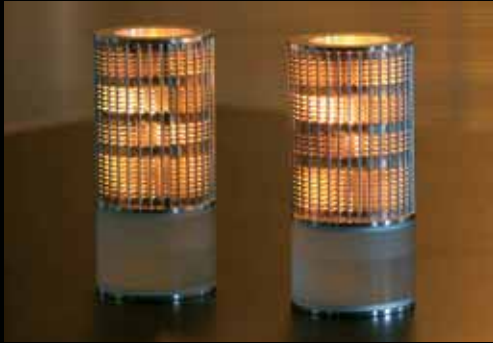


PHOTO: JIM HANSEN/MAYDAY DESIGN

With feeling for design

Michael Nedergaard's great passions are aluminium and cars. Through creative combinations of these personal interests, he has forged a career as a designer.

DESIGNERS ARE OFTEN characterised by their ability to see opportunities in the shapes, colours and materials in their surroundings. The first time Nedergaard discovered and became inspired by aluminium, he was working as a production engineer at Nissens Kølerfabrik in Hørsholm, Denmark. What everybody else saw as the constituent parts in a completely ordinary radiator became an elegant oil lamp in the eyes of Nedergaard.

"Aluminium is a fascinating material for a designer," he explains. "It can be used to create so many different impressions – everything from glossy and ice-cold to matte and glowing. You can also create exciting contrasts by combining the metal with coloured acrylic, for example." In 2000, Nedergaard started his own company, Mayday Design. For a

few tough but exciting years, he developed a collection for Danish and international furniture and design boutiques. The big breakthrough came in 2005, when Lamborghini (whose 250-hp Gallardo model contains radiators from Nissens Kølerfabrik) contacted Nedergaard.

NEDERGAARD'S WORK SO impressed Lamborghini that the automaker selected seven of his products for its new advertising collection. The Italian company also asked him to design new products, including picture frames, key rings, and penholders.

"I think my simple and elegant "alu look" is a perfect match for Lamborghini's profile and design philosophy," says Nedergaard.

TEXT: JESPER ELM LARSEN