

A magazine from the Sapa Group #2 2005

# Shape

DESTINATION: EAST

LARGE ORDER FROM RENAULT

EASY GLIDING WITH LUNDHAGS

LESS AT STAKE WITH S-STAKES

# Behind the facade

MEET ARCHITECT JEAN-PAUL VIGUIER

sapa

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Close cooperation yields added value for customers

**S**apa is consciously focusing on growth in Eastern Europe. Through the acquisition of the Alufinal profile company in Slovakia, we are expanding our capacity there and signalling that we wish to be a partner to all companies that are establishing production in Eastern Europe. We are optimistic with regard to local development and Alufinal is strategically interesting with its proximity to high-growth markets. The investment also aims to strengthen our overall competitiveness in the European market. It is my hope that you as customers will appreciate the opportunity to have Sapa as a partner for your continued expansion.

During 2005, we have been able to help many of our customers develop efficient, intelligent solutions based on aluminium profiles. You can read some examples in this issue of Shape. For us, it is important that we work close to our customers at an early stage of their product design. This applies both if we are to deliver a processed component or merely a profile to be processed by the customer.

Also within Sapa Heat Transfer, we are working actively and systematically to understand what is important in customers' production processes and how we can contribute to making these processes as efficient as possible. This approach enables us to increase and enhance the value for you as customers in our business relation, which benefits both parties.

We are soon to enter a new year and I would like to take this opportunity to thank all of our customers for placing their trust in us and our employees for their excellent work during the year. I wish us all a successful 2006.



**Kåre Wetterberg,**  
President and CEO



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Sapa is an international business group, which develops, manufactures and markets value-added aluminium profiles, profile-based components and systems, and heat-exchanger strip in aluminium. Sapa has sales of approximately SEK 14 billion and has some 7,900 employees throughout Europe and in the US and China.

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## Viking lifts with style

Taking into consideration the needs of customers, Swedish-owned Liko continues to develop mobile lifts for home and health-care settings. The latest addition to the Viking series, launched in September, is the Viking XS.

"It is a specially adapted lift for people who live in residences where space is tight," says Liko president and founder Gunnar Liljedahl.

The Viking series was created two years ago with the introduction of Viking XL. Liko had noticed there was a strong need in the United States for secure patient lifts for large individuals.

"We try to cover the entire range of lifts from large to small. Demand dictates what products we develop," says Liljedahl.

Liko's line of lift devices numbers around 300. Sapa manufactures the profiles for the lifts while Liko assembles and tests the products.

There are several reasons why Liko chooses to use aluminium for its lifts.

"Above all, we want to distinguish ourselves by providing our customers high-quality, attractively designed products. Like the furniture in our homes, our equipment is both functional and appealing in form."

Another reason is weight.

"The Viking XL weighs 42 kilograms. If it had been made out of steel, it would weigh twice as much and be difficult to manoeuvre," says Liljedahl.

Liko places exacting requirements on its suppliers. This autumn, Liko has been

working together with Sapa to improve routines and shorten lead times for developing prototypes. Time is money and the earlier a model enters regular production, the more profitable that product will be.

Last year, Liko experienced 80-percent growth in the U.S. market alone – a market that continues to grow. The United States is Liko's largest market, followed by Sweden.



**Uplifting equipment.**

## Window shopping

The renowned shopping centre Grand Bazar in Liège, Belgium, was recently renovated and equipped with new windows from Sapa RC System. As with all renovations of this nature, specific demands were placed on the systems used. In this case, demand involved adaptations to the existing window arches and determining the size of windows that can open.

The architects decided the best alternative was to use Excellence 65 triple-pane windows, with polyamide insulation strips.



**Grand Bazar shopping centre in Belgium.**



**Three-in-one for tight spaces.**

## New form of transit for families

Does an integrated carrier bike, combining a bicycle and child stroller, sound implausible?

Not anymore. The new TrioBike, designed in Denmark, is just such a revolutionary product. Using a strong, yet lightweight aluminium frame, it accomplishes all three tasks in one.

It is possible to convert the carrier bike into a separate bicycle and child stroller in less than a minute without using any tools. This enables people to bike to daycare with their children firmly fastened in the bike carrier, then remove the carrier with a simple hand motion, converting it into an easy to push child stroller and allowing them to continue their ride to work on the seven-speed designer bicycle.

"Thanks to the aluminium frame, TrioBike is the lightest carrier bike on the market and is still able to handle a maximum weight of 80 kilograms. That makes it a convenient, environmentally friendly transportation alternative for the modern family with small children," says Sammy Eisinger, president of TrioBike.

TrioBike's carrier is designed for two children, up to 9 years of age. It is also possible to attach a baby seat in the bike carrier.

## BRIEF NOTICES



Roof racks from Thule.

### Automotive production in China begins

Sapa Automotive has established a presence in the automotive industry's largest growth market – China.

Sapa opened a processing plant in the heart of the Chinese automotive industry, Shanghai, in 2004. During spring 2005, Automotive began deliveries of roof racks from the plant to Thule's Chinese operations.

"We're extremely happy and proud of our progress, especially since domestic production is incredibly competitive. In

China, you have to be world class," says Andres Thålin, technical director at Sapa Automotive.

Deliveries of airbag housings to Autoliv are expected to start up during the first quarter of 2006. The hope is for greater collaboration with Autoliv and Thule in the future, as well as an expanded customer base.

"This is the start of something big. We're already working on several orders and are positive about the future," says Thålin.

### Functional conference room

Today's architecture with open office spaces places new demands on conference equipment, something Sweden's Audiocom specialises in.

"Glass walls, more windows and generous floor space are typical of today's modern conference rooms. Since there aren't as many

walls available, new solutions have to be found for audiovisual aids and cabinets," says Mikael Ströberg, technical designer at Audiocom.

In collaboration with Sapa, Audiocom has developed aluminium pillars with multiple built-in functions. The system is aimed at customers who value design, such as hotels, banks and high-tech companies. The solution was nominated for the 2005 design award.

"The aluminium profiles are snapped together to form round pillars that contain numerous functions," says Ströberg.

The pillars can be positioned anywhere and assembled according to customer specifications. In addition to built-in loudspeakers, cabinets, plasma screens and adjustable-height whiteboards can be attached to the pillars.

According to Ströberg, aluminium is a lightweight and durable material that makes it easy to modify conference room solutions to fit various needs.

"Aluminium is easy to extrude into profiles with built-in functions," says Ströberg. "Furthermore, the material is durable and economically advantageous."



Attractive and flexible.



Stairways for maintaining aircraft.

### Towards loftier heights

Germany's Günzburger Steigtechnik GmbH manufactures about 1,500 units of mobile scaffolding with built-in steps annually. Thanks to increased demand for specialised solutions, the company has secured a market share of approximately 20 percent in Germany. Günzburger Steigtechnik is continually looking for new solutions and product innovations.

Since the early 1950s, the company has utilised aluminium profiles for its scaffolding. Advantages include long lifespan and good moulding characteristics.

According to Günzburger Steigtechnik, the use of aluminium profiles has contributed to the company's positive growth.



Bus bars headed for Romania.

### Electric highway

Thanks to its excellent conductivity aluminium is the perfect material for power transmission. Recently, Sapa RC Profiles in Lichtervelde, Belgium, delivered 20 tonnes of bus bars to Va Tech T&D for a power station in Romania.

Bus bars can best be described as an electric highway and are an alternative to conventional power distribution by cable. The tubes are easily installed and environmentally friendly since they are completely recyclable.

The extruded aluminium tubes for Va Tech T&D are between 80 and 250 millimetres in diameter and more than 20 metres long. They underwent rigorous testing and before delivery each tube was packed individually according to customer specifications.



**Station provides smoke-free air.**

## Smoking without smoke

Sweden's Smoke Free Systems manufactures smoking stations for offices and public spaces – mobile alternatives to smoking rooms. Together with Sapa, the company has developed a new series using aluminium profiles, the SF-line.

"The new stations will be launched at various trade shows throughout Europe," says Bo Dolk-Pettersson, project manager at Smoke Free Systems.

The company's collaboration with Sapa began in December 2004 and has resulted in the delivery of some 50 modules. Another 150 are in the works.

"Using aluminium is good for two reasons – one it's appealing from a design perspective, and two, it's easy to work with," he says.

The freestanding smoking stations effectively capture tobacco smoke. Thanks to a special filter, smoke is not spread, preventing second-hand smoking. Smokers themselves avoid being confined to smelly smoking rooms.

## New in aluminium



**Optimal in the office.** The AI-One hole punch from Sweden's Opto is manufactured from aluminium profiles. According to Opto, aluminium is a superior material since it allows demanding designs. Also, a profile can vary in thickness across a surface or be combined with several profiles to form a single product.



**For the whole body.** The U.S.-based firm Precor has launched the Elliptical Crosstrainer – a training tool for both the upper and lower body that is also gentle on joints and the lumbar part of the back. The adjustable platform is manufactured using extruded aluminium profiles from Sapa.



**48%**

of all aluminium cans manufactured in Western Europe in 2004 were recycled.

## Focus on customer relations

During the year, Sapa has initiated a project that focuses on customers, Customer Value Management (CVM). Johan Menckel at Sapa Heat Transfer is the project manager.

"Working together with customers and using an academic approach, we want to positively demonstrate the added value we provide," he says. "Through documentation and demonstrations, we can evaluate work routines of both parties and show how and where in that production Sapa can save customers money."

CVM is a concept from Kellogg Business School and the London School of Economics that focuses on measuring the performance of both the supplier and the customer.

"The data we collect can, for example, be used for value-based pricing to justify if Sapa is a little more expensive than competitors from a materials standpoint. If the customers experience fewer production interruptions when they use Sapa, then it will be profitable for them over the long term," says Menckel.

## More than two holes in the wall

Working together with Sapa, Stockholms Lokaltrafik (SL), which manages Stockholm's public transportation system, has developed flexible solutions for advertising billboards in subway stations. Markus Eisler, facade and projecting consultant for SL, wanted to find a solution that avoided leaving holes in the walls from the billboards.

"The signs along the tracks are large and heavy. Also, the advertising company changes the location and format of the signs at regular intervals, meaning SL constantly has to drill new holes in the walls. After a while, the walls start to look like Swiss cheese," says Eisler.

SL needed a system that would allow signs to be easily moved and repositioned. The solution came in the form of rails made out of aluminium profiles, attached horizontally along the tracks.

The concept was developed over a six-month period at one of Stockholm's subway stations. An important aspect was the thickness of the aluminium profile.



**Movable advertising sign.**

"SL requires a certain safety distance between the cars and the subway walls, a test which the initial rails failed – they were too thick. In other words, not only are the rails required to bear the weight and size of the signs, they also have to be very thin. This posed exacting demands on construction," says Eisler.



## Eastward bound

Sapa now plans to expand in Eastern Europe. The acquisition of the Slovakian aluminium profile company Alufinal is just one investment of several in countries where Sapa has not previously had operations.



Alufinal in Slovakia.

**S**apa established itself in Eastern Europe as far back as 1992, when it built an operation from the ground up in Poland. Sapa was the first western aluminium profile company in the Polish market, an initiative that has been a success.

“We entered the market at the right time, we had the right personnel and equipment – and a functional strategy,” says Sven Magnusson, head of Sapa’s business development in Eastern Europe.

**ALTHOUGH SEVERAL COMPANIES** have established themselves in Poland in recent years, the domestic market has grown approximately 10 percent a year and exports are increasing, especially to Central Europe.

“In many ways, Poland has been the driving force behind Sapa’s continued expansion into

Eastern Europe. We will continue to focus on Poland,” says Magnusson.

Sapa is now investing in a third press at Trzcianka in Poland, an investment that will essentially double production capacity. The new press will also enable Sapa to produce larger profiles, thereby reaching new groups of customers. In addition, capacity for both surface treatment and machining at the pressing plant will be expanded.

Another example of Sapa’s expansion in the region is the acquisition of aluminium profile company Alufinal in Slovakia that was finalised this autumn.

Alufinal holds a strong position in the Slovakian and Czech markets. The company is also situated close to other markets experiencing strong growth and is close to established markets in Central Europe. >>

Сүр  
бица  
Тј

★ Lithuania

★ Poland

★ Czech Republic

★ Slovakia



## INSIGHT: EASTERN EUROPE

» “Not only is Slovakia experiencing strong economic development, it is also well situated geographically. The expansion of the European Union has resulted in the centre of Europe shifting towards the east. That makes Slovakia strategically interesting,” says Magnusson.

**BUSINESS POTENTIAL IS** great, not only in Slovakia but throughout the entire region. Growth in these countries is two to three times greater than in Western Europe.

“Eastern Europe has become an important part of Sapa’s overall operations and will continue to increase in importance for us in the future. As things look now, positive developments will continue in these markets for a long time to come,” says Arne Rengstedt, head of Sapa’s profile operations in the Nordic region, Baltic States and Eastern Europe.

Today, Sapa is represented in a large number of countries in Eastern Europe. In addition to production facilities in Poland and Slovakia, Sapa has production in Lithuania and sales offices in the Czech Republic, Slovenia, Estonia, Latvia and Lithuania. Recently, sales offices were also opened in Hungary and Ukraine. During the coming year, Sapa will focus on developing sales in Slovenia and Croatia.

“Many of our customers are moving to or setting up new operations in Eastern Europe. By establishing ourselves in the region, we will continue to be an attractive partner,” says Rengstedt.

**SAPA’S CURRENT AMBITION** is to establish itself in Russia. Magnusson is enthusiastic about the endeavour.

“The Russian market is very exciting. Econo-

mic development is starting to accelerate and could gain enormous momentum,” he says.

Establishing a presence in Eastern European markets holds huge possibilities – but also certain risks in terms of economic instability, corruption and criminality.

“My perception is that the business risks are generally overstated. Risks are minimised as markets develop within these countries. Sapa is counting on long-term development with calculated and limited risks,” says Magnusson.

One requirement is to have accurate knowledge about markets and the right contacts.

“Sapa, with its entrepreneurial spirit, its customer relationships and expertise has excellent potential for successful expansion in Eastern Europe,” he says.

TEXT: CARL HJELM

ILLUSTRATION: ANNA ÖDLUND

# Alufinal focuses on automotive

The acquisition of Slovakia’s Alufinal is a key part of Sapa’s venture into Eastern Europe. Development inside the country is strong. Within a couple of years, it is anticipated that Slovakia will be the world’s largest automobile manufacturer per capita.

**THE ALUMINIUM PROFILE** company Alufinal in Ziar nad Hronom, Slovakia, currently holds a strong position in the Slovakian and Czech markets. Through this acquisition, Sapa has expanded its production in a strategically important market.

“Alufinal is a unit that fits very well with Sapa in terms of localisation, image and production capacity,” says Arne Rengstedt, head of Sapa’s profile operations in the Nordic region, Baltic States and Eastern Europe.

Slovakia is currently one of Europe’s most attractive countries for investments within the automotive industry. According to estimates, within a couple of years the country will be producing more cars than any other country per capita. That translates into a great opportunity for the company, according to Teodor Kvapil, president of Alufinal.

“Development within the automotive industry will result in significantly higher production of



**Anodising at Alufinal’s pressing plant in Ziar nad Hronom.**

aluminium profiles and components for the automotive industry. With Sapa as owner, we have very good prospects for reaching new markets, especially within the automotive industry. We, in turn, will benefit from the expertise and technological know-how that exists within Sapa,” he says.

**ALUFINAL HAS JUST** over 300 employees. Through investments, the capacity of the three existing

presses could be increased from 13,000 tonnes to 20,000 tonnes of aluminium profiles annually. Alufinal currently has sales of approximately 35 million euro annually.

“Sapa is taking over a highly functional and profitable company. Our ambition is to further develop operations while not making any radical changes. We have great confidence in the management team,” says Rengstedt.



# Lighter loads with S-series

Logging trucks need to maximise the size of their loads. ExTe's new tapered S-series stakes make room for more timber while reducing air resistance.

**SWEDISH TIMBER HAULING** equipment manufacturer ExTe is on a roll. In just over a decade, sales have increased from SEK 20 million to 120 million. The demand for hauling timber as efficiently and economically as possible is constantly growing. ExTe markets its products in 30 countries. While its operations are centred in Färila, Sweden, some production is also carried out under license in South Africa.

The new lightweight S-series stakes, made entirely out of aluminium, have become a bestseller.

"We're selling twice as many as we anticipated in our most optimistic predictions," says president Kjell Jonsson.

The entire timber bunk is made out of aluminium, including the frame that

lies against the truck bed. That makes it extra lightweight, allowing more timber to be loaded onto the truck, without exceeding overall weight limits. In Sweden, that figure is 60 tonnes, and somewhat lower throughout the rest of Europe.

However, the most revolutionary aspect of the S-series stakes is their aerodynamic tapers, narrowing towards the top like a flagpole. This provides several major advantages. The tapered shape and lighter weight translate into less wind resistance, resulting in lower fuel consumption. In other words, the S-series stakes contribute to more environmentally friendly timber transports.

The tapers are made by slotting the profiles, pressing them together and welding them prior to surface treatment. Production is handled in collaboration with Sapa, which performs the tapering and welding of the stakes.

"Having Sapa as a partner means being in close contact with the sales organisation, access to technical expertise and good product quality," says Jonsson.

Following a development period of approximately three years, the S-series is now sold in the Nordic countries.

"We test our products using test bunks at the plant, prior to installing them on test vehicles for at least a year", says Jonsson.

"The Nordic region is at the forefront when it comes to forestry transportation products. After having been in use in the Nordic markets, we're now expanding exports primarily to the rest of Europe but eventually also to Canada and Asia."

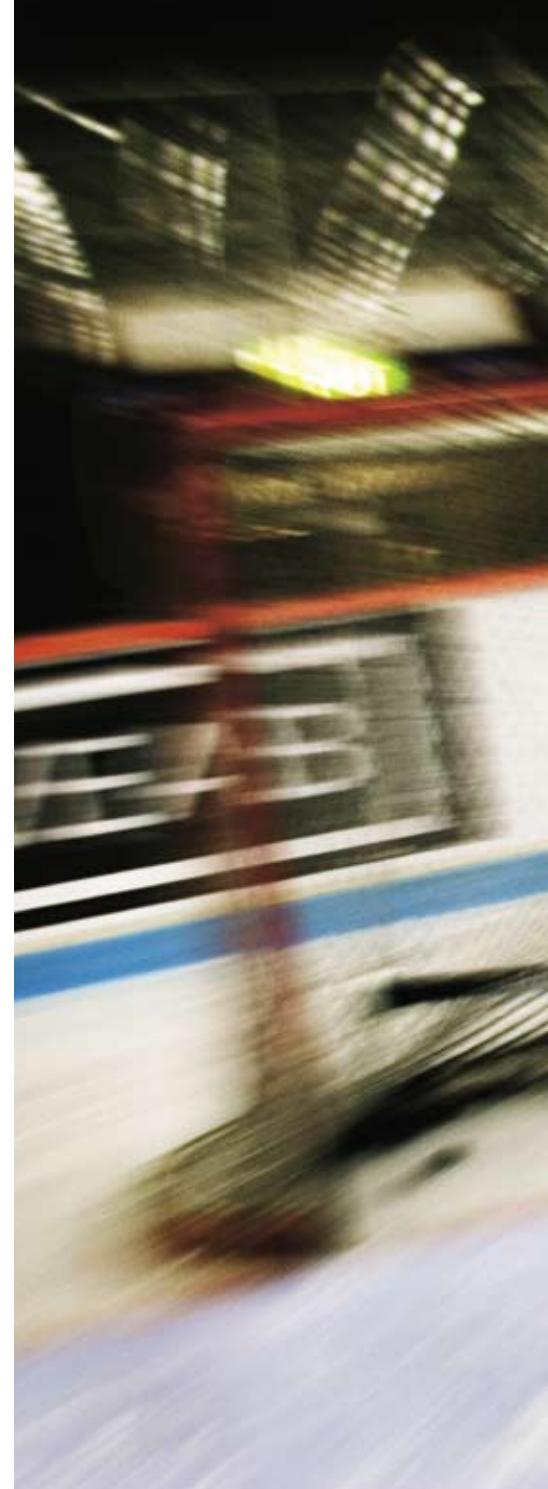
Needs, preferences and demands differ from country to country. In Southern and Central Europe, for example, the maximum weight and size allowed is less than in the Nordic countries. Jonsson is a bit worried that such regulations might be implemented in Sweden in the future.

"That would mean more timber trucks on the road, resulting in greater wear and a greater impact on the environment," he says.

TEXT: EWA THIBAUD



**ExTe, the best selling S-series aluminium stake.**



Swedish elite goalie Thomas Sehlstedt tests

# Goalie scores with light hockey stick

Lighter, cheaper and better. Those are the characteristics of the new, revolutionary goalie stick with replaceable parts.

**R**apid technological advances are taking place in most sports. In ice hockey, such changes are most obvious in the goalkeeper's equipment.

One piece of equipment that has not evolved so much, however, is the goalie stick itself. Certainly, composite material such as carbon fibre has made an entrance even here, but the various parts of the stick – the shaft, the shield and the blade – are still one piece. Now the first ever multi-piece hockey stick is being launched, with a shield made of an aluminium profile.

"It's the world's lightest goalkeeper stick, weighing 40 percent less than conventional sticks," says Jörgen Wikström, president of Swedish company ProMask and who developed the XV2 stick together with colleague Esbjörn Berglund.

**WITH 21 SEASONS** behind him as a pro net minder, Wikström knows exactly what is required of an optimal goalie stick. In addition to withstanding shots and load, it must have the right elasticity and "feeling" for goalies to make passes.

And Wikström is an expert on how to handle a hockey stick.

He was first goal-

keeper in the Swedish elite league to score a goal.

"The opposing team was trying to score a game-tying goal and had taken out the goalkeeper. I got the puck and shot from 50 metres, straight into the empty net," says Wikström.

**THE USE OF ALUMINIUM** in hockey sticks is nothing new. Wayne Gretzky, the greatest hockey player of all time, tested aluminium sticks back in the 1980s. However, players soon went back to wooden or composite varieties. The problem was that the aluminium sticks lacked the right feel.

Wikström and Berglund were reflecting on the problem while travelling to a trade fair in Toronto, Canada, last year. Somewhere across the Atlantic, they came up with the solution: To use an aluminium profile for the stick's shield.

As veteran goalkeepers, they both knew the shield is the weakest part of the stick.

A large majority of damage to a stick occurs on the shield. In a three-piece stick, the damaged part can simply be replaced instead of throwing away the entire stick.

"A traditional goalkeeper stick costs upwards of 1,000 Swedish kronor (SEK). When you consider that a top-level goalie goes through 50–60 sticks each season, this adds up to a lot of money. The stick we have developed costs about SEK 2,000, but you only need a maximum of five

sticks per season. This represents a saving of 80 percent, which most hockey clubs would welcome," says Wikström.

The duo contacted Sapa and demonstrated their idea.

"At first, they were a little sceptical, but once they had seen our drawings, they were really positive. In order to be able to develop hi-tech products such as today's hockey sticks, you need help. Sapa has this know-how, so it was natural to turn to them. In fact, it's a little strange that no one had come up with this idea earlier," says Berglund.

"In addition to enhanced properties and a



The XV2 goalkeeper stick comprises three replaceable parts – a shaft, shield and blade.



the new XV2 stick from ProMask.

more economical product, the stick also facilitates matters for retailers. Instead of having 50 or so different models with different angles and lengths, they now need to stock only a few. The stick is assembled exactly the way the goalie wants it. And it can be varnished or anodised in any colour. We have even thought about having flashing light-emitting diodes in the shield, but maybe that's a bit over the top," laughs Wikström.

**How long will it take until all top-level goalkeepers use sticks with an aluminium shield?**  
"Many clubs still have agreements with the large stick manufacturers. But my

guess is that nearly everyone will be playing with this stick within a few years," says Wikström.

**What is the next piece of equipment in the hockey world that can be improved with aluminium?**

"Aluminium could be used for parts of the goalie's helmet. Today, for example, the cage is made of titanium, but aluminium would be a few grams lighter. And these few grams can make the difference between a great save and a miss," says Berglund.

TEXT: DAG ENANDER  
PHOTO: ELIN BERGE

## What does the expert say?

The only person who can review a goalkeeper stick is, of course, a goalkeeper.

Thomas Sehlstedt, goalie for Swedish hockey team Björklöven, has tested the new stick.

He gives it top marks all round.

"It is both lighter and stiffer, which is good. As a goalkeeper, you want your equipment to

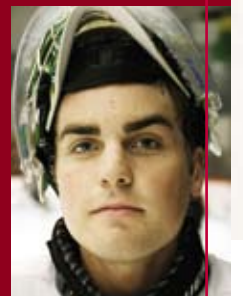
be as light as possible. The stiffness makes it last longer. A normal stick weakens once the shield has received a few blows."

**Are there any more advantages?**

"Yes, the possibility to switch between an extremely lightweight match stick and a training stick with a foam-filled shield. It weighs a few grams more but lasts all the longer."

**What do your teammates think about your new stick?**

"They haven't said anything in particular – but they all look a bit envious."



Thomas Sehlstedt

French architect  
*Jean-Paul Viguier*

*is regarded in some circles as the unofficial spokesperson for the virtues of aluminium. For others, he is the torchbearer for eco-architects*

*who consider the sustainability of the structures that they design.*



*One thing that all can agree on is that Viguier is responsible for visionary architecture around the world.*



**O**n a quiet side street, in an unassuming part of the 13th arrondissement in Paris, you would probably pass the building that houses Jean-Paul Viguier's architecture practice without thinking twice about it. The bleached stone and dark wrought iron facade blends in with the surroundings. However, once inside the building it is clear that the space has been designed for creativity and the exchange of ideas.

Viguier is a big man, with big white hair and big amounts of boundless energy. He says hello dressed in a sombre black suit, white shirt, and well-polished black shoes. It's as if any other attire would compete for space with his personality, and the surroundings.

"I like the idea of designing flush, sleek

facades, and this I believe comes from my use of aluminium. When I design a facade all the materials that are put together such as stone, marble, aluminium and glass, are designed to work together in such a way that in the end when you look at the facade, everything is smooth. This gives an impression of tension to the facade. I do that because I think that the "outside skin" of the building is the energy of the building," he explains.

**VIGUIER SAYS THAT** designing this way is not easy, and demands skill from the architect as well as a thorough knowledge of the way that the building materials will perform when used in the design.

"If you were to look at a cross section of the facade of the France Télévision building that I designed, you have stone, marble, aluminium profiles and double glazing. All materials are completely aligned with each other. To do that, I have been obliged to make some kind of cut in the angle, to push the materials inward, as this gives the feeling of smoothness. Usually, this work is invisible and only seen by the architect, but I want people to know what the profiles look like on the inside," he says.

Viguier feels that by using aluminium profiles and designing structures that show their sections, he is "taking what was once behind the scenes, and bringing it onto the stage."



France Télévision in Paris.



One of Jean-Paul Viguier's ongoing projects is a shopping and office building in Budapest.

### Why this fascination with aluminium?

For Viguier there is no simple answer to this question.

“I like working with aluminium because it is like a child’s modelling clay. You can shape it and transform it for different uses: you can make it big, or you can make it small. The possibilities for its use are endless. Also, you can basically use aluminium forever because it is a totally recyclable material,” he says.

**THE SOFITEL CHICAGO** Water Tower Hotel in Chicago is one of Viguier’s newest buildings. It won the city’s Best Building Award in 2003 and has been featured in *Skyscrapers: the New Millennium*, the Art Institute of Chicago’s exhibition in 2000 of 50 design projects around the world that illustrate the skyscraper as an architectural form that is alive and well within today’s society.

It is interesting to talk to Viguier about the Sofitel Chicago Water Tower Hotel. He is pleased with the final result, and it shows.

“The idea for the Sofitel Chicago Water Tower Hotel was to have a floor plate like an ellipse. The shape of the hotel, which is something between an ellipse and a triangle means that there are almost no corridors, so guests don’t have to walk far to get to their rooms. I wanted guests to see Chicago. The city has wonderful views of the lake and also the downtown area, which is why I used so much glass in the guest rooms. I also wanted

passers-by outside the building to discover this shining tower which rises out of the ground,” he says.

In addition, Viguier says he was keen to give something back to the city of Chicago. “I came to Chicago and was given a piece of land to develop for the hotel. As a gesture, I didn’t use the entire piece of land, I gave a piece back to the people who live here, and that piece is a beautiful small park, just beside the hotel.”

Viguier admits that using aluminium in his designs is not cheap. Materials that he feels can compete with aluminium in his designs are glass and steel.

“I think that many underestimate the properties of glass. I have used glass beams in my architecture and the strength of the material is surprising. Many see glass as being fragile, but it isn’t always,” Viguier explains.

**HOWEVER, HE BELIEVES** that architecture in the future will incorporate new uses for aluminium.

“I have collaborated with aluminium producers in the past, and would like to do that again sometime. I think there are many new ways to use aluminium that have yet to be developed. For instance, I think that it must be possible to produce inexpensive, nice houses from aluminium,” he says.

TEXT: TSEMAYE OPUBOR HAMBRAEUS

PHOTO: ALASTAIR MILLER AND

JEAN-PAUL VIGUIER S.A. D'ARCHITECTURE

## Some facts about Jean-Paul Viguier

### Background:

- Qualified at the Beaux-Arts school in Paris, France, in 1970, and went to Harvard University, United States, on an Arthur Sachs Fellowship, graduating in 1973 as Master of City Planning in Urban Design.

### A selection of awards:

- Recipient of the Grand Prix National Architecture from the French Ministry of Equipment, for the Gaz de France Research Centre, 1984.
- Recipient of the Grand Prix for Best Metal Construction, Paris, 1992 – competition for the glass roof of the C3D building.
- Recipient of the Equerre d'Argent, an important prize for architecture in France, for the Métropole 19 industrial building, Paris, 1998.
- *Business Week*/Architectural Record Award – American Institute of Architects, for the Astra-Zeneca head office, 1999.
- Gold medal of the Federation of Architects of Russia, 2000.
- Best Building Award for the Sofitel Chicago Water Tower Hotel, 2003.

### Personal distinctions:

- Knight in the French National Order of Merit.
- Officer of the French Order of Arts and Letters.
- Knight in the French Legion of Honour.



### **Some buildings that feature aluminium:**

C3D Atrium, Paris, France, 1992

Astra Zeneca, Paris, France, 1997

Gec Alstom Transport, Paris, France, 1997

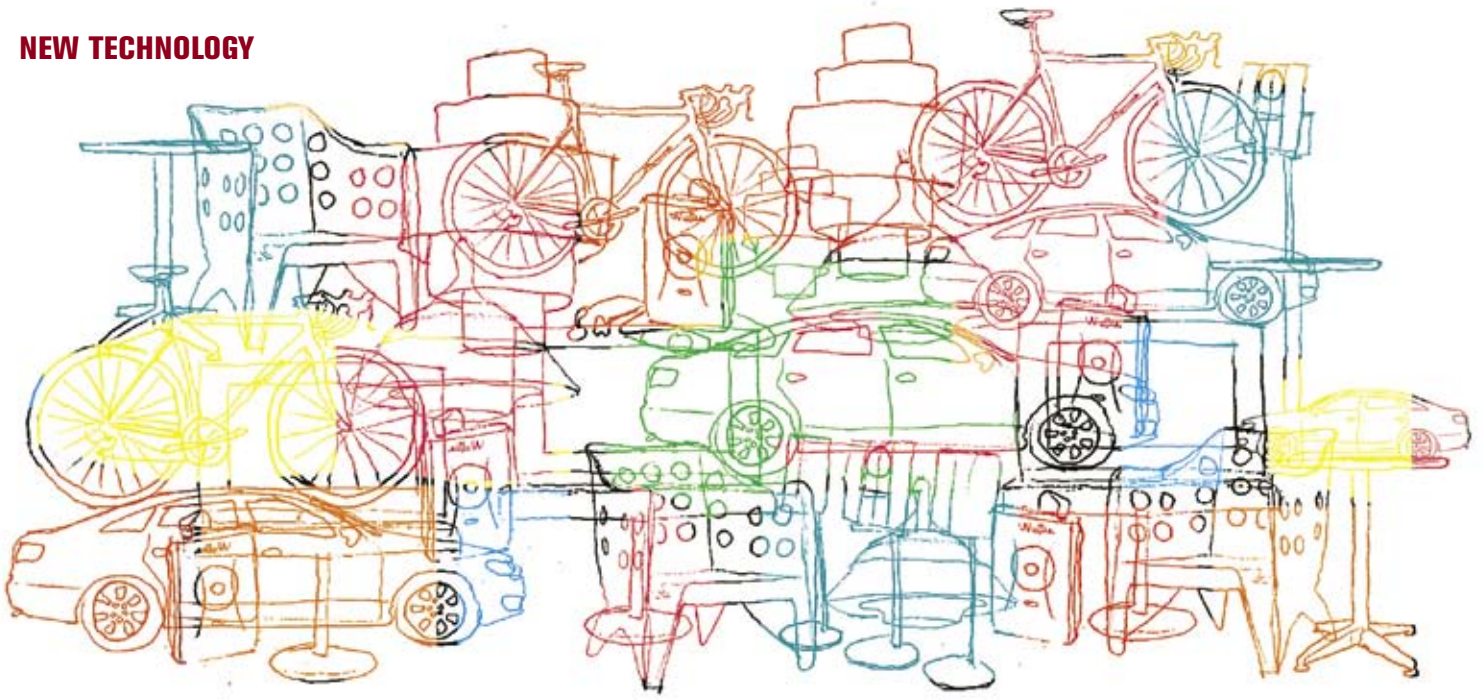
France Télévision Headquarters, Paris, France, 1998

La Défense – Coeur Défense, Paris, France, 2001

Sofitel Chicago Water Tower Hotel, Chicago, United States, 2002

McNay Art Museum, San Antonio, Texas, United States, 2006

**The triangle-shaped Sofitel Chicago Water Tower Hotel was awarded for best building in 2003.**



# Shaped for success

Hydroforming is a shaping technique that is gaining in popularity. While the automotive industry is currently the largest market for hydroformed products, interest in the technique's unique advantages is growing, especially in the design world.

In the early 1990s, significant advances in hydroforming of aluminium profiles were made. The technique had advanced to the point where it was possible to manufacture details with great precision and drew the attention of the automotive industry as a way to reduce weight. Audi, for example, developed its Space Frame body from hydroformed aluminium beams.

In a collaborative venture with Volvo Trucks, Sapa began developing a method for hydroforming aluminium profiles in 1998. Three years later, the first hydroformed components were delivered to Volvo. At the same time, Sapa Profiles in Sweden opened a Hydroforming Skills Centre.

"Development in the field of hydroforming is very strong. Today we're manufacturing hydroformed pipes and beams for the automotive industry. We have several projects in the works and have noticed that the market for hydroformed products is growing," says Tomas Nilsson, head of the unit.

Currently, the automotive industry is by far the largest market. One of countless examples is Chevrolet's latest sports car, the Corvette ZO6, which has hydroformed aluminium side beams.

Hydroforming is used frequently in other product areas as well.

Many designers have started to take an interest in the technique and the possibilities it offers to create unique forms. Today the technique is used in the manufacture of furniture parts, including table and chair legs. Home electronics manufacturer Bang & Olufsen, renowned for its design, uses hydroformed parts in its products. Also, most aluminium bicycles have hydroformed frame parts.

**PETER BENSON, PHD** in engineering and head of Sapa Mass Transportation says that hydroforming offers virtually limitless possibilities.

"It's an incredibly interesting technique. All modern production strives to achieve low weight and use as few manufacturing steps as possible. Hydroforming achieves both of

## Hydroforming – how it works

A profile is placed inside a mould shaped in the desired form. High hydraulic pressure is created inside the profile, causing it to expand until it matches the mould.

## Advantages

- Complicated forms can be manufactured with a high degree of accuracy.
- Manufacturing takes fewer operational steps than with other techniques.
- Durability is high since hydroformed designs have no seams or welds.
- Weight is low.

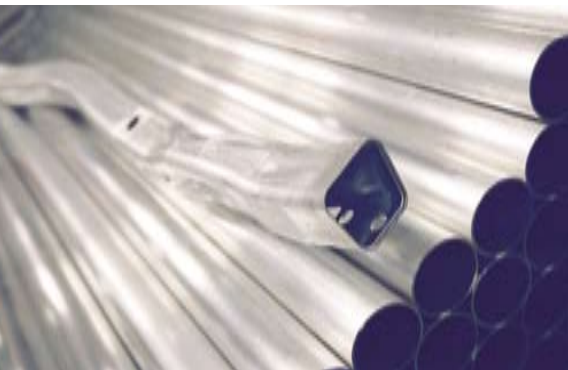
those characteristics. I'm convinced that the technique will be utilised to an ever-greater extent in the future. Sapa can manufacture hydroformed aluminium profiles for all product areas," says Benson.

According to Nilsson, hydroforming is a shaping technique that fits well with Sapa's operations.

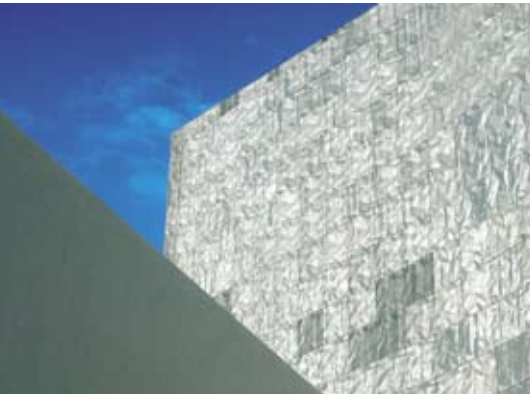
"Sapa has extensive knowledge about everything from casting and extrusion to cold forming and other shaping methods. Hydroforming is an area of expertise that contributes towards making Sapa's operations more comprehensive," he says.

TEXT: CARL HJELM

ILLUSTRATION: ANNA ÖDLUND



Complicated forms can be manufactured with a high degree of accuracy.



Stamped aluminium panels covering the new addition of the Walker Art Museum continually change in appearance.

## Modern architecture – a work of art

A gleaming new addition attracts visitors to the Walker Art Center in Minneapolis, Minnesota.

**GLEAMING ALUMINIUM** that reflects sunlight has made the newly expanded Walker Art Center in Minneapolis, Minnesota a work of modern art itself.

The award-winning Swiss architectural firm of Herzog & de Meuron is behind the daring choice of materials. The expansion was inaugurated in April 2005 and has attracted considerable attention for its modern, minimalist architecture. The Walker Art Center is the architects' first public building in the United States and, as a museum structure, unique in its class.

The design was inspired by and supports the Walker Art Center's vision to link together ideas, perspectives and artistic disciplines by physically weaving together galleries with spaces for education, stage performances and film screenings. As a result, the architecture is specifically adapted to present various kinds of modern art forms, from visual and experimental art to performances. The emphasis is on letting visitors feel involved in the creative process.

**THE MUSEUM'S MOST** sensational addition is the 12,000 square metres southern wing, the exterior of which is clad with stamped aluminium panels. The material reflects changes in weather, resulting in a façade that is constantly shifting

in appearance. Contact with the outside world is made through gigantic, asymmetrical windows, simultaneously providing passers-by with a taste of what is going on inside the Walker Art Center.

In designing the extension, Herzog & de Meuron was careful to pay homage to the cube-shaped windowless original brown brick building, designed in 1971 by Edward Larrabee Barnes. The architects did not want the new building to overshadow the old one. Rather, they drew inspiration from the original's cube shape, infusing it with a more modern form. The resulting addition gives off an airy, multi-dimensional impression, thanks in part to its aluminium outer layer.



Creative environment for 1,300 students.

### Crystal-clear project

Sapa RC System in Belgium has delivered new windows and façade units for the Lycée Technique university in Esch-sur-Alzette, Luxembourg. The new, four-storey building is 275 metres tall. The glass façade alone measured a total of 6,300 square metres.

Products from the Excellence 75 SI and

Ellegance 52 series were used in the façade. The window modules were series produced and equipped with exterior metal blinds. In order to meet the high static requirements, Sapa constructed a specially designed structural profile that can withstand loads such as weight and wind pressure.

# New technology for automotive order

Overcoming tough competition, Sapa Automotive landed the contract to supply aluminium seat rails for the Renault Espace car model. To handle this major order, Sapa has invested in new equipment and techniques.

**T**he 20-year old Renault Espace auto model is currently undergoing an upgrade prior to a major makeover. Renault's upgrading started in mid-July with a new seat system for the rear seats.

Sapa Automotive has the assignment of delivering fully assembled aluminium profiles to the French unit of Grupo Antolin, which in turn supplies complete seat systems for the Renault Espace.

The contract is anticipated to last approximately four and a half years and the order is worth approximately SEK 500 million.

"This is an enormous challenge and we're obviously proud at having received the order in the face of such tough competition. Our strength lies in the fact that we have all the expertise as well as all the technical and mechanical equipment under one roof," says François Boulin, key account manager at Sapa Automotive.

**SAPA'S TASK IS** to manufacture four long and four short rails for each car. The profiles serve as seat rails for the two rear rows of seats and are part of the floor construction. In order to handle the design of the seats and withstand large forces and great strains, the rails require advanced processing. Several hundred thousand parts will be delivered each year from the Vetlanda plant in Sweden, and in order to achieve that volume,



Fully automated processing line.

production will operate in three shifts.

"In order to handle such a large project, we've divided it into one main project and three smaller projects: production, processing/assembly and anodising," says Peter Husberg, sales and project engineer at Sapa Automotive.

**CONSIDERABLE INVESTMENT WAS** required in preparation for this large order. Sapa's pressing plant in Finspång, Sweden has been equipped with a new thermal ageing oven and a newly built buffer warehouse with FIFO management. The plant in Vetlanda has been remodelled and adapted for a fully automated processing and assembly line. Sapa has invested in large new eccentric presses, robots, CNC machines, and further equipment to meet the customer's product requirements.

In order for the rails to meet design standards, handle seat wear and tear and the harsh environment of a car interior, the profiles must be surface treated. The rails are hard-anodised, which means that the surface layer is built up at lower temperatures and greater voltage and amperage than during normal anodising. The result is a denser surface layer, which is harder and considerably more durable. This method is entirely new for Sapa and required extensive investment in processing equipment.

The production flow concludes with assembly, which is carried out in a robot cell, where the surface-treated rail is complemented with as many as six different accessories. These are assembled automatically onto the rail. With the help of a robot, the completed rail is placed in the packaging for shipment to the customer.

The automotive industry's exacting demands for strength of materials and recovery have also contributed to the development of a stronger aluminium alloy by Sapa Technology, Sapa's research and development unit.



Seat rails on the way to anodising.

As with all large projects, not everything has run smoothly, but thanks to industrious teamwork at Sapa and good collaboration with both the customer and Sapa's suppliers, those problems have been resolved, says Boulin:

"Now we feel confident. The facility has been approved by Renault and Grupo Antolin and all the equipment is operational."

Roland Deleage, purchasing manager at Grupo Antolin in Loire, confirms that everything is working.

"Yes, production is up and running and deliveries to Renault are progressing as planned. We've succeeded in solving the problems that always arise in situations like this, and the necessary adjustments are now complete," he says.

"I'm very satisfied with our collaboration," says Deleage.

TEXT: ELISABET TAPIO NEUWIRTH

PHOTO: KJELL ISRAELSSON



## Durable alloy

Exact demands regarding strength and ductility are placed on materials used in the automotive industry. In addition, recycling must function. Scrapping costs are significantly lower if all of a car's aluminium products can be recovered simultaneously.

In response to customer demand, Sapa Profiler AB, together with Sapa Technology, developed an aluminium alloy that is significantly stronger than previous alloys.

The starting point was an existing alloy containing magnesium and silicon. Certain other substances were avoided in order to make the new alloy easier to recover.

The alloy and the manufacturing processes were modified to meet demands for high strength and ductility, important safety characteristics, for example.

Development efforts took two years, but early in

the process the development group found the right composition for the alloy.

"Initially, it was uncertain whether we would be able to modify the alloy to achieve the appropriate characteristics, but we realised relatively early on that it would be possible," says Kristina Lewin who oversees the new alloy at Sapa Technology.

Work to secure the process was a team effort since it posed greater demands than usual due to such a small spread in the outcome of various characteristics. That means the settings are more sensitive than in earlier productions.

"The unique thing about this product is that we achieved high strength and a small spread at the same time," says plant manager Christer Thorn.

Some investment was required for the new product, including a new thermal aging oven and improved measurement devices.



**Seat rails in the trunk.**

The new alloy was developed especially for the automotive industry and is currently used only by Sapa in Sweden. However, the possibility exists to expand areas of application to other modes of transportation.

TEXT: EWA THIBAUD



# The lightweight skate

Long-distance skating requires skates that are lightweight yet stable. The Swedish company Lundhags, based in the village of Järpen in northern Sweden, has manufactured skates since the mid-1960s and has chosen aluminium as its main material.

According to the Swedish Association for the Promotion of Outdoor Life, Sweden probably has the best areas in the world for skating on naturally formed ice. Thanks to the cold climate, thousands of skaters can take their rucksack, ice prods and ice sticks and set off onto the ice during a skating season that generally lasts from October until April.

There is a high probability that they will be skating on Lundhags skates. The company, which specializes in outdoor equipment, has manufactured long-distance skates since 1994, after acquiring Almgrens, which had manufactured skates since 1964. The cooperation with Sapa dates back to the 1970s.

**HERMAN LUNDELL**, manager and product developer at Lundhags, explains that the exact date is not entirely certain.

"I have found tubes that we ordered in 1973, and they were from Sapa," he says.

Lundell explains that the main frame of the skate is made of aluminium profiles. The actual blade is made of stainless steel. The properties that Lundhags strives for are lightness, since the skater will lift both skates several thousand times during a run, and torsional rigidity, since the skate must have a strong and stiff profile when the skater cuts into the ice and pushes off with his foot.

"Aluminium is used because it is light and inexpensive. It is also easy to shape, and Sapa can extrude advanced profiles that cannot be made in steel," says Lundell.

Lundhags currently sells skates to Finland, the United States, the Netherlands and Norway. The range comprises 11 models, half with a loose heel and half where the heel is fixed.

The collaboration with Sapa has deepened in recent years.

"We used to draw a profile that we would send to Sapa for manufacture. Now, however, we have started using their support and technology."

Lundell sketches the profile and the technicians at Sapa use CAD software to perform various theoretical tests in terms of weight and torsional rigidity. For Terminator, which is the latest skate model, Sapa devised a new solution for fixing the actual blade to the skate.

Patrick Massana, salesman at Sapa, says about the cooperation, "Lundhags has a vision of carving out a niche market, of standing out from the competition in terms of design and development. This means that they maintain very close and frequent contact with us since we have resources in the form of technical service and technicians. Lundhags has an idea of what a skate should look like, but this might not be optimal from a profile production standpoint. In which case, we suggest an alternative profile solution that looks almost identical."

**THE NEW SOLUTION** entails a serrated channel for the blade in place of the straight channel, which required rolling. Consequently, a production stage was eliminated, while structural stability was improved.

"Previously, a force of 300 kilogram was needed to extract the blade. Now, the scale on the meter isn't sufficient as it only goes to 500 kilogram. The result was a superior end product that was cheaper to produce and that had various other functions. We also obtained a groove in the profile that allows you to slot the skates together for carrying," says Lundell.

TEXT: HENRIK EMILSON

## Aluminium à la wood

Ice sticks are used by skaters and anglers to judge the thickness of the ice. For centuries, wooden ice sticks were used. When Lundhags was looking to replace its ice sticks with a stronger, more lightweight variety made of aluminium, Sapa had the solution – Decoral coating.

Decoral is a variant of powder coating that produces patterned surfaces.

"The technique is very simple," explains Patrick Massana, salesman at Sapa. "A computerised pattern is developed that represents wood, rock, marble or a logo-type."

The pattern is then printed onto a film similar to greaseproof paper. The aluminium profile is given a basic coating, and then the film is coated onto the profile through vacuum pressure. The profile is placed in a vacuum kiln where the temperature releases the pigment on the film, which seeps into the coating.

"Since the pigment seeps into the coating, the surface is extremely wear-resistant. The pattern cannot be rubbed off, not even with sandpaper," says Massana.



**A stronger Terminator thanks to a new technical solution.**



# What lies beneath a princess

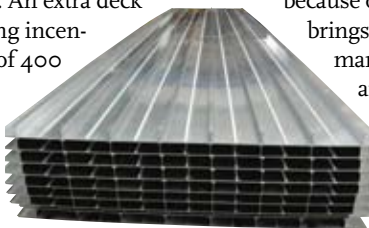
Luxury cruisers are a huge investment for shipping companies. But with aluminium constructions the volume of the vessels increases and thereby the number of passengers.

**PASSENGERS BOARDING THE** 951-foot-long Crown Princess cruise ship for its inaugural Caribbean voyage in May, 2006, will have many reasons to be dazzled. An outdoor movie screen, nine-hole putting course, four swimming pools, a wedding chapel and a vast two-storey spa are among the attractions.

But one of the most innovative features of this latest addition to the 11-vessel Princess Cruises cannot be seen directly by passengers. It consists of the aluminium construction of the top three decks of the ship.

By using extruded aluminium profiles, ship builders can reduce weight and add volume to vessels above the water line. Thanks to an aluminium infrastructure on the top two decks, an entire deck was added to a sister ship of the Crown Princess two years ago. An extra deck equals 260 cabins, an appealing incentive for a ship with a price tag of 400 million euros.

Traditionally ship construction is made of steel – for its strength, durability, reliability, and cost efficiency. But steel is heavier than aluminium, so Fincantieri,



**Deck panels to Crown Princess.**

builder of the Princess ships, has been experimenting with the latter to lighten the overall weight of cruise ships. “We have been using aluminium in construction since the 1960s,” says Alessandro Nevierov, in charge of production methods and new technologies at Fincantieri’s shipyard in Monfalcone, Italy.

But it is only recently, with the advent of Friction Stir Welding, that problems related to the welding process have been resolved, allowing aluminium to replace steel in ship construction.

**FINCANTIERI MONFALCONE IS** a leader in the construction of mega-cruisers. It eagerly invites new design solutions within a framework of strategic partnerships. Such a partnership has been developed with Sapa Mass Transportation

because of the advantages aluminium brings to the party at sea. “The managers of Princess Cruises are interested in safety and durability,” notes Nevierov.

“Each ship is a huge investment so they want to spend wisely. Aluminium is one way to do so.”

## Advantages of FSW

Friction Stir Welding (FSW) is used by Fincantieri for several compelling reasons, according to Alessandro Nevierov:

- FSW reduces thermal deformation, meaning there are only minor thermal stresses in the aluminium as the result of welding. So surfaces that are supposed to be flat remain flat and joints are, in principle, flush with the surface.
- Joints are stronger than with traditional (MIG) welding.
- Joints are more impermeable, which is vital in an ocean environment.
- Joints allow closer dimensional tolerances in the structure geometry.
- FSW is more economical.

Proof of the cruising company’s confidence: a third sister, the Emerald Princess, is planned for launch in April, 2007, and aluminium will again play a supportive role.

TEXT: CLAUDIA B. FLISI

# Sapa's founders awarded

They founded Sapa in 1963. More than 40 years later, Nils Bouveng and Lars Bergenhem have been awarded the Swedish Aluminium Association's honorary prize for their achievements.

**THE SWEDISH ALUMINIUM** Association arranges an annual trade fair for the aluminium industry. Nils Bouveng and Lars Bergenhem extruded their first aluminium profile back in 1963, but they had no idea that they would one day receive the aluminium industry's honorary prize.

"It came as a very pleasant surprise. Naturally, I take an interest in Sapa's progress but otherwise I no longer follow developments in the industry. We both retired many years ago," says Bergenhem.

Bouveng says: "When I visit Sapa, I always feel welcome. My visits are not all that frequent these days, but I'm planning soon to help sort through old photos in the archive."

## What is the secret of Sapa's success?

"Obviously a good business concept, but equally important is the ability to put everything into figures. Liquidity is essential. The optimal scenario is to have a job where you both make money and have fun. We succeeded in this respect," says Bouveng.



**Nils Bouveng (left) and Lars Bergenhem (right) received the honorary prize from Lars-Åke Lagrell, President of the Swedish Football Association.**

Excerpt from the jury's reasoning: "Together, Nils Bouveng and Lars Bergenhem have contributed to creating a renowned and successful Swedish aluminium environment. Their successful career is based on technical know-how, entrepreneurship and long-term, modern business thinking.

They have steered and headed develop-

ments and have been pioneering in several areas.

Selling added value and being involved in customers' development work was a recipe for success formulated at an early stage by both prize-winners and that still holds true and is equally important for the company today."

TEXT: DAG ENANDER

## Profile School/Radii within the cross section

The previous issue of *Shape* gave examples of the advantages of rounded profile shapes. Here are some further reasons for designing profiles with generous radii.

There are functional reasons for adding radii. A profile or component with rounded shapes is always aesthetically pleasing. It is also more pleasant to grasp. Rounded internal corners considerably facilitate cleaning in kitchens, shower cabins and other areas with high hygiene requirements.

In electrostatic coating, the electromagnetic field is focused on sharp corners and a larger number of coating particles collect

there. Consequently, profiles with generous radii obtain a more even coating layer. Large radii are also an advantage in profiles that are to be surfaced with Decoral or veneer.

A large radius is often desirable from the perspective of strength. To avoid notch effects in designs subject to dynamic stress, soft forms are important. Angled shapes are often



Fig. 1

strengthened considerably by a large inner radius, which helps keep angle tolerances tight, particularly in thin-walled profiles (fig. 1).



Fig. 2

Inner radii can, however, impede the assembly of other components. To cope with both functional requirements and the need for soft forms, corners can be shaped as in fig. 2.

Consequently, the general recommendation is to always include radii in corners and changes in thickness – the larger the radii, the better.

AND FINALLY...



PHOTO: HANS COUCKUYT

# High-flying plans

Model aircraft enthusiasts are investing in aluminium for better durability – and a more true-to-life appearance.

**IS IT A BIRD? IS IT A PLANE...?** No, it's a model helicopter whirring in the air and making a perfect landing. While model planes are a dream to fly for enthusiasts worldwide, there isn't much to it when it comes to building model helicopters. They often come complete with a ready-made chassis, engine and controls.

"All you have to do is assemble the frame," says Hans Couckuyt at Sapa RC System in Belgium. "And most of the parts are made of plastic as this is cheaper."

The real enthusiasts who are unwilling to content themselves with plastic parts create their own. Couckuyt explains that those who

compete with model helicopters and who like advanced freestyle flights often replace the plastic with aluminium that can withstand the more powerful engines. Otherwise, the plastic on the rotor would break under the high pressure of the engine. Replacing plastic with steel would be too heavy and titanium too expensive.

Aluminium is reasonably priced, strong and sufficiently light. In addition, many find it attractive.

"It has a shiny quality, just like the parts on a real helicopter."

TEXT: HENRIK EMILSON