

A magazine from the Sapa Group #T2005

Shape

**FURNITURE TAKES SHAPE
IN NEW MATERIAL**

**SÖRENSTAM PUTS IN A WORD
FOR BETTER PUTTING**

Full speed ahead!

**BOOMING INDIAN
AUTOMOTIVE INDUSTRY**

**ENERGETIC EFFORTS IN CHINA TO
MEET INCREASED ENERGY NEEDS**

**SAPA INVESTS IN
CUTTING-EDGE EXPERTISE**

sapa:

A bright future with new investments

To date, the current year has been an eventful one for Sapa. For several years, Elkem ASA of Norway has been the principal owner in Sapa AB. In February, the majority shareholding in Elkem was acquired by Orkla ASA of Norway, with the result that Orkla also tendered an offer for the shares outstanding in Sapa AB. Consequently, Sapa became a wholly owned subsidiary of Orkla and its shares were de-listed from the Stockholm Stock Exchange.

However, this will not affect our customers or employees. We will continue to nurture our brand and to ensure that you, our customers, continue to feel confidence in our business relations. During the company's 42-year history, ownership has shifted but has never acted as an impediment to the further development of the company. I am convinced that we will see Sapa develop favourably. For customers such as yourself, this continued development provides a strong partner when you are seeking solutions based on profiles and heat-exchanger strip made from aluminium.

In both areas, we are making new investments to strengthen our position in the market and to provide you with the advantages you seek in a supplier. Among other things, we are extending Sapa Heat Transfer's production facility in Shanghai, installing an additional press in Poland and building a facility for vertical anodising in Sweden. We are also making additional investments in refinement in Poland and establishing new plants in Lithuania and China.

We are also making efforts internally to continuously improve, so that you will truly feel that you receive the service you expect, while we are able to offer competitive solutions and conditions. I feel secure about Sapa's future. We have knowledgeable and creative employees who are pleased to accept challenges and we have the resources. The success will continue.

Our goal is for Sapa to be the natural first choice when purchasing profiles, components, building systems or heat-exchanger materials of aluminium.



Kåre Wetterberg

Kåre Wetterberg,
President and CEO



Unusual shapes

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Smooth façades

A number of the buildings at Hull College exemplify Sapa RC System's solutions for interior walls, windows and doors. The newly-constructed faculty for media and the performing arts is one of them.

The façade of the main building comprises a curved glass wall from the ground to the roof, giving a light and airy indoor environment.

Sapa collaborated closely with the architects behind the project to design and extrude a new décor-profile for the entire interior wall.

The windows are made from Confort 50 components – a double-glazing system that allows for large ventilation windows. The system also includes a cladding mount, allowing the sides and rear of the building to be clad with panels to achieve a harmonious overall impression.

For the entrances, doors were chosen of the type used in shops for their ability to cope with large amounts of traffic, while being easy to handle and maintain.



Large glass walls provide an airy interior.

Sapa expands in the United States

Parsons City, Kansas – this is the address of Sapa's new extrusion plant in the United States.

Sapa Inc operated the extrusion plant under a leasing agreement from the summer of 2004, but this spring, the plant was acquired for SEK 10 million.

"By operating the extrusion plant during the autumn, Sapa Inc gained valuable experience of the press and local market knowledge. The

investment is an important step in maintaining and increasing Sapa's market share in the United States," says Robin Greenslade, who is responsible for US operations at Group level.

In recent years, Sapa has enjoyed a favourable trend in the United States, following the initial establishment in Portland, Oregon, in 2000. Today, Sapa holds a sizeable market share in aluminium profiles in the north-western United States.

Lightness – a weighty issue for the army

For US transport manufacturer Silver Eagle Manufacturing Company, weight is crucial. In 2004, when the company won a five-year contract to supply light trailers to TACOM (US Army Tank-Automotive and Armaments Command), it chose to use aluminium profiles from Sapa.

"As for all other players in the transport industry,

reduced weight is a characteristic that is growing in importance. This is why aluminium is used," explains Patrik Andersson, market manager at Sapa Inc.

TACOM has ordered up to 12,800 trailers that are specially designed to suit a particular kind of sturdy army vehicle called the HMMWV or "Humvee."

"Our assignment isn't that large but our local presence has contributed competitive advantages that can hopefully increase our customer share," says Andersson.

The Silver Eagle Manufacturing Company has been in the business for more than 65 years. The company also produces heavier trailers for the truck industry. Its customers include companies such as UPS and FedEx.



Trailers adapted for the army.

New in aluminium



Attainable goals. Scansis of Norway manufactures soccer goals and pitch-surround frames from Sapa profiles. In March, Scansis secured a contract for 20 complete sports facilities for the Moldavian soccer association – sponsored by UEFA.



Beneficial jets. Hydro-massage is considered beneficial for both body and soul – not least in preventing stress. This is the business concept of Pool-spa in Poland, which has launched a series of wall-mounted shower panels in aluminium with built-in massage functions.



No mess. A new series of napkin dispensers from SCA combines modern design with smart functions, making them easy to refill. The dispensers are available in three different sizes and are intended to be placed in restaurants, cafés, ice cream bars and so forth.

sapa
Shaping the future

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. Shape is the Sapa Group's customer magazine.

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Exciting angles in the corridors of the Casa de Música.



Elegant aluminium entrance.

A building with a view

In April, architect Rem Koolhaas of the Netherlands and the Office for Metropolitan Architecture (OMA) architectural agency unveiled their latest masterpiece – the Casa de Música concert hall in Porto, Portugal. The Casa de Música is the result of a competition announced by the country's minister for culture during Porto's year as the European Cultural Capital in 2001.

The concert hall, which is situated in the oldest part of Porto, can be described as a shoebox-shaped building in a self-supporting outer concrete shell. Rem Koolhaas wanted to erase the borders between the interior of the concert hall and its surroundings. For example, he used corrugated glass facing to distort the view. The purpose was to alter the idea that everybody knows what cultural institutions look like from the outside while few know what they look like on the inside.

For the assignment, OMA developed new materials and new uses of typical Portuguese materials. The building has an entrance staircase of aluminium, tiled terraces, corrugated glass facing and specially mixed concrete for its façade.

Sapa puts best foot forward in Hanover

More than 6,000 exhibitors from 65 countries participated in this spring's Hanover trade fair, which is one of the largest events on the industrial calendar. This year, the focus was on the automotive industry. Sapa was on-site with a stand shared by its Automotive and TeleCom business segments, as well as its German and Polish companies.

"We were able to show Sapa's full breadth. The units co-operated to promote our philosophy of conducting sales and marketing across borders,"

says Lars-Inge Arwidson, head of the TeleCom business segment.

Lothar Kanowski from Sapa Vertrieb in Germany was the project manager for the event and was pleased with the results.

"We conducted useful discussions with existing customers and made many new contacts with potential ones. We received confirmation that Sapa is seen as a potential supplier for the various areas of industry represented," he says.

School windows get top grades

Break-in attempts are unfortunately part of everyday life for schools. Sapa Building Systems in the United Kingdom recently conducted a safety test of its sliding Dualframe window system. The purpose of the tests was to demonstrate to school personnel and head teachers how well the window systems meet the requirements the schools place on security against break-ins. The model tested proved able to resist repeated attacks of different kinds.

Many advantages with Ligna

A new insulated aluminium system for windows and doors has been launched on the market. The system, called Ligna, is produced by Sapa RC System and offers several favourable characteristics: specially designed seals, pressure-equalising chambers and drainage to protect against all kinds of weather. The system reduces energy costs through its sealing insulation and ability to cope with all weather conditions. Ligna has a construction depth of 89 mm, a façade depth of 77 mm and holds sealed glazing units with a total thickness of 20 to 28 mm.

Pedigree one-year-old

In January this year, Sapa RC Profiles in Belgium celebrated its first birthday – but, in reality, this one-year-old is much older.

The company's history stretches back to 1949 when Remi Claeys Aluminium (RCA) was founded in Lichtervelde. In July 2003, RCA became part of the Sapa Group, and was at that time Sapa's largest acquisition to date.

There were many reasons for the acquisition – the geographic location of the company in north-western Europe, its market position, its modern production apparatus and its specialised product range (large profiles, building systems and welded aluminium tubing).

Sapa RC Profiles produces 36,000 tonnes annually and exports products to 19 countries. In 2004, sales volumes rose by 6 per cent.

Sweet music for the ear

Getting music to sound right in cars is not always the easiest task. In old models, it was quite easy to install a larger radio if you were in the slightest technically skilled. However, in modern cars, this is more difficult, since most technology is hidden behind panels and integrated into the car's systems.

Procar Audio of Germany seized upon this, developing the i-sotec brand of products that improve the quality of sound from existing systems in a simple manner without complicated modifications to the vehicle.

Products include the i-soamp car-radio amplifier, which is a "plug-and-play" device. Thanks to various adaptors, the amplifier can be used in more than 550 car models with built-in or removable radios.

Having previously purchased aluminium products in Asia, Procar Audio became a Sapa customer in

the summer of 2004. In just five weeks, an initial version of the amplifier with a black aluminium casing was developed.

"We chose to work with Sapa because it is competitive," says Daniel Wälker, sales manager at Procar Audio.



Improved in-car sound.

Long-term co-operation

For nearly 100 years Leupold & Stevens of the United States has manufactured optical equipment, including binoculars and telescopic gun sights. Its products are used for bird-watching, hunting, shooting and for military purposes.

The company has also co-operated with Sapa for a number of years, and that co-operation has grown with time.

"It is not the profile that is at the core of our customer relationship, but rather our ability to surface-treat the gun sights. A company in California produces the aluminium parts, which are then processed by Leupold & Stevens. The entire process saves man-hours and metal for the customer," explains Patrik Andersson, market manager at Sapa Inc.



Gun sights in focus.

Non-clogging gutters

Seamless Aluminium, which produces rainwater systems of aluminium, has developed a new gutter that allows water to flow unhindered. The innovative design of the gutter and its patented protection against leaves, snow and ice (Slip) prevents it from becoming clogged with waste.

"This is a new and unique system, which can handle as much as 50 mm of rainfall per hour," says Peter Kavanagh, administrative manager at Seamless Aluminium.

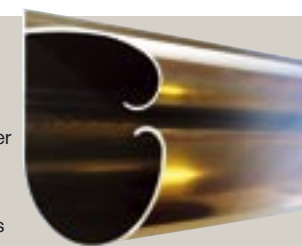
The upper part of the system consists of a curved protective cover. Water runs over this curved surface and down through a slit into the lower part and the gutter channel. The gap between the upper and lower parts of the system is so narrow that leaves and other waste are un-

able to enter, while rainwater is able to flow freely.

The various parts of the gutter are manufactured from extruded aluminium profiles in order to be able to withstand all types of weather, including heavy snowfalls.

"We use aluminium because the material is durable and lightweight," says Kavanagh, who adds that this type of gutter is no more expensive than the traditional kind.

By replacing ordinary gutters with the Slip system, there is no need for the risky process of cleaning out gutters along the eaves of houses.



A buoyant material

French marine vessel manufacturer Ocea has developed a type of floating pontoon made from aluminium – a material that offers great advantages in marine environments.

Ocea chose aluminium for its pontoon design because of the material's high resistance to corrosion. Weighing less than, for example, galvanised steel, which is often used in this area, aluminium is consequently cheaper to handle and transport.

Ocea turned to Sapa for parts including the bridge spans between the floating units. Sapa contributed expertise in the development and design of the profiles.

"Sapa has done everything required to be both a supplier and a committed partner in the development of our pontoons," says Xavier Aubert, Ocea Transport's business unit manager for marine projects.



Pontoons from Ocea.

It's fixed

In collaboration with Kingspan, Sapa Building Systems in the United Kingdom has developed a new cladding fastener for Kingspan's panels and Sapa's Dualframe system for windows and doors. Thanks to this cladding fastener, it is no longer necessary to order un-tested solutions for joining windows and wall panels. The connection components meet demands for warmth and air-flow sealing in accordance with construction standards and resolve the problems that usually arise in the interface between adjacent parts of a building.

Internet tip: alumatter.info

Alumatter is a new interactive website containing scientific and technical information intended to be used for training purposes.

Sapa's strategic business segments enable it to cooperate more effectively with customers in key industries. The newcomer in the group is TeleCom, which was launched in April. Percy Ekström, head of the business segments, describes future plans and challenges.

In 2002, Sapa Mass Transportation and Sapa Automotive became the Group's first strategic business segments, functioning as sales organisations focusing, respectively, on the railway and shipping industries and the automotive industry. The Group's expertise was assembled in Automotive and Mass Transportation, leading to more efficient cooperation with customer segments.

Since then, an additional business segment has been created – the recently launched Sapa

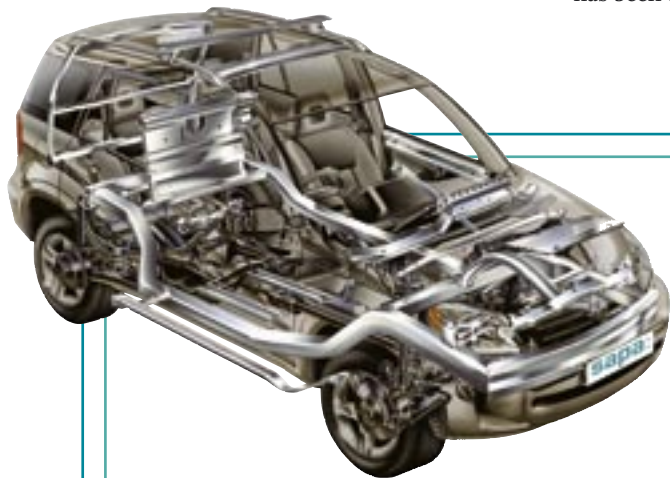
TeleCom. During last year, Percy Ekström, former head of Automotive, took up his duties as the new head of the strategic business segments. He regards the business segments as a way for Sapa to approach a global market that is difficult to handle via the local sales organisations.

"Major international customers demand special resources from us. Our business segments enable us to be present for our customers throughout the world, which is a great advantage," says Ekström.

Sapa Automotive's customers currently include a number of the major vehicle producers and their subcontractors, while Sapa Mass Transportation has major international customers in the railway and shipping industries.

"All of these customers have rigorous quality and logistical requirements," continues Ekström. "It is considerably more efficient to gather our expertise into segments, so that we can work with our customers worldwide. It is also a way for us to expand markets and create growth."

TeleCom was previously a product area in Sapa Profiles' Swedish organisation, but became, as of April 1, 2005, a separate strategic business segment with prioritised markets in Europe, China and the United States. >>



Sapa Automotive

- The Sapa Automotive strategic business segment was established in 2002.
- The segment comprises many of the major vehicle producers and their subcontractors, including GM, Ford, Volkswagen, Renault, Scania, Volvo Trucks, Antolin, Delphi and Autoliv.

Percy Ekström in brief

Age: 42.

Home: House in Vetlanda.

Family: Wife Åsa, children Jonatan, 15, Pontus, 13, and Cajsa, 9.

Background: After completing my engineering degree, I began as a trainee at Sapa in 1984. Since then I have held various positions within Sapa.

Leisure interests: Fly-fishing, golf, training a boys' handball team in which one of my sons plays, and enjoying the company of family and friends.

Most recently read books: Toyota Production System by Taiichi Ohno, and Digital Fortress by Dan Brown.

Most recently seen film: Shrek 2.

A moment I remember at Sapa: Our first large order for fuel distribution lines for Volvo in 1992, which can be regarded as the start of our focus on the automotive industry.

Future plans: To work for increased growth, profitability and success for our business segments. And to further strengthen our cooperation with all of the companies within Sapa. Another item on the agenda is to examine the possibilities for potential new business segments.



“There is a tremendous depth of expertise in the Sapa companies. It is important that we exploit this resource to create added value for customers.”



Sapa TeleCom

- The TeleCom business segment was formed on April 1, 2005.
- The segment is responsible for the Sapa Group's sales in the telecom and datacom industries.
- Sapa TeleCom's largest customer is Ericsson. Other customers include Nortel, Flextronics and Sanmina-SCI.

» “The telecom and datacom markets are becoming increasingly international, and we note that the growth potential is greatest in countries outside Scandinavia. The business segment will enable us to expand in a market that is highly significant for us. We plan to reshape the organisation to make it more international.”

TODAY, THE THREE STRATEGIC business areas have combined sales of approximately SEK 1.1 billion. The largest is Automotive, which accounts for more than 50 percent of total sales.

“Automotive has grown impressively over the years, and Mass Transportation is also growing steadily,” continues Ekström. “By establishing TeleCom as a business segment, we hope to increase both growth and

profitability, particularly in new markets.”

According to Ekström, the aim is for the business segments to achieve annual growth of about 15 percent – a growth rate that they have essentially maintained to date.

“The outlook is excellent for the business segments. A clear sign of this is that we are now growing in markets outside Scandinavia, which is highly significant,” says Ekström.

However, Sapa's strategic business segments also face major challenges – there is tough competition for large international customers.

“There is a tremendous depth of expertise in the Sapa companies. It is important that we exploit this resource to create added value for customers. The competition is fierce, but Sapa's breadth and collective competence give us a major advantage.

Ekström believes that Sapa's main competitive weapon is indeed the Group's competence and versatility. The task of the business segments is to transfer this competence to the market in order to strengthen Sapa's position.

“We must be able to demonstrate to customers that we can offer higher value than our competitors or competing materials can offer,” emphasises Ekström. “We must also work in close partnership with our customers and offer technical support and development, and I believe we are succeeding in this regard.

“As proof that this is so, we have a large number of new projects. We learn from all our new projects, which provides further evidence of our competence to customers. By offering advanced technology, such as hydroforming and friction stir welding, we show that Sapa also possesses a high level of technical expertise.”

Ekström has clear visions for the strategic business segments, which he believes have excellent prospects of growing at a faster rate than the market.

“Our aim is to grow while maintaining a high and stable level of profitability. Success in this regard requires inspiring leaders – and they are not in short supply at Sapa: people with real enthusiasm for their work. I am convinced that we will successfully meet the challenges facing us,” concludes Ekström.

PHOTOS: MAGNUS GLANS, SAPA AND BOMBARDIER



Sapa Mass Transportation

- The Mass Transportation business segment is one of Europe's leading suppliers to the railway and shipping industries in Europe.
- Major customers include Alstom, Bombardier, Siemens, Fincanteri and Åker Finnyards.

Safer cars for the London Underground

Bombardier Transportation has been contracted to supply 376 new cars for service on the London Underground's Victoria Line. Each car is fitted with six aluminium profiles that together form its side panels.

London's venerable underground railway system is scheduled to undergo an extensive modernisation programme that will take a number of years to complete. Multinational company Bombardier Transportation, which is among the world's leading producers of rail equipment, has secured a major order in conjunction with the project, comprising delivery of new underground cars and a 30-year maintenance contract for the equipment delivered.

"We will be delivering 376 cars for the London underground's Victoria Line and assuming responsibility for the vehicles in their entirety, including reliable operation," says Andy Smith, head of Strategic Sourcing at Bombardier Transportation in Derby, in the United Kingdom.

DELIVERIES WILL BEGIN this year with 16 cars, which will undergo an extended period of testing before the total order is executed in two years.



New underground railway cars will soon be in service on the Victoria Line in London.

Safe, cost-efficient and reliable operation is a high priority in the requirement specification from the customer.

"It is one of the largest orders we have ever received and will be a major challenge, with tough targets to meet," says Smith.

He explains that the new cars that Bombardier has developed have a standardised form but contain many new design features and advanced structural engineering. For the sides of the cars, ready-to-mount panels comprising aluminium profiles from Sapa were chosen.

"We began cooperating with Sapa in December 2003 on a project for ordinary commuter trains," says Smith. "In that project, the profiles were used only for the lower part of the sides of the cars. This will be the first time we have used them for the entire side panel of the cars' bodywork."

This means that six aluminium profiles have to be joined together to form the sides of the underground cars. Sapa is responsible for the joining process, which is performed using a welding technique known as Friction Stir Welding (FSW). This capability was a key factor in Bombardier's choice of supplier.

"Previously we used aluminium bodywork assembled using conventional Metal Inert Gas (MIG) welding," says Smith. "FSW is a more technically advanced welding technique that results in a stronger and more stable product, with excellent performance in terms of withstanding a crash situation, for example."

Tolga Egrilmez, Sapa Mass Transportation's sales manager in the United

Friction Stir Welding (FSW)

The FSW welding technique makes use of the fact that at high temperatures the metal can tolerate substantial plastic deformation. Neither additives nor protective gas are used. The clean metal surfaces of the profiles to be joined are brought together under high pressure at the same time as frictional heat is generated through the mechanical effect of a rotating tool. A new homogeneous structure is formed by the combined effects of pressure and heat.

Kingdom, has long experience of the FSW technique. One of its advantages is that it does not require such high welding temperatures, which reduces deformation of the material and gives a smoother, more attractive finish.

"THE COMBINATION OF FSW and the fact that we deliver a finished component with all the necessary processing completed make it simpler and quicker to construct the entire car body," adds Sven Lundin, sales manager for Sapa Mass Transportation.

The order for the London underground is huge even by Sapa's standards and involves a number of units within the company – particularly R&D, which has worked closely with Bombardier's technical department.

"Among other modifications, we optimised the customer's structural drawings to reduce the weight of the product," says Egrilmez.

He notes that deliveries for the first test series have begun according to plan, and sees excellent prospects for future orders as the modernisation of London's entire underground railway system proceeds over the next 15 years.

PHOTO: BOMBARDIER

Dam construction for full power

China's energy requirements are expected to double in the next 20 years – and the build-out of the power network is fully under way. ABB has now started its third project with power connections for the world's largest hydroelectric power plant. Sapa is one of the partners and is supplying processed aluminium profiles for the project.

The Chinese economy is growing enormously and this development is placing considerable demands on the country's energy supply. The build-out of China's power stations and networks will be intensive in the next few years. To fulfill the energy supply, an expansion of not less than 20,000 megawatts per year will be required, which corresponds to Sweden's entire annual consumption.

The Three Gorges hydroelectric power plant in central China is part of the country's plan for the future. The plant is the largest of its kind in the world.

Electricity from the power station will be carried using high-voltage direct current (HVDC) to China's industrialized and energy-demanding coastal areas. Since it is more efficient to transport direct current over long distances – the energy loss is lower – alternating current is converted to direct current and then back to alternating current. The conversion is made in converter stations at either end of each power line.

In accordance with China's expansion plan, more than ten new power connections will be installed in the next 10-15 years.

ABB Power Technologies has already supplied power links for two projects in China, which are both in operation today. ABB secured its first order in 1999, which was for power transfer from the dam at the Three



Sapa supplies processed aluminium profiles for the hydroelectric plant's thyristor valves.

Gorges to Changzhou in eastern China. The second order, in 2001, was for transfer from the dam to Guangdong in the south.

ABB has now initiated work on another two converter stations, this time on the 960-kilometer stretch between the Three Gorges and Shanghai. The power link is expected to be placed in operation in 2007.

"We are supplying materials for the power link, which China's national power company will then assemble under our guidance. The three projects each correspond to 3,000 megawatts. A normal year for us involves 2,000 meg-



The Three Gorges in China is the world's largest hydroelectric power plant. It will provide 4 percent of China's energy supplies.

awatts, so these are extremely large projects," says Toivo Lindmark, Key Supplier Senior Manager at ABB Power Technologies HVDC.

THE CONVERSION OF current is conducted in 20-meter tall, 20-tonne thyristor valves that are freely suspended in enormous valve halls. The two current converter stations comprise a total of 24 thyristor valves.

"In our applications, aluminium is the most important material. Since the valves hang from the ceiling in the halls, it is important to minimise the weight," says Lindmark.

ABB has cooperated with Sapa on all three projects. In the most recent one, Sapa supplied more than 140 tons of processed aluminium profiles, mainly for the thyristor valves' nearly 5,000 liquid coolers.

Lindmark says that product development for the project has been conducted continuously in cooperation with Sapa.

"Sapa's role in the project is incredibly important. We have had positive cooperation for several years and Sapa has been actively involved in the development of the coolers," says Lindmark.

The project places high demands on Sapa. Such factors as quality, measurement precision, surface treatment and durability are all important, according to Rolf Pettersson, salesman at Sapa.

"Many details on the items we supply require a high level of expertise. We have a joint project group with ABB, which works continuously with product development. Sapa's customers do not only purchase aluminium profiles, they also purchase our expertise," he says.

PHOTOS: ABB AND REUTERS/CHINA PHOTO

China's energy

China's GDP is growing by as much as 10 percent annually and is now the world's fourth largest economy. Compared with 2000, the economy is expected to increase four-fold by 2020.

The rapid economic development is also affecting the country's energy supplies.

The Chinese authorities estimate that energy consumption will increase from 1,890 TWh in 2003 to 4,500 TWh in 2020.

Industry currently accounts for 70 percent of China's energy consumption.

Electricity consumption per inhabitant in China was 939 kWh in 2003. The corresponding figure in the US was 12,878 kWh.

When the Three Gorges hydroelectric power plant is in full operation in 2009, it will supply about 4 percent of China's total energy requirement.



"Jives" clothes hanger by Pia Skoglund.



Long-distance skates for Lundhags.

A sharp-edged profile

Aluminium is still an unexplored material when it comes to furniture. Sapa is about to change this and is investing in design projects in Scandinavia and the United Kingdom.

Close collaboration with designers, sponsors and, in particular, inspirational exhibitions and trade fairs are the essential ingredients for creating interest in aluminium profiles within furniture design.

"Good examples of design will bring many designers into the public eye," says Olle Lundberg, who runs a design agency in Stockholm and has worked with Sapa and aluminium as a material for more than ten years.

The Sting chair designed by furniture manufacturer Blå Station is a good example. The chair was launched a few years ago and consists of two aluminium profiles, with one profile forming the seat of the chair and the other forming the backrest.

"Many designers like the feel of aluminium," says Lundberg. He predicts:

"If you choose aluminium as a strategic material, you are inspired to work with the distinctive appearance of aluminium. I don't think this will disappear. On the contrary, I think it will increase."

Sting was one of several inspiring examples featured in the launch of "Beyond the Profile." Ruth Hasselgren is project manager and marketing coordinator for Sapa Profiles in Sweden, Finland and the Baltic States. She explains how Sapa has endeavoured for several years to meet designers and encourage them to use aluminium in their designs.

Students at design schools often receive extensive training focused on steel and wood. By contrast, knowledge about aluminium among students and design graduates is relatively low. Ruth Hasselgren and her colleague Tor Zetterström conducted a questionnaire survey to investigate the situation. So what conclusions did the survey reach?

"Well, knowledge about aluminium profiles was fairly poor. But it seems that people are interested in learning more. The survey respondents expressed an interest in attending workshops arranged by us," says Hasselgren.

Workshops form part of the drive in Scandinavia, with two already planned to take place later this year. Frequent meetings with >>



"Eolin" electric violin.

designers are also an important ingredient in creating an information flow. One of the first meetings took place at the Stockholm Furniture Fair in February.

"We wanted to meet designers in an appropriate setting they were planning to visit anyway," says Hasselgren.

On the stand, images of various designs in aluminium were displayed, such as an electric violin, a stove-top, a loudspeaker for a home cinema system, ice-skates and jewellery. For many visitors to the stand, it came as a revelation when they saw the designs on display.

"There is no doubt that we drew a positive response," says Zetterström. He explains that, as the name suggests, the Beyond the Profile concept goes much deeper than just the physical profile.

"It involves every aspect of the profile and the benefits that it can bring. That instead of being just a small piece of aluminium that

fits somewhere in an item of furniture, it can also be visible and an important part of the design," he says.

THE FOCUS ON FURNITURE design also extends beyond Scandinavia's borders. In the United Kingdom, Sapa has been collaborating with Furniture Works, a project led by London Metropolitan University and aimed at drawing attention to, developing and improving the design and production of quality furniture by London designers. The results of this design collaboration were exhibited at the Furniture Show in Birmingham at the beginning of the year.

Exhibits included the Isos Collection, on which Sapa worked together with Jasper Startup and the designer duo Paul Brady and Thomas Modeen, who operate under the name of Small Architecture.

The contributions demonstrate the almost

infinite breadth of the material. From the more avant-garde to simple, straightforward designs such as Startup's "Troy" CD rack.

"Troy functions in the same way as most CD storage products, but is more flexible in that it can be stacked or attached to the wall," says Startup.

The shelf is made of aluminium profiles and stainless steel. So how did Jasper choose the materials?

"The materials chose themselves," he says, pointing out that combining stainless steel and aluminium will prevent oxidation.

The Small Architecture duo chose to work with aluminium and glass for their part of the Isos Collection. They designed a chair and a shelf that they named Float Chair and Float Store.

Both the chair and the shelf are made of chemically strengthened glass, with aluminium profiles glued to the glass.



The Sting chair.

Modeen explains the thinking behind the shelf.

"Although the profile's curves and bends may appear random, they are in actual fact carefully proportioned to fit CDs, DVDs and paperback books, and shoes on the lower shelves."

The chair also fulfils other functions, or rather can be used in two different ways.

"It can be used as a normal chair at the dinner table. However, if you turn it upside down, it acts as a rocking chair. The S-shape works in both directions," he says.

For colleagues Brady and Modeen, this was the first time they had worked with aluminium in a design context.

"It was fun playing around with the different profiles when we designed the chair and the shelf. And it was interesting to see how the surfaces were affected when we produced various anodised and brushed versions."

Furniture Works, including Small Architecture, had another exhibition in London in May. These encounters between designers and innovative designs can influence and inspire the choice of materials, which is the very idea behind the Scandinavian "Beyond the Profile" venture. We may be seeing the start of a new trend.

"Why not?" says Modeen. "The lightness and strength of aluminium are obviously a positive quality. Since aluminium is still a somewhat unexplored material in a furniture context, there is enormous potential to develop and play with the material. Working with aluminium inspired us and, following our experience with Float Chair and Float Store, we intend to continue to explore its potential."

PHOTOS: PEKKA STÅLNACKE

Three winning ideas

Last autumn, the winners of the Aluminium Design 2004 competition were announced. The contest was arranged by the Swedish Aluminium Association and the Aluminiumrikt cluster. Here we present some of the winning innovations.

Lightweight wheeled walker

While working in the domestic care sector, design students Johan Kuikka and Stefan Kindberg came up with the idea of developing a new type of walking frame with improved functions and a more modern design.

They saw the needs encountered by young disabled people and designed a walking aid that was both sturdy and easy to steer.

"The entire frame is made of aluminium. Aluminium is lightweight, mouldable and easy for the user to manage. It is also a modern material," says Kuikka.

The wheeled walker was awarded first prize in the Aluminium Design 2004 contest. The prize was the manufacture of a prototype. Work on the prototype is currently under way in collaboration with Sapa.



Fantastic fiddle

As an industrial design student with an interest in music, Hägg knew immediately what to do when he received an assignment to design something within electronics.

"I play the violin myself and I have both an electric violin and an electric guitar at home, so I am familiar with this type of instrument," says Johan Hägg, a fourth-year student at Lund Institute of Technology.

The result was Eolin, an electric violin where the main structures are made of alu-

minium. The idea was to create a modern version of a classical violin with stylised lines (see page 13).

"Electric violins differ significantly from classical violins, both in appearance and tone. I wanted to create a thin design that gave a feeling of lightness. Lightweight instruments are also important from an ergonomic viewpoint."

Hägg was able to use a thin profile without compromising strength.



Stairs on a reel

Architect Morten Johannessen has been designing houses for 30 years. He developed the "Spareway" compact, extendable stairs as a solution to the problems associated with staircases in small houses. Many staircases today are heavy, expensive, difficult to assemble and take up a long of space.

"Spareway is bought and delivered in reels. It is easy to unroll and attach. Thanks to the aluminium material, it is also portable and easy to transport to your workplace," says Johannessen.

Spareway includes a side rail made of flexible aluminium. The stairs are attached to the rail and to each other's inner edges after the reel has been fully extended.



Float Chair from the Isos Collection.



Currently, all long-length anodising is still performed in Vetlanda.

Anodising

Anodising transforms a metal's surface layer into oxide through electrolysis.

In Sapa's production, different baths are used to give the aluminium profiles a durable outer surface. The treatment begins with an alkaline degreasing bath. This is followed by pickling, which involves dipping the profiles in soda to open the pores in the material. After a series of rinsing processes, the actual anodising is performed: the oxide layer is created in a sulphuric acid bath through which direct current is passed. Then follows several rinses with water before the process concludes with sealing. The pores close up when the profile is placed in water at a temperature of 96°C.

The result is a brighter, smoother, more durable surface with increased corrosion protection.

Smart special facility surface-treats entire mast

Sapa Profiles in Finspång has solved the problem of jointless sailboat masts. A new anodising plant for aluminium profiles up to 20 metres in length will be inaugurated in the autumn.

EXTRUDING ALUMINIUM PROFILES to specific lengths is no problem with today's advanced pressing tools. Rather, the limitation lies in the subsequent surface treatment required so that sailboat masts, for example, are better able to withstand the heavy wear and tear caused by wind and weather.

The anodising process creates a thin oxide layer that hardens the surface and makes it

more weather-resistant than the underlying material.

"Up to now, we have had anodising baths barely 13 metres long, but now we are installing baths that will be 21.5 metres in length," says Mats Thörn, project manager for the new facility in Finspång.

This means that sailboat masts up to 20 metres in length will no longer need to be constructed in sections.

The application area naturally extends to other types of products. Tall television and radio masts, for example, are currently built up from a number of sections. If long-length anodising were used, fewer joints would be needed.

PREPARATIONS FOR THE NEW production in Finspång are proceeding at full speed. A new, longer ageing oven has been installed and put into operation. A new traverse system has



been installed in the roof of the plant to transport the long, heavy profiles from the press to further processing.

"There are very few companies in Europe capable of anodising profiles up to 20 metres long, and handling them in our own plant is a challenge," says Thörn.

Today, all of Sapa Profiles' masts are pressed in Finspång, after which they are transported to the company's Vetlanda plant for anodising and packaging for onward distribution to customers.

"The new plant will bring everything together under the same roof. It is a major advantage to be able to reduce our transport and reloading of goods," says Thörn.

THE PLAN IS TO begin production at the plant during August. The pipes will be laid and ten baths installed during the spring.

The surface treatment capacity at the new plant will be approximately 80,000 square metres per year.

"We are hoping that the new plant will enable us to substantially increase our deliveries once the new production gets under way," says Thörn.

PHOTOS KJELL ISRAELSSON

IN THE LEAD

Sink putts with Sörenstam

The idea of creating the ultimate putting aid was born during a tedious trip over the Atlantic. Today, golf ace Annika Sörenstam uses the Putting Guide.

Putting is the aspect of the game feared by both hobby golfers and top-flight professionals. Despite the fact that only a few metres remain to the hole, it's all too easy to transform a record-low round into a complete disaster.

Tomas Dahl became hooked on golf when he was seven and knows how frustrating putting can be.

"Despite the fact that 40 percent of all shots during a golf round are putts, most golfers practise putting far too little.

"I got the initial idea for the Putting Guide >>



» while I was training putting, when I started to wonder whether the angle of the club face was right at the moment of impact.”

In the workshop, Dahl designed a predecessor to the Putting Guide, which resolved the issue of club angle, pendulum movement and impact on the putter face. If one of these features is performed incorrectly, the putt is missed.

A few years later, on his way home from Florida, Dahl sat on a plane reading a newly purchased book.

“Its author Dave Pelz has scientifically proved the importance of these three factors after years of empirical studies. What he had not succeeded in doing was finding a tool that resolved all the training features at the same time. That was when I realised that this tool was lying at home in my garage, collecting dust,” says Dahl.

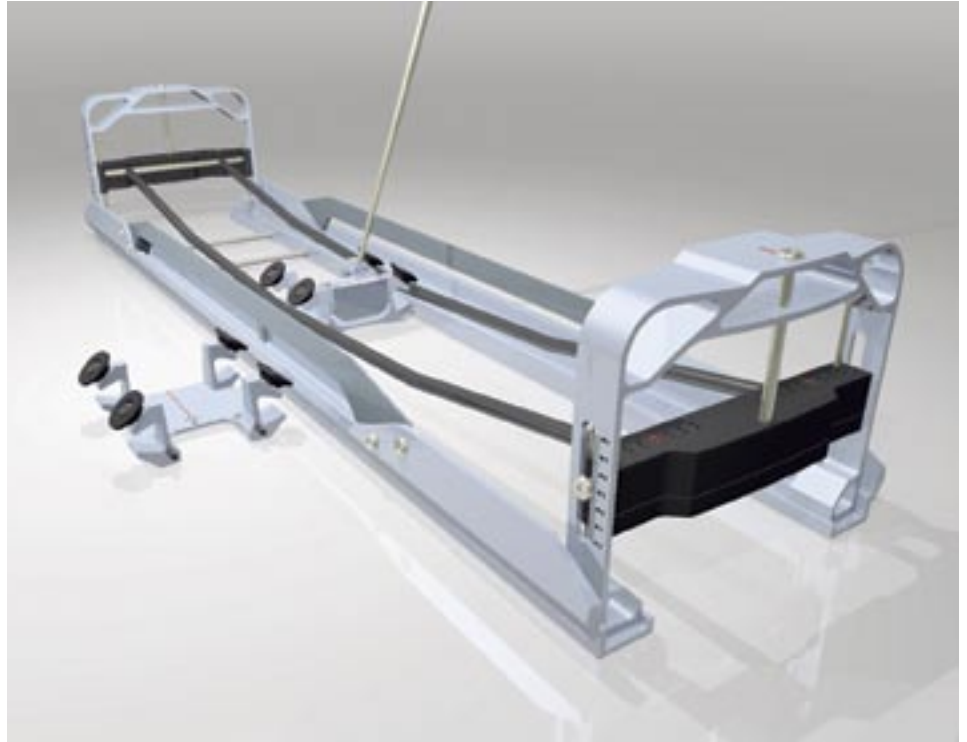
ONCE HE ARRIVED home, Dahl discovered that there was no impediment to registering the patent and he approached various golf pros to get their verdict. One of these was Henri Reis, who has been Annika Sörenstam’s trainer since the late 1980s. He quickly realised the power represented by the new practice tool.

“I had never seen anything like it. It’s the best aid available for practising putting,” says Reis, who is currently a co-owner of the Putting Guide.

His world-famous disciple, Sörenstam, is also a Putting Guide user. Reis took one of the first versions of the aid to the sevenfold major winner, who was so impressed that she, quite simply, kept it.

The main material used for making the Putting Guide is aluminium extrusions, which was a natural choice for Dahl.

“Aluminium radiates precision, is durable



The Putting Guide consists of a ball-bearing hung carriage between two composite rails. The actual frame is made of aluminium.

and works well outdoors. It’s also light,” says Dahl, who explains the background to his initial contact with Sapa.

“I called their switchboard and asked what members of the management team played golf. All of them, was the answer. So I was given an opportunity to demonstrate the prototype,” he explains with a chuckle.

Today, more than 400 Putting Guides have been manufactured in two different versions, one for pros and one for private individuals. Many of the products are found in Swedish

golf clubs, but Dahl hopes that exports will increase in the future.

“Sweden is a good test market, but the big markets are the United States and Japan, which have 27 and 15 million golfers, respectively.”

Many miracle aids are offered to golfers but Dahl pledges that the Putting Guide has improved his putting.

“After having trained a week with the Putting Guide, I tested whether I’d improved. After sinking 268 consecutive 2.5-metre putts, I was convinced. That was all the proof I needed.”

From prototype **to product**

Sapa often receives proposals for unique inventions. Few are really well conceived, but the Putting Guide stood out.

WHEN TOMAS DAHL contacted Sapa with a view to cooperation, he had already made a rough version of the Putting Guide, using standard profiles from Sapa. Rickard Kjellberg,

sales technician at Sapa, was assigned the task of developing the finished version.

“In contrast to many other proposals, Dahl had both a prototype and proper blueprints. It was quite clear that he had carefully thought out its appearance and how it would be produced,” says Rickard Kjellberg.

Together with Sapa’s designers in Vetlanda, he optimised the Putting Guide’s profiles for Sapa’s production, and studied how best to conduct the milling and make the holes.

Do you cooperate well with the Putting Guide?

“Excellently. It’s a product that we believe in ourselves. Occasionally, our delivery times have not been as short as the customer has wanted, because certain details have taken time. We’re now working intensively to be able to deliver as fast as possible.”

Have you tested the Putting Guide yourself?

“Just for fun. You see, I’m one of the ones who don’t play golf,” Kjellberg explains.



Wardrobes that measure up

Getting standard wardrobes and cupboards to fit into both bedrooms and kitchens is not always the easiest task. Danish company KA Interiør found its niche in customised cupboards with sliding doors.

Kurt Armose is the entrepreneur behind Danish company KA Interiør, which produces cupboards with sliding doors. Over a period of ten years, he has built up operations based on a clear business concept – manufacturing cupboards entirely to individual customer specifications, as opposed to mass-producing them.

“Everyone knows that costs are lower in China, so we would gain nothing by conducting mass production in Denmark,” says Armose, who is now Chairman of the Board of Directors. “Instead, our strategy is to specialise and supply products that cannot be mass produced.”

This means that the customer can have exactly the cupboard that fits – regardless of the dimensions, unusually angled walls or other special conditions. The quality is high, and price is not the primary competitive weapon. But Armose is

nevertheless interested in the opportunities that China and other low-cost countries offer.

“One of the reasons why we chose Sapa as our partner was the company’s operations in China,” says Armose. “We use aluminium profiles for both the edge protection and the ceiling and floor rails, and we naturally depend on our supplier being able to deliver at a competitive price. If China one day becomes the best and cheapest alternative, it is important that our supplier is already established there, as Sapa is.”

EVEN BEFORE COOPERATION was initiated, Armose was also very interested in what Sapa knew about product development.

“I expect a supplier to suggest good ideas for new products and technical improvements to existing solutions,” he says. “The supplier must also have a thorough understanding of our

concept, since our business strategy is entirely based on flexibility.”

He emphasises that delivery reliability and quality are prerequisites for cooperation, since all production at KA Interiør would have to stop if a key aluminium profile were missing. To date, KA Interiør and Sapa have jointly developed a number of new products and made improvements to the company’s cupboards, which are mainly sold through kitchen stores in Denmark and other countries.

“Right from the beginning, we focused on selling our products via the kitchen sector, which has personnel who are used to custom orders, as well as craftsmen who can handle the assembly work. We also develop various lines that fit into the product ranges of the different kitchen furnishings companies, which means that product development is important for us,” emphasises Armose.

Although most of the company’s products are still sold in the Danish market, exports are increasing and currently account for some 30 percent of sales. The target is a 50 percent export share by 2007. The most important export countries are the other Scandinavian countries, Germany and the United Kingdom.



“We need to use the best materials, so that we can offer customers the best product.”

Praveen Agarwal, Group Chairman of Vikas



Full speed ahead for India's car industry

India is one of the fastest-growing car markets in the world, which benefits the local companies working in the industry. One of them is the Vikas Group, which manufactures air-conditioning systems.

The Indian government has given the country's automotive industry a vote of confidence. In the Economic Survey for 2005, the government estimates the production of automobiles in India will exceed 10 million vehicles by 2007. In the first 11 months of this business year (April–February 2005) car sales rose 17.7 percent to 730,425 units, from 620,705 a year earlier, according to the survey.

Nowadays, you can pick up a Mercedes, Honda, Mitsubishi or Ford model from the glitzy showrooms in Indian cities. Increasing incomes, more job opportunities, particularly in IT and IT-related industries, financing options at low interest rates and attractive discounts from dealers and vehicle makers have fuelled India's auto sector.

AUTO EXPORTS HAVE also seen robust growth, showing that cars made in India could compete with global standards. According to the Economic Survey, the total number of Indian cars exported was 161,000 during 2004–2005. The auto component industry grew 20 percent in 2003–2004 to register a sales turnover of USD 6.95 billion.

Plugging into the success is India's Vikas group of industries – Pranav Vikas and Sanden Vikas – two leading players that manufacture car air conditioning systems. With a 30 percent market share, they buy their component requirements from Sapa. Says Group chairman Praveen Agarwal, “We are the largest manufacturers of heat exchangers in India and supply car air conditioners to all auto majors in India: Maruti-Suzuki, Tata Motors, Mahindra and Mahindra, General Motors, Honda, etc.”

ALL HEAT EXCHANGERS manufactured by the Vikas group are 100 percent aluminium. The group's relationship with Sapa has grown as the Indian auto market has expanded.

Even though global auto majors initially overestimated the Indian market and created overcapacity, Agarwal is happy about the growth of the auto industry.

“India is one of the fastest growing automobile markets in the world today, after China. Globally in this industry there is always an overcapacity.”

Agarwal says another trend is that the family is having a bigger influence on sales. “More >>



Vikas in brief

Group sales: approximately SEK 800 million

Location: Faridabad in the north Indian state of Haryana, 20 km from Delhi.

Number of employees: 1,500

Products: Complete airconditioning systems with evaporation coils, condensers, heating units, cooling packages, intercoolers, oil cooling radiators, and charge-air coolers – all made from aluminium.

Advantages of aluminium: The most widely used material in heat exchangers for cars, since it has excellent thermal conductivity, and is considerably lighter than copper, completely recyclable and corrosion-resistant.

Research and development: A strong team that, for more than 20 years, has been designing, developing and building prototypes of air-conditioning systems, using the latest technology.



The Vikas Group manufactures airconditioning systems made from aluminium for India's major car producers.

» and more women in India – not to forget the children – are having a say in what car model or brand the family will buy. This is clearly reflected in all the auto ads.”

Regarding the future plans of his group he says, “We want to maintain our vision as one of the largest heat exchange manufacturers in the country. We aim for value-added and high-



technology products and are committed to giving the best-of-its-kind products to our customers. To do this we need to use the best material combined with the best technology, to give the best price and quality option to the customers. It is here we depend on support from our suppliers, including Sapa.”



AGARWAL ADMITS THAT when Sapa established its manufacturing facility in Shanghai to serve the Asia-Pacific market better, in the late 1990s, the group had reservations about buying material out of China.

“We were unsure we would get the same quality that we were getting from Sweden. But their export sales manager Per Stark convinced us they would meet all our needs, and we became their first client out of China, in 2000.”

He has not regretted that decision.

PHOTOS: ARUN NANGLA

Mutual trust

Board Chairman Praveen Agarwal believes that Vikas' partnership with Sapa will grow steadily during the coming years, given the economic boom in the Indian car industry, combined with the fact that most of the components in the Group's airconditioning systems are made from aluminium.

“Our business relations are already based on mutual trust and appreciation,” he notes.

He feels that Sapa is a reliable, solidly based supplier.

“If problems arise, their representatives come here without delay and give advice on innovative solutions. We are able to benefit from their latest technology, and they make every effort to understand our needs and meet them as quickly as possible.”

Sapa's export manager Per Stark comments:

“After beginning with individual orders of test examples, our business with the Vikas Group has developed into a strategic partnership. Now they purchase nearly everything they need from Sapa Heat Transfer China.

On the right track

The Translohr tram was designed for urban environments. The premiere trip is scheduled for next year in Clermont-Ferrand, France.

Exhaust fumes, cars and queues are everyday features of the centres of most large cities. Pedestrians, cyclists, buses, trams and motorists – everyone is competing for space.

This was the startingpoint when French vehicle producer Lohr Industrie was developing its new series of trams, Translohr.

The new tram series is designed to blend in effortlessly with the existing urban environment, without any need to widen or rebuild streets. The tram is electrically powered and follows a single track at the same level as the road surface. Since the tram is no wider than a car, it leaves more space for other vehicles, pavements and bicycle paths.

One of the major differences between Translohr and conventional rail-bound vehicles is the design of the wheels. The Translohr



The tram's pneumatic tyres ensure a quiet ride.

cars are equipped with pneumatic tyres, giving them a tighter turning radius. According to Lohr Industrie, they can handle sharp bends and greater inclinations. The tyres also enable the trams to run more quietly.

The wheel pairs are located between the car modules and provide support for the entire structure. They also neutralize any unevenness in the road surface. The tram body is partly made from aluminium profiles supplied by Sapa, including the side beams and seven different cross beams for the seats.

The tram is made up of modules, which increases flexibility in terms of passenger capacity. The tram can carry from 80-250 passengers, depending on the number of modules used.

The trams have been test-driven more than 15,000 kilometres on the company's testing tracks in Duppigheim, France. Next year, the first trams will go into service in Clermont-Ferrand, after which they will also traffic a number of cities in Italy. The company also hopes to be able to deliver Translohr to cities in northern Europe and Asia.

Profile School/**Cross-sectional radii**

Aluminium profiles function best when they have rounded shapes. Here is part 1 of the Profile School, on how to produce hard-wearing corners.

It is hardly ever possible to produce knife-sharp corners through extrusion. One reason for this is that the matrix is wire-spark-processed. The thickness of the spark wire plus the gap between the wire and the tool gives a radius of approximately 0.3 mm in the inner corner of the cavity, the profile's outer corner. Even if the matrix is knife-sharp – which can be achieved using sink-sparking with a copper electrode – the material will not penetrate into the sharp corner; a smaller radius will be formed instead.

To ensure that the material penetrates into small radii without any breaks along the length of the profile, the press speed must be reduced, which in turn increases the price. A radius of 0.5-1.0 mm is a major improvement.

Another reason is that the tool's strength and lifespan are increased, while the risk of the tool malfunctioning when forming sensitive cross-sections diminishes.

Another phenomenon that can arise during pressing is the formation of "heat zones," which occur if a thick section comes into contact with a thinner external wall. During cooling, the thinner wall cools more rapidly than the thick section, resulting in a clearly visible streakiness on the outer surface. The effect can be considerably mitigated if the material blank is processed with an adequate radius.

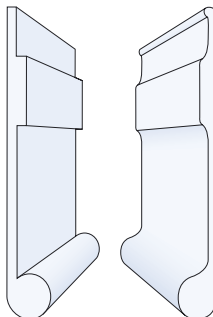


Fig. 1

The depth of deep, narrow tracks in the profile must be limited, since the risk of breakdown increases if the ratio between depth and width is

too large. A full radius in the bottom allows the depth of the track to be increased considerably. In Figure 2, the ratio between depth and width is increased from 3 to 4.

Accordingly, the general recommendation is: always incorporate radii in corners and when there are variations in thickness – the larger the radii the better.

More good reasons to incorporate radii will be presented in the next issue.

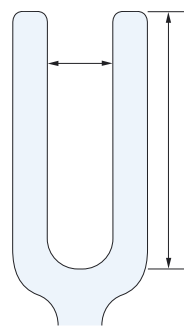


Fig. 2



The Atomium lives on

A six-month lifespan increased to nearly 50 years. Now the Atomium in Brussels, Belgium, is being renovated, and 30 tonnes of aluminium will be transformed into wheelchairs, bicycles and children's toys.

WHEN THE BRUSSELS World Exhibition opened in 1958, visitors had the opportunity to see a unique structure – a molecule consisting of nine atoms enlarged by 165 billion times. Within the molecule, visitors could ride escalators between the nine spheres and view various exhibits. And in case anyone was hungry, there was a restaurant in the topmost sphere.

Initially, it was thought that the aluminium panels would last for the six-month duration of the exhibition, but the metal showed its strength. It was not until 47 years later that renovation work began on one of Brussels' major tourist attractions.

The real enthusiasts gained an opportunity to own a piece of the structure when one thousand

numbered panels one square metre in area rapidly sold out at a price of approximately 1,000 euro each. However, the remaining panels were not discarded but are acquiring a new lease of life at this very moment.

Through the Aluminium for Future Generations program established by the European Aluminium Association (EAA), the industry organisation, nearly 30 tonnes of aluminium will be reused in products with a social function, such as wheelchairs, bicycles, ski poles and many other products.

"This proves what a versatile metal aluminium is," says Patrick de Schrynmakers, secretary general of the EAA. "The aluminium from the Atomium is now on the threshold of a new life."