

▶ **ROUGHING IT** in offshore climates • **MEASUREMENT METHOD** to conquer fatigue

SSAB World

CUSTOMER BUSINESS IN FOCUS

OPTIMIZED OPTIONS IN PLACE

New brands benefit the **customers**

1/16

SUSTAINABLE Chinese buses • **FUSION ENERGY** is the future •
FISKARS GARDEN TOOLS has it all • **WIELTON** appreciates the advantages

The future begins

When the Composite China Expo 2015 Innovation Awards were presented last year, one of the winners was Changzhou Hongfa Zongheng Advanced Material Technology Co. Its lightweight-module, high-performance composite minibus uses Docol from SSAB to achieve its lightweight features.

CHANGZHOU'S BUS is much lighter and offers better mechanical properties than conventional vehicles. This is due to its modular structure and the combination of high-strength steel and composite materials. The composite sandwich structures used for the bus body and panels not only ensure their

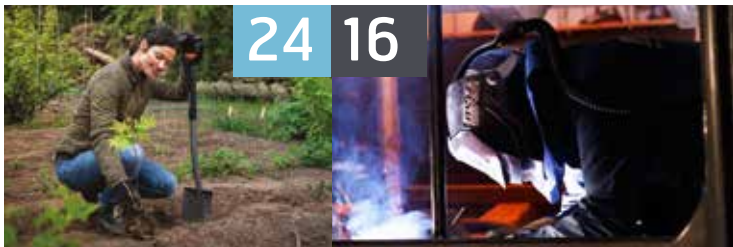
strength and stiffness, but also dramatically reduce their weight. The automotive industry is one of the main pillars of the Chinese economy. In recent years, rapid market development has resulted in increased car ownership but also in three major problems: energy shortages, significant environmental pollution, and

safety issues. Chinese auto manufacturers are therefore acutely aware of the need to reduce fuel consumption and pollution. "China is in the midst of rapid urbanization, with parking congestion and heavy traffic in major cities receiving increasing attention. Although the market for private cars remains, there's

a significant need for green public transport solutions. As the market leader in lightweight, sustainable steel, SSAB will cooperate with innovative companies to speed up this growth by supplying the materials needed to build these solutions," says Jacky Li, SSAB's Regional Sales Manager for Automotive in China. •



Award-winning Chinese bus uses Docol to achieve lightweight properties.



CONTENT #1-2016

02 Inspiration

Sustainable lightweight buses in China in the making.

04 SSAB Inside

SSAB's new brand structure presents an easier way for customers to find the right product.

08 Smart Solutions

Companies Ponsse, Milotek, Fácil and Terex all have what it takes to stand out in competition.

12 Focus

Special steel for rough climates in offshore seaside communities.

16 In-Depth

Fighting fatigue: New revolutionary method for measuring welding.

22 The Big Picture

Fusion reactors: start-ups across the globe race to secure the future of energy.

24 The Improvement

Fiskars gets the right material – making garden tools lighter and stronger at the same time.

27 My Inner Strenx

Wielton gets all the benefits of the membership service program.

Experience the difference

IT IS NOW ALMOST two years since SSAB and Finland's Rautaruukki merged to form the new SSAB. For us, this has been a great opportunity to examine ourselves and plan for the future. We have harmonized our product portfolio and chosen the best products and services to streamline our offering to you, our customer. We are continuously developing even more value-added services based on our 100-year-long experience serving our customers.

We are pleased to launch our Optimized for You program, with five new SSAB product groups to better meet your needs. Within these five families, we have selected customized products with SSAB quality and designed product offerings for specific purposes. We will continue to push beyond standard offerings, which we are proud to say is the SSAB way.

Now that we have one of the broadest product offerings on the market, we are combining the products with service. This is manifested by a new unit called SSAB Services. We will develop our offering by listening to your needs and making sure we provide solutions that make your business even stronger.

We're not the biggest player in the steel industry, but being biggest is not what's most important to us. Instead we want to be recognized for our quality and our belief in partnership. We want to develop a new steel industry standard for sustainability and performance, which is in line with what society expects from us in the global challenges that we are facing right now.

We want to develop things that set us apart from the rest of the industry – not by talking about our own processes, but by talking about how we can improve your business.

I would like you to experience the difference in SSAB.

Martin Lindqvist



Martin Lindqvist, CEO, SSAB.

SSAB
World
CUSTOMER BUSINESS IN FOCUS

Published by SSAB, P.O. Box 70, Klarabergsviadukten 70, D6 101 21 Stockholm, Sweden
Editor-in-chief Taina Kyllönen **Project manager** Mikael Petersen, +46 243 711 08, mikael.petersen@ssab.com
Editorial production Spoon, www.spoonagency.com
Editor Chi An Gramfors Englund, +46 765 26 48 49, chian.gramfors@spoon.se
Layout Eva Englund **Cover photo** SSAB **Copyright** Texts and images in SSAB World may not be republished without permission. Please visit www.ssab.com for more information. For address or subscription changes please mail ssab@tm-gruppen.se

SSAB

The multi-purpose family SSAB Domex is the biggest of the new product groups.

“
We have focused
on customer needs.”
OLAVI HUHTALA, HEAD OF SSAB EUROPE

The recent launch of five new SSAB branded product families will make it even easier for customers to find the best product to suit their specific needs.

by NIC TOWNSEND

NEW PRODUCT PORTFOLIO COMPLETE

THE FIVE NEW PRODUCT FAMILIES
under the SSAB brand cover a wide new and existing products and are part of SSAB's new product portfolio, which is designed to offer greater clarity and understanding of what each product can offer. While previously products were named and defined by their manufacturing processes, the new product ranges are based on their function.



Olavi Huhtala,
Head of SSAB
Europe.

“Customers want to know what a product can offer, not where or how it is made, so it makes sense to group our products according to how they are used,” says Olavi Huhtala, Head of SSAB Europe. “With the new naming structure we want to focus on what our customers get out of our products. This will make it much easier to identify the right product for the right application.”

The new product groups are SSAB Domex, SSAB Form, SSAB Weathering, SSAB Boron and SSAB Laser Plus. In each instance, the SSAB name represents a guarantee that the customer is getting the same high quality steel, with properties above the standard norm, each and everytime. All products are manufactured with clean raw materials from the best sources, along with special treatments to reduce harmful impurities. SSAB can also offer narrower tolerances than the industry standard and even the tightest customer-specific tolerances are available.

“In creating these new product families we have focused on customer needs in different segments and have designed product offers to meet those specific needs,” adds Huhtala. “We have selected our best products from our earlier ranges, while also developed new products, to create a complete and harmonised portfolio.” •



● SSAB DOMEX

A multi-purpose product group that covers applications within the heavy transports segment and bearing structures, such as chassis beams, frames, and lifting devices. It can also be used in bridges and buildings.

Hot rolled plate is a structural steel that is easy to weld, bend and process in workshops and onsite. Its high strength and good flangeability allow steel structures to be made using thinner steel plates and reduce number of welded joints

Hot rolled strip consists of high strength, high-strength low-alloy (HSLA) steels that features consistent quality and excellent engineering properties. It is the ideal choice when looking for high productivity, improved design possibilities and high-quality end products.

Cold rolled HSLA products are developed specially for the demanding automotive industry, but can also be used in other segments.

Metal coated products are fit for a range of applications and are developed for versatile use in highly demanding customer processes where guaranteed high quality with enhanced corrosion resistance is a must.

Tube is a product family of versatile, high strength hollow sections with numerous tailoring possibilities and benefits.

“
SSAB Domex
covers applications
within the heavy
transports segment
and bearing
structures.”

● SSAB FORM

The SSAB Form product family offer extreme formability and solutions to every deep drawing, bending and roll forming operation that customers face. It is ideal for applications such as tubes, pulleys, brackets and rims.

Hot rolled strip and cold rolled products feature very high ductility and formability, and are designed for components that are produced by deep drawing, bending or roll forming.

Metal coated products have unique forming properties combined to narrow tolerances. These products are developed for highly demanding applications that need the ultimate cold formability, combined with galvanic corrosion protection.



“
SSAB Form is a
range of products
that offer extreme
formability.”



SSAB Boron ensures wear resistance.



● SSAB BORON

SSAB Boron steel is a perfect base material for a great variety of products, parts and components, that need extreme hardness, wear resistance, high strength, toughness and resistance to mechanical load. Good forming, bending, welding and cutting properties enable the manufacturing of complicated structures, components and parts, such as spades, knife blades, saw blades, disc harrows and cog wheels.

Hot rolled plates have been developed to be hardened, either by heat treatment after workshop processing or by a direct hot forming and quenching process, to get their final properties. This ensures longer lifetime and considerable weight reduction.

Hot rolled strip has the same properties as hot rolled plates and can further be delivered in annealed condition with improved ductility, so that it is easier to cut and form in customers' processes.

Cold rolled is used for a variety of applications as a wear material and as a high strength structural steel. The steel can easily be hardened and can often be used without subsequent tempering.

Tube uniquely combines ultra-high strength as quenched, formability as delivered, narrow tolerances and wear resistance with large variety of different shapes and sizes. Its outstanding properties will help you lower manufacturing costs and reach new limits in processes where formability, uttermost strength and wear resistant are needed.



● SSAB LASER PLUS

Workshop friendly SSAB Laser Plus structural steels are easy to cut, weld and bend, offering high performance in automated production processes.

Hot rolled plates are manufactured with clean raw materials from the best sources, and offer a guaranteed flatness tolerance of 3 mm/m after laser cutting.

Shorter set-up and cutting times and reduced rework on finished components are definite benefits for workshops. Uniform steel quality ensures uninterrupted production and high quality fabrication. It involves machine-finished components produced in large runs in a highly automated manufacturing process. The main benefits include consistent high quality and mechanical properties from batch-to-batch, and the potential to increase both production efficiency and profit. Applications include fastening, hole edging and hinges.



SSAB Laser Plus steels are optimised for laser cutting and guarantees 3 mm/m flatness after cutting.

SSAB Weathering steel is used in Transtech trams in Helsinki, Finland.



● SSAB WEATHERING

SSAB Weathering is a range of corrosion resistant steel grades that have been optimised through their alloying elements for a variety of environments and purposes. They are specially composed and designed to be exposed to atmospheric corrosion, and can offer significant economic benefits through low life time costs. They are ideal for flue gas ducts and chimneys, buildings, containers, engine heaters and many other applications.

Hot rolled plates and hot rolled strip offers improved bending properties compared to standard weathering steels, and delivered with improved flatness guarantees to reduce customers' need to reprocess the material before use.

Cold rolled offers anti-corrosive properties that make it perfect for use in tough weather conditions with low maintenance costs during lifecycle.

Tube is designed for advanced engineering and construction under tough atmospheric conditions, and its use minimises the need for maintenance and corrosion-prevention treatments.

The SSAB Weathering range also includes the COR-TEN A and COR-TEN B weather-resistant steel grades, which are optimised through their alloying elements for a variety of environments. SSAB is the only suppliers of COR-TEN in Europe.

SSAB Weathering has been used for constructing Lugnets ski jumps in Falun, Sweden.



SSAB Weathering is optimised for a variety of environments and purposes.



The development of Transtech's low-floor tram was based on safety and best overall value for money. This means high reliability and availability as well as low operating and maintenance costs, which the use of weather-resistant steel promotes.

PASI RYTKÖNEN,
MATERIAL AND LOGISTICS MANAGER,
TRANSTECH, FINLAND

Weathering is used in the body structures of the new trams made by Transtech for use in Helsinki, Finland. The use of high-strength steels helps to lighten tram weight because the steel used can be thinner and still retain the properties required. A lighter tram structure means less energy is required to operate it.





The company is one of the world's leading manufacturers of forest machines for the cut-to-length method.

Smart solutions

Together We Create Better Results

Smart solutions

LEADER of the pack

A revolutionary design for a forest harvester that improves both performance and comfort – this is what won Finnish company Ponsse the Swedish Steel Prize 2015.

THE PONSSE SCORPION is a totally new kind of forestry machine. It offers the operator total visibility and the ability to work comfortably and efficiently.

“We started the project at the request of customers that wanted to have a rotating operator cabin and we didn’t want to make compromises in the design,” says Technology and R&D Director Juha Inberg at Ponsse.

The machine features an ergonomic cabin that places the operator in the center of all the action. This gives operators full visibility in all directions, enabling them to work comfortably and efficiently.

A groundbreaking innovation with an eye-catching design made Ponsse winners of the Swedish Steel Prize 2015.

“It’s a great recognition for all our customers and employees and to all our suppliers as well,” says Juha.

It’s a big leap in improvement in the history of logging technology.

“We know we have a great product and the prize shows the customers just that. It has been 20-30 years since any forest machine manufacturer came out with an innovative solution of this scale,” says Carl-Henrik Hammar, Managing Director of Ponsse AB, the Swedish subsidiary of Ponsse.

The unique two-arm lift boom over the operator cabin is made of high-strength steel. The boom was developed by SSABs Strenx 700 MC Plus together with steel casts in an innovative way.

High loads, environmental stresses in tough terrain and winter conditions down to -40° C make fatigue a big issue



in foresting. To get around this challenge, Ponsse uses Strenx 700 for the machine frame. The high-strength steel is made especially resistant to fatigue. The harvester head is made from the wear-resistant SSAB steel Hardox 500, which provides good abrasion resistance.

The high strength steel makes the Scorpion more environmentally friendly as a result of its long maintenance intervals, low-emission engine technology and low surface pressure levels.

Going forward Ponsse has more innovations in store.

“You can never stop developing in this business,” admits Katja Paananen, Communications Manager at Ponsse. •

• ABOUT PONSSE

Ponsse was established in 1970 to meet forest machines’ need for heavy-duty use. Based in Vieremä, Finland, the same place where it was established in 1970, Ponsse is a family company whose roots are deep in the Finnish countryside.

SSAB steel in Scorpion

- Strenx 700 MC Plus steel in the boom.
- Strenx 700 steel in the frame.
- Hardox 500 in the harvester head.

View from **THE TOP**

A true modern day rail transportation system, the Futran System is not only easy to install but also environmentally friendly. It carries heavy loads using patented modular components designed from high-strength steel.



● **ABOUT MILOTEK**

Milotek is a South African-based company that owns the rights to the Futran system in Africa South of the Sahara, and South America.

SSAB steel in Futran System

- Strenx steel
- Hardox steel
- Strenx 700 instead of steel cables

“OUR FUTRAN SYSTEM is a suspended transportation system for a cost-effective alternative to rail, trucks, conveyor belts and underground mine haulage systems, as well as buses and taxis,” says Andries Louw, founder and CEO of Milotek. South Africa, the company founded to develop and commercialize the Futran System.

The system is a modular elevated track with self-propelled trains that carry heavy loads. It has components

with a simplified design for easy installation and minimized maintenance costs. Each wagon can carry up to 20 tons and travels up to 56 miles per hour. The elevated tracks make it suitable in remote territory and in terrain inhabited by wildlife.

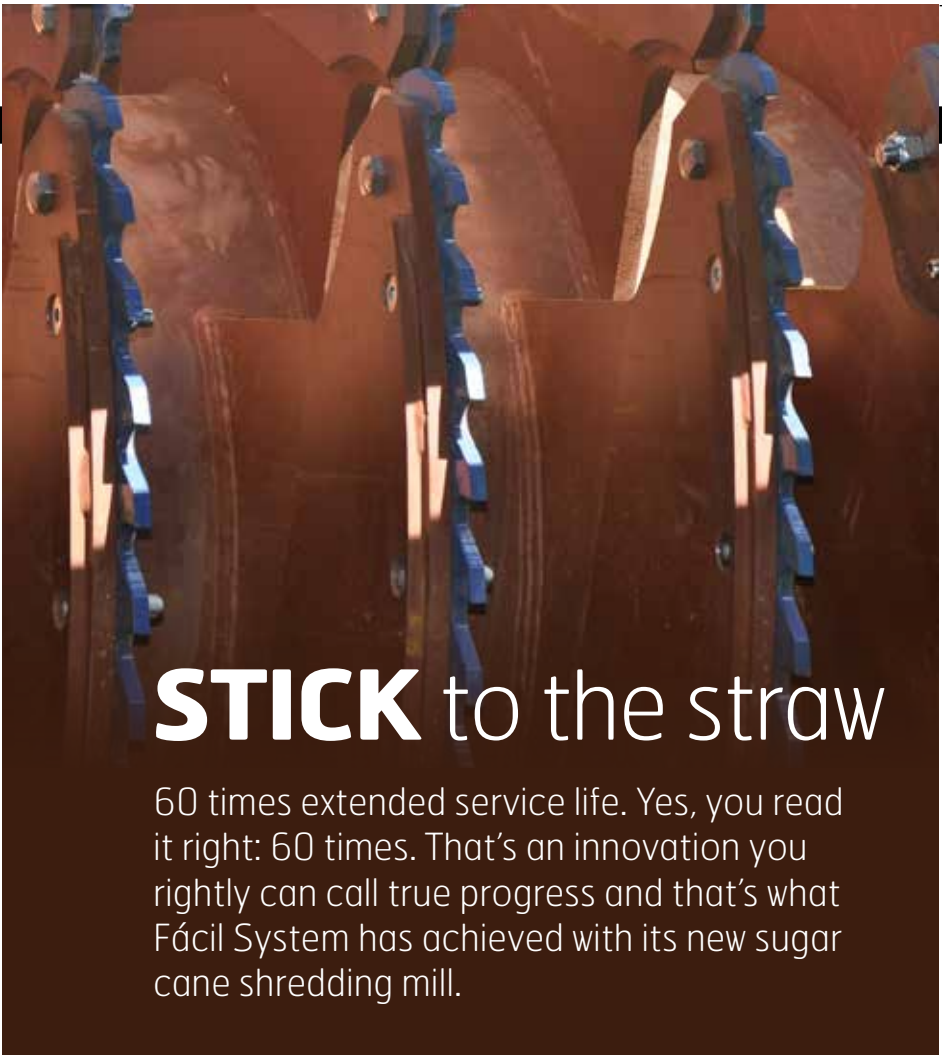
“It has a small footprint and is a very suitable solution for rugged terrain, which makes it optimal for use in places like Africa,” says Louw.

The patented innovation was nominated for the Swedish Steel Prize 2015 and utilizes SSAB’s high-strength Strenx and wear-resistant Hardox in different components such as the track, the legs of the superstructure, the suspension system, the hanger brackets and the skips used for ore haulage. Furthermore, by using the high-strength steel Strenx 700 as opposed to steel cables, the cost of the suspension system can be cut by 85 percent.

“To receive this recognition through the nomination is marvelous – it means we have done things right. The high-strength steel has been a big part of our success as the construction is now incredible lightweight and still robust,” says Gerhard Claassen, the chief design engineer.

The engineers at Milotek have no intention of stopping here – the innovation will continue.

“We have a lot of ideas on how to develop better and better products,” Louw says. ●



STICK to the straw

60 times extended service life. Yes, you read it right: 60 times. That’s an innovation you rightly can call true progress and that’s what Fácil System has achieved with its new sugar cane shredding mill.

YOUR AVERAGE sugar cane harvest lasts 240 days. Imagine that instead of having to stop the milling machines and change knives 120 times per harvest, you only have to do it twice. That is what you’ll achieve with Fácil System’s new sugar straw shredding mill.

For their new system for sugar cane straw shredders they use knives developed with wear-resistant Hardox 600 steel.

“By using wear-resistant materials, there is also a reduction in electricity consumed by the shredder,” says Laércio Ribeiro, CEO of Fácil System, Brazil.

The machine’s outlet grate, which determines the straw particle size, is made from Hardox 450 and improves particle size performance. The extraordinary solution as a whole was nominated for the Swedish Steel Prize 2015.

“I have spent 17 years developing this system and the nomination is proof that it was the right thing to do. It also sends a message to our customers about the success of the solution,” says Ribeiro.

Cane straw as a raw material has started to be used as boiler fuel, to produce electricity. The market is growing fast

● **ABOUT FÁCIL**

Since 1986, Fácil System develops and customizes machine design as well as complete industrial plants.

SSAB steel in Fácil’s shredders

- Hardox 600 steel for the knives.
- Hardox 450 for the machine’s outlet grate

and the design of the mill was created out of a need to serve this segment.

The mill’s rotor, which shreds the sugar cane straw, consists of a set of shredding knives bolted spirally to the equipment support at the axles.

“We are unrivaled in the grate material and in the knives,” Ribeiro says.

Using straw as a source of energy is already a reality in Brazil. The material, left over after producing ordinary ethanol from sugar cane, considered a “green” and renewable energy source that is widely used to produce fuel for cars, has also become a raw material with great potential for a new biofuel, called second-generation ethanol or E2G. ●

HIGH expectations

By dramatically increasing performance, the innovative Boom Booster Kit has made it possible to use the same crane for a wider variety of jobs.

THE INNOVATION

made global crane manufacture Terex Cranes, Germany, one of the nominees for the Swedish Steel prize 2015 and winner of the People’s Choice Award.

“It’s a great honor to be nominated as one of the top four – it’s absolutely a win in itself. To become People’s Choice Award winner shows that we have a popular product,” says Harald Riedinger, Director Technology&Innovation at Terex.

The Boom Booster is an add-on boom structure that can almost double the efficiency in steep and long boom configurations of their CC 8800-1 crane model. Part of the kit is made from SSAB’s Strenx 700 steel, a

lightweight and high-strength solution. Terex Cranes wanted to make sure that the Boom Booster was lightweight without compromising on safety.

“Safety is top priority for us,” says Klaus Meissner, Director of Product Strategy at Terex Cranes.

With the nomination in its pocket, Terex believes this means that new customers know that the company truly lives up to the promises of the product.

“This attracts customers from all over the world. Clients have already shown a lot of interest,” says Harald Riedinger.

New solutions are on their way and are being developed for other crane models. ●

Read more about Terex in SSAB World 1/15 on ssab.com/newsroom.





● HUISMAN EQUIPMENT

Huisman designs and manufactures heavy construction equipment for onshore and offshore companies. Huisman's cranes – ranging from heavy lifting to deep-water operating cranes – contain high strength steel, mainly Hardox 400 and Weldox 700, but Strenx 700 and Strenx 960 are also used.

"We are always battling between strength stiffness difficulties, as our products are highly loaded and have big dimensions," says Clive Anstey.

"The weight of our cranes and the harsh conditions they operate in is challenging for our engineers. But, using high strength steel is one of the pieces to complete this puzzle. With high strength steel we are able to reduce our manufacturing costs and deliver solutions which have a lower own weight and sufficient ductility for the offshore environment."

Huisman relies on the quality of SSABs steel as well as its technical expertise.

"We can count on SSABs quality, delivery reliability and competitiveness, especially in our global market where compliance with the certifying authorities is very important."

“
Using high strength
steel is one of the
pieces to complete
this puzzle.”

CLIVE ANSTEY, STRATEGIC BUYER AT HUISMAN
EQUIPMENT IN SCHIEDAM, NETHERLANDS.

The main task of the jack-up legs
JSA Group produces is to raise and
lower the hull clear of the water.



Uncharted territory:

EXPLORING THE OFFSHORE MARKET

Now that oil and energy prices are down, companies in the offshore industry are looking into how they can improve efficiency in their designs and processes. **Some are slowly starting to explore the benefits of using high strength steel.**

by ALANNAH EAMES



From left: Jay Fogal, President, and Karl Oswald, CEO, at JSA.



● **SSABs OFFER TO THE OFFSHORE INDUSTRY**

THE OPPORTUNITIES for the use of high strength steel in offshore applications are endless. Besides oil and gas platforms, it is ideal for equipment positioned high up – and, therefore, which needs to be lighter – on rigs or boats, such as drill towers and production equipment like winches, compressors or pumps. Structural steels are dominating but there are also a number of Hardox opportunities for guide plates, deck reinforcements and cargo holds.

And, then there’s also the renewable or ‘green’ energy market where high strength steel could be used in offshore wind, wave and tidal turbines.

“Now is a golden time to look into

- Extra high-strength steels: Strenx 700 OME for jackup legs, offshore cranes, lifting equipment, top side structures, drill towers. Strenx 960 for tension bars.
- Thermomechanically rolled high-strength steels: S420, S460, S500 with offshore specifications for platform structures, advanced ship hulls and ice breakers.
- Normal shipping and offshore grades from grade A to S355 MPa level: For platform structures and conventional ship hulls.
- Prefabrication: Plate finishing and prefabrication for custom sizing, weld preparation of edges, roll bending, press breaking, large tube forming and welding and profiles and hollow sections.

these opportunities for efficiency,” says Joakim Nyström, SSABs Key Segment Manager for Energy & Offshore. “High strength steel may not work in every application but in the offshore team – including both SSAB Europe, SSAB Special Steels and SSAB Americas – we have a fantastic offer. We have a full range of classed grades from Grade

A to Strenx 700 OME with ABS EQ 70 approval in combination with great prefabrication possibilities.”

One particularly successful offshore product has been building legs for jack-up rigs, where SSAB high-strength steel is used for chords on each jack-up leg assembly.

“The high strength steel is also used

in lift-boat applications,” says Chris Gasper, General Manager at SSAB in USA. “These legs – up to 150 meters long – require strength in order to stabilize the boat for performing maintenance and lifting operations for the rig at sea.”

The US operations have been able to offer customers a “One-Stop-Shop” together with manufacturing company JSA Group. Offshore jack-up drilling rigs and jack-up lift-boats are very complex structures incorporating a wide variety of materials, machinery and equipment.

“The fundamental task of these units is the ability to raise and lower the hull clear of the water, by means of a rack and pinion driven system supporting and elevating the heavy platform numerous times over the life of the rig,” says JSA President Jay Fogal.

PRODUCTION OF the jack-up leg components involves heavy fabrication of high strength steel, flame cut and/or machined parts and the steel forming of pipes, transitions and other heavy components.

“In 2012, our Houston-based JSA were searching for a domestic source for high-quality quenched and tempered steel for offshore jack-up rig legs. We met with a team from SSAB in Houston and later visited their steel mills in both Mobile, Alabama, and Borlänge, Sweden, says Fogal.

“We were highly impressed that the Mobile mill had adopted many of the quality aspects that SSAB was known for at its Swedish operation. Since that time, our group has purchased several thousand tons in the thickness range of 1” to 2” which were produced in both their US and Swedish mills. We were also thoroughly impressed with the flatness, surface condition and weldability of the steel. In particular, the extraordinary consistency in chemical and mechanical properties of all the plates made for a consistent end product, explains Fogal.”

These factors coupled with con-

sistent timely deliveries of quality products and materials have formed the foundation for a lasting and mutually satisfactory relationship between SSAB and JSA.

UNTIL NOW, the use of high strength steels in offshore products has been low. According to Nyström it’s because the industry has not prioritized on making its products lighter, plus the fact that regulations governing the materials used in offshore designs are very tight.

“But times are changing,” he explains. “The market is more interested in weight reduction opportunities now compared to ten years ago. The extreme low oil price force the market to find every possibility for increasing efficiency and reducing cost, and using high strength steels is one.”

There are two major challenges though. The first is related to the harsh conditions of operating offshore. The advanced load case made by waves and wind cause torsion, twist, horizontal and vertical stresses that together with salt and humidity affect the steel structures.

The second is classification rules that state limitations for steel strength in ship-, platform hulls and fixed platforms to maximum 500 MPa, the SSAB TM rolled high strength steels are here an opportunity. For secondary structures, machinery and equipment there is more freedom of material choice. Here we see great possibilities for our customers to use classed Strenx 700 OME and also normal Strenx 700. Even Strenx 960 can be used in unwelded structures with special approvals.

“We want to promote cold-forming and HFMI*-treatment to remove the welds from the most critical areas and ensure they are as fatigue resistant as possible. In the past cold-forming was not allowed; now it can be used in the design as long as some extra tests are conducted to prove it is suitable for the application.” says Nyström. ●

* High Frequency Mechanical Impact

“



SSAB is a preferred supplier for us due to its competitive pricing, product quality, wide product portfolio and solid stock program.

GAUTE FARDAL, LEAD GROUP CATEGORY MANAGER AT AKER SOLUTIONS AS IN EGRSUND/OSLO, NORWAY.

● **AKER SOLUTIONS**

Aker Solutions is a global provider of products, systems and services to the oil and gas industry. The portfolio of products and services includes subsea equipment and production systems, field development engineering, and maintenance and modifications services.

“Aker Solutions’ products are often installed and operated in harsh environment. This requires durable and reliable solutions of high quality, including the material quality. SSAB/Tibnor has produced and provided a range of steel products to Aker Solutions for many years. Bulk steel deliveries; plates, beams, profiles and tubulars but also rolled and welded products for both topside and subsea projects. SSAB/Tibnor has been a preferred supplier to Aker Solutions in several projects due to its competitive pricing, wide range of products and product qualities and a solid stock program.”

Fighting fatigue

Weld quality is crucial to the performance of any steel application. This is especially true for parts made of High-Strength Steel (HSS) due to the increased stress levels to which they are exposed. Now PhD student Thomas Stenberg, a researcher from Stockholm, has created a new method for assuring weld quality.

by ISABELL KLIGER



If fatigue fractures occur they usually appear around the welds.



● AREAS OF USE

The new quality assurance technology is primarily designed for a range of welding methods, including MMA, MIG/MAG, TIG, SAW, Laser and Plasma welding. From SSAB's point of view, this makes it particularly applicable to the Strenx High-Strength Steel product program.

A new measurement method invented by Thomas Stenberg helps fight the threats of fatigue.



A component may go through the entire manufacturing process before a weld defect is discovered.

WHEN FAILURES and fractures occur in HSS products, they usually appear around the welds. When parts move or vibrate, they are more susceptible to fatigue – or wear and tear – because of the increased stress concentrations between the weld and the base material. If the quality of the weld is substandard, cracks will eventually begin to appear.

As Anders Ohlsson, Manager of Joining & Thermal Cutting Technologies at SSAB's Knowledge Service Center explains, it is very costly to carry out reliable quality assurance on welded structures. As a result, one of the main limitations in the steel industry today is its inability to effectively ensure weld quality in its products.

“Welding typically takes place during manufacturing, but can only be quality controlled through visual inspections once the process is complete. A component may therefore go through the entire manufacturing process before a weld defect is discovered, after which it would need to be either repaired or scrapped,” he says.

“Meanwhile, due to time and cost constraints, it's normally only possible to inspect a fraction of the total output. So, even though a lot of time is invested in carrying out weld inspec-

“

This system will provide instant feedback to the welding operator on whether the welded joint fulfills all its requirements.

THOMAS STENBERG, PHD STUDENT
AT KTH ROYAL INSTITUTE OF TECHNOLOGY IN STOCKHOLM

tions, you still run the risk of delivering parts with welding defects to the market,” adds Ohlsson.

Thanks to a new innovation by Thomas Stenberg, a PhD student at KTH Royal Institute Of Technology in Stockholm, these concerns will soon be history. Stenberg and his colleagues have developed a new robust quality assurance (QA) method, which uses a laser profile scanner to assess the welded surface and measure the quality of the weld. The most revolutionary aspect of this method is that the assessment takes place in real time – online – during the actual welding process.

“This system will provide instant feedback to the welding operator on whether the welded joint fulfills all its requirements,” explains Stenberg. “If not, the welding robot will be able

● NEW QA METHOD

The method is a groundbreaking quality assurance technology that uses a laser profile sensor to assess the weld bead surface and quantify the parameters needed to ensure the quality of structural components that are subject to fatigue loading. The welding operator uses the laser profile scanner to measure the welded surface and assess the quality of the weld. If it is found to be inadequate, the welding robot can adjust the process parameters to ensure that the weld quality complies with the desired result. Thomas Stenberg and his colleagues are currently working on developing a commercial version of the method, which is expected to be available on the market within one to three years.

Today the inspection of the welded joint can only be done after the job is completed.

Here are four examples of welding defects that may occur during steel welding.



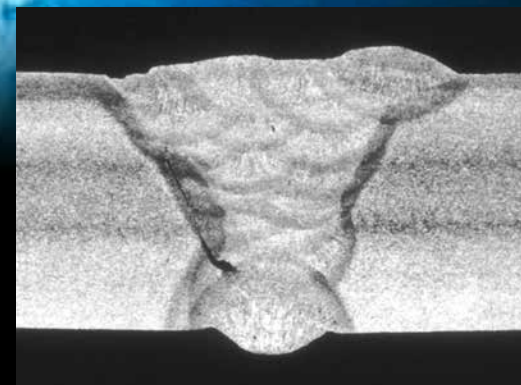
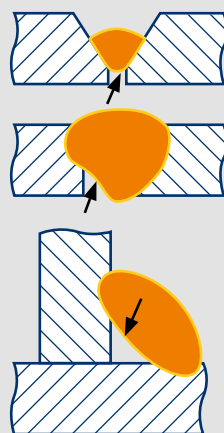
● 1. LACK OF PENETRATION/ROOT DEFECT

Cause

- Too small joint angle
- Too small gap
- Too large root face
- Wrong welding technique
- Too low heat input

Remedial actions

- Increase the joint angle (45 – 60°)
- Increase the gap
- Adapt the root face in relation to the heat input (1 – 2 mm)
- Decrease the oscillation of the electrode
- Increase the heat input



● 2. LACK OF FUSION

Cause

- Travel speed too low (weld metal starts to flow in front of the arc)
- Travel speed too high
- Arc voltage too low
- Too long "stick out" distance
- Contact tip worn out
- Insufficient inter-run cleaning
- Welding in inclining position (downhill)

Remedial actions

- Increase the travel speed
- Decrease the travel speed
- Increase the arc voltage
- Decrease the stick out distance
- Replace the contact tip
- Remove the surface slag prior to next run
- Adjust the travel speed in relation to the position



to adjust the process parameters to ensure that the weld quality complies with the desired result, without needing to disrupt the process or repeat the work."

Ohlsson adds that the new QA method has the potential to revolutionize the ways in which many of SSAB's customers utilize HSS, opening up opportunities for more applications to benefit from its superior qualities, which include lower component weight and reduced fuel consumption.

"Minimizing the occurrence of failures caused by fatigue will enable us to use HSS in many applications in which they cannot be used today – such as in machines and components that are known to be subject to high stress concentrations. Examples of these applications may include chassis for manufacturing and forestry equipment, trailer chassis and components used in energy production," says Ohlsson.

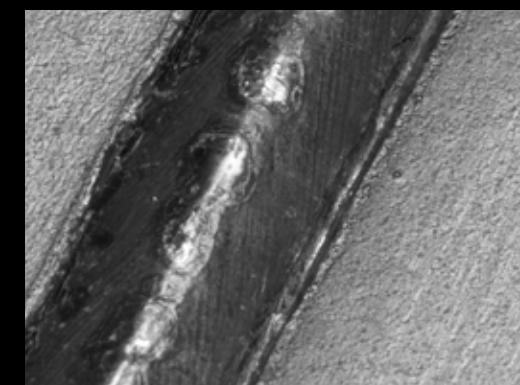
According to Stenberg, who won the 2015 Swedish Steel Prize "University Challenge" award from SSAB for his groundbreaking work on the new QA method, the method will deliver sig-

nificant benefits to the customers who implement it.

"Firstly, we expect productivity to increase by about 50 percent due to increased robot travel speed, coupled with a reduction of up to 30 percent in the consumption of weld filler material," he says. "It will also allow manufacturers to cut lead times, thanks to the reduced number of inspections, while the need to scrap or rework products will be minimized."●

“... the welding robot will be able to adjust the process parameters to ensure that the weld quality complies with the desired result, without needing to disrupt the process or repeat the work.

THOMAS STENBERG, PHD STUDENT
AT KTH ROYAL INSTITUTE OF TECHNOLOGY IN STOCKHOLM



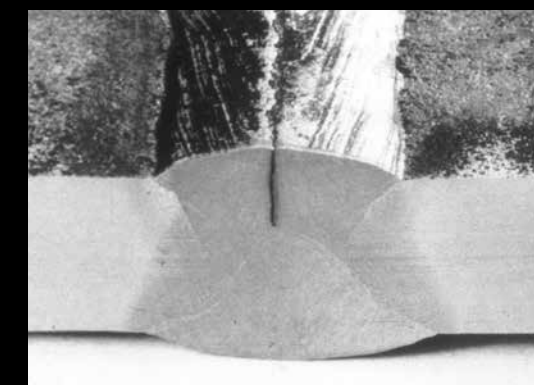
● 3. INCOMPLETELY FILLED GROOVE

Cause

- Too high travel speed
- Number of beads too few
- Misplaced weld bead

Remedial actions

- Reduce the travel speed
- Use sufficient number of beads
- Make sure that the weld bead covers the groove



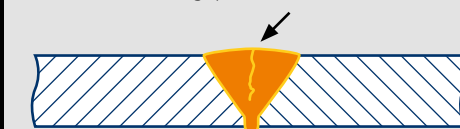
● 4. HOT CRACK/SOLIDIFICATION CRACK

Cause

- Weld bead too deep in relation to the width
- High C, S, P, Nb pick-up
- Too high travel speed
- Large root gap

Remedial actions

- Make sure that the width/depth ratio of the weld exceeds about 1.0
- The joint must be free from impurities
- Reduce the welding speed
- Reduce the root gap



IS THIS THE ANSWER?

Imagine an energy source that is cheap, clean and abundant. That's exactly what scientists believe fusion energy can achieve.

The quest to produce fusion energy started in the 1940s but it has stepped up a pace recently as a new wave of startups – financed by risk-loving entrepreneurs and governmental agencies – dig deeper into the mysterious world of fusion power.

by ALANNAH EAMES photo: VINCENT FOURNIER

SO, WHAT IS FUSION ENERGY?

Not to be confused with nuclear energy, it is basically energy that is formed when small atoms are squashed together to form bigger ones. This releases a huge burst of power that creates a lot of energy. The best example of fusion energy is the sun, which is a titanic fusion reactor, constantly squashing hydrogen nuclei into heavier elements to create sunlight.

Fusion could solve a lot of our current energy problems. It would produce much more energy than other sources like nuclear. And it's a clean energy source with no risk of radioactive disasters –

fusion reactors just stop working when they run into trouble. Another plus is that fusion runs on common elements like hydrogen, the most abundant element on Earth.

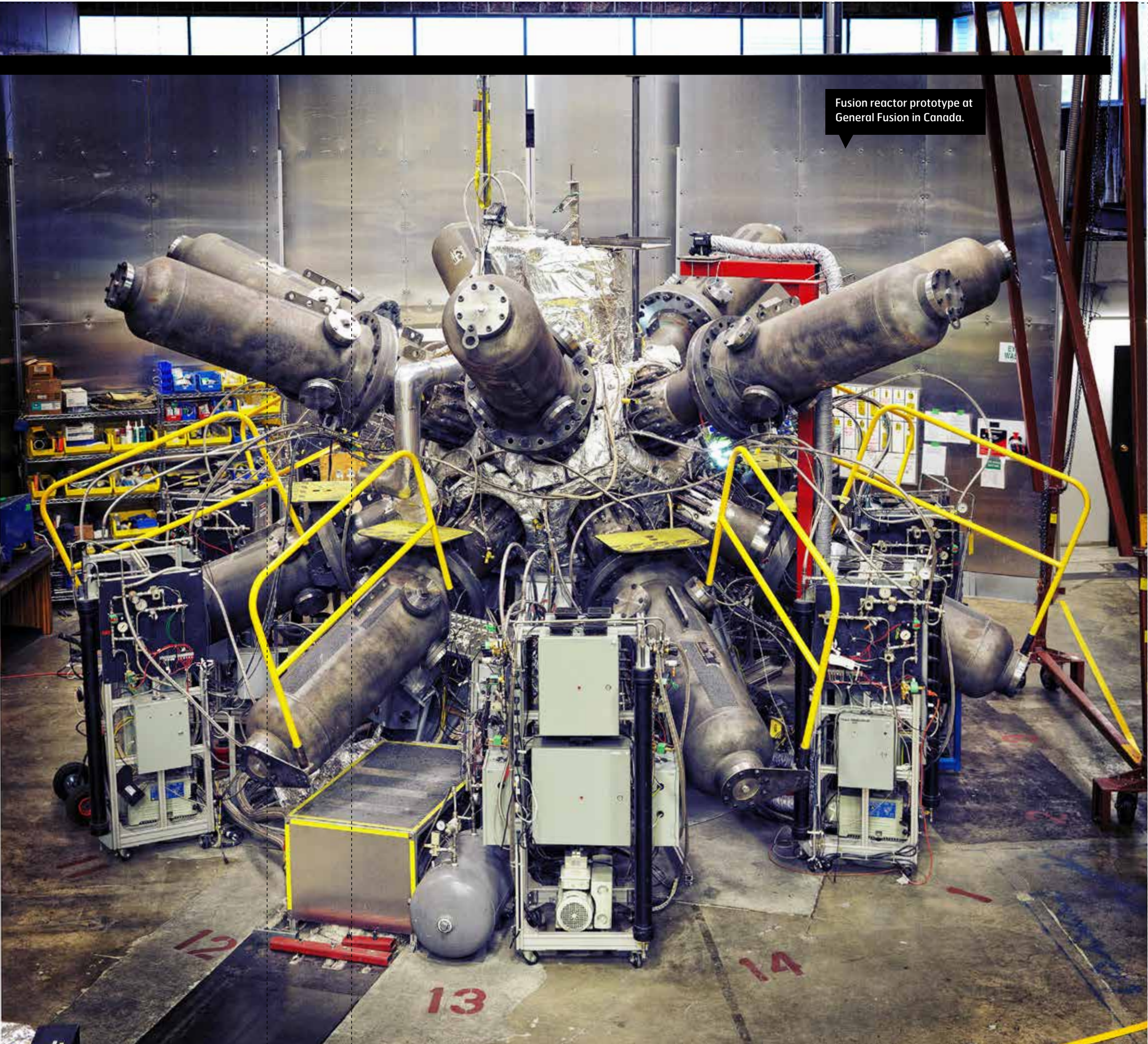
But scientists have been battling two major challenges for decades. The first is that atomic nuclei – positively charged protons and neutrons – don't want to fuse. To force them together, they have to be heated to extreme temperatures so they become a plasma. The plasma must be hot enough and the nuclei banged hard enough together so that they fuse. The second challenge is how to confine this plasma, which is neither liquid,

solid, nor gas. Another issue is to find materials – such as steel – for the wall linings of fusion reactors that can withstand high temperatures, high thermo-mechanical stresses and embrittlement.

An international consortium is currently building the International Thermonuclear Experimental Reactor (ITER) near Marseilles in France. It marks a milestone in fusion energy research but it's already behind schedule – it won't open before 2027 – and is over budget by USD 15 billion so far.

There's no doubt that fusion energy will be possible in the future. The only question is when. •

“There's no doubt that fusion energy will be possible in the future.”



Fusion reactor prototype at General Fusion in Canada.



● ABOUT FISKARS

Founded in 1649 as an ironworks in a small Finnish village, Fiskars is Finland's oldest company and produces products for the home, garden and outdoors. Its products are renowned worldwide for their functionality and cutting-edge design. Its most famous brands are Fiskars, Iittala, Royal Copenhagen, and Gerber.

Fiskars employs 8,600 people in 30 countries and had net sales of EUR 768 million in 2014. It is listed on the Nasdaq Helsinki Stock Exchange. More information at www.fiskarsgroup.com

Fiskars manufactures functional, long-lasting products made of strong, high-quality steel.

CUTTING EDGE

Fiskars' new WoodXpert Felling Lever is said to be one of the strongest tree felling levers in the world. **This breakthrough was possible thanks to the use of customized lightweight steel tubes from SSAB.**

by ALANNAH EAMES photo: FISKARS

FISKARS MAY BE Finland's oldest company – and some of its bestselling products may be hundreds of years old – but it never stops improving its products.

“At Fiskars we believe that even the simplest things can be made better and smarter,” says Markku Pietiläinen, Sourcing Manager, who purchases the company's raw materials and components.

“For example, take our ‘old’ Fiskars spade from the 1960s – it might look the same as the new one that you could buy today, but the old one is around 30% heavier. New materials mean we can make our products lighter and stronger, and this is better for the user.”

Fiskars' relationship with SSAB is a long one dating back to the 1960s.

As Fiskars' sales and manufacturing have become more global, Pietiläinen says SSAB is the perfect example of a top-quality supplier that can offer a global service for all of Fiskars' factories.

Fiskars' Wood Xpert Felling Lever, launched in 2015 and acknowledged as one of the strongest products of its kind in the world, is just one example of the strong collaboration between the two companies. The lever is used to bring a tree down safely but also to section logs for transportation. Improvements on its predecessor include a detachable log hook, a revised comfortable SoftGrip handle and a lightweight tubular steel

construction to make it easier – and lighter – for the user to handle.

“This product was only possible thanks to the joint collaboration with SSAB,” says Pietiläinen.

“We needed a 1,400 grade, a new kind of steel from SSAB with a special shape. Our R&D guys in Finland worked very closely with SSAB to create these steel tubes with a unique design and material.”

Like many other Nordic companies, Fiskars has a reputation for producing functional, long-lasting products. That's why they need top quality and take no risks with their suppliers.

“SSAB has very strong steel and has been a key partner for us in ensuring

“**SSAB is developing lighter and stronger materials, exactly what we want for our products. We're moving in this direction and this is something we can do together with SSAB.**

MARKKU PIETILÄINEN, SOURCING MANAGER





● FISKARS WOODXPERT FELLING LEVER

Fiskars’ new tree felling lever was launched in 2015. It is used for felling medium-sized trees and can also be used as a support for sawing and carrying logs. The blade drop is made from forged hardened steel and the shaft is made from lightweight special steel. All the boron steel used in the product comes from SSAB, which customized the material in collaboration with Fiskars’ product development team. The Wood-Xpert Felling Lever won a Red Dot product design award in 2015. Fiskars also buys Docol 500, steel tubes and boron steel sheets from SSAB for other products.



that we create lasting and functional products. The quality is very consistent with almost zero quality claims,” says Pietiläinen.

SSAB’s global network has also been a major plus for Fiskars, according to Pietiläinen. “Our factory in Slupsk, Poland, which produces garden tools, always tells me that SSAB is their favorite supplier as they are so reliable. They can’t find enough good things to say about SSAB.”

Fiskars wants to replicate this way of working at its other factories, such as its site in Oslo, Norway. “SSAB’s CEO and top managers visited our factory in Oslo. That was really nice. It makes us feel like they make time for us even if they have thousands of other customers,” says Pietiläinen.

Although Fiskars’ products already are tougher and weigh less, there’s still room for continuous improvement. “SSAB is developing lighter and stronger materials, exactly what we want for our products. We’re moving in this direction and this is something we can do together with SSAB,” he concludes. ●



- MY INNER STRENX**
- Members have priority access to the SSAB Knowledge Service Center, SSAB Tech Support, and dedicated technical advisors.
 - Most participants work within lifting and transportation, agriculture, offshore cranes, trains and light rail vehicles, and yellow goods.
 - All My Inner Strenx product stickers carry a serial number that can be tracked.

“A SIGNIFICANT CONTRIBUTION”

My Inner Strenx member Wielton’s commitment to product development makes it a long-haul candidate for capturing new trailer markets. by **ANN TÖRNVIST** photo: **ADAM LACH**

WARSAW-LISTED WIELTON SA is on its way to becoming Europe’s third-largest manufacturer of semi-trailers, trailers and truck bodies. Offering customers strength and levity are key to keeping on target.

“The Strenx logo adds even more credibility to our product offering. The cooperation with SSAB has definitely made a significant contribution in the competitive positioning of Wielton products,” says Marketing Director Jacek Kurowski.

Wielton has worked with SSAB for eleven years, using both Strenx and Hardox in its products, which translates into savings for the end users.

“There’s a saying in the industry that the truck is the transport company’s cost center, the trailer is the profit center,” Kurowski says. “The math is simple, the

lighter the trailer, the more you can carry.”

As the company sets its sights on further expansion – it already dominates the Polish market – durability will be key in markets such as Russia, Central Asia, the Middle East and North Africa, due to climate, road conditions, and usage. In Europe, the combination of lighter trailers and a continued focus on testing and validation will be key to expansion.

“Some customers may question super lightweight products, saying that ‘it’s going to bend, it’s going to warp, it’s going to distort’, and ‘How can it be so light and still work?’,” says Kurowski, adding that the answer to these questions is to crunch numbers.

“Soon Wielton will be only the second European manufacturer to have a testing and validation center for simulating the use of semi-trailers. We can put our

products through 1 million kilometres of heavy work conditions and say it’s good, nothing’s happened. Customers want to know that it’s not a throw-away item, but will have resale value.”

● **WIELTON AS**

Founded: 1995

Markets: 35 countries in Europe, North Africa and the Middle East.

Number of products: More than 65

SSAB metals used in production: Strenx 700 and Hardox 450.

Current focus of product development: Wielton is testing hybrid welding technology that links laser and GMA methodology. All test results are analyzed by Wielton and SSAB specialists.

PRE THINK YOUR CHOICE OF ROUNDBAR

GREAT TOOLS ARE PREHARDENED

Prehardened Toolox roundbar steel can cut your production time and give a better product at the same time. You can go straight from machining to production. No need to stop for time-consuming and costly heat treatment on the way. Toolox has excellent machinability thanks to low carbon content. The steel is both hard and tough for an extended service life, and ultra-clean for superior fatigue resistance. If you haven't tried Toolox yet, now it's time to prethink. toolox.com



SSAB