

DOCOL ROLL

THE NEW GENERATION OF
ROLL FORMING STEELS

Docol®



SSAB
SWEDISH STEEL

Safe, lightweight and cost-efficient: Advanced high strength steel products from SSAB

Advanced high strength steel products offer a whole range of advantages in comparison with conventional steels. First and foremost, they make it possible to build lighter components, allowing for greater weight savings in the end product.

SSAB's advanced high strength steel products under the Domex (hot-rolled), Docol (cold-rolled) and Dogal (hot-dip galvanised) brands are renowned worldwide for their quality. With Docol Roll, SSAB has now launched a multiphase steel whose primary components are a hard phase (martensite) and a soft phase (ferrite). Thanks to a special annealing process, at SSAB we are able to optimise the distribution of both phases, and thus to minimise any variations in hardness between them. This results in optimum forming characteristics for the steel, while still allowing for very stiff constructions weighing as much as 50 percent less.

Reduced weight, reduced CO₂ emissions

With today's focus on climate change, the need to achieve reductions in CO₂ emissions is becoming an ever more important factor in favour of lighter constructions. Utilisation of high strength steels also reduces the total volume of material required, something which reduces costs, not to mention the fact that the reduced volume of material to be processed translates into reduced requirements for transport and warehousing capacity. It is possible

to reduce weight by as much as 50 percent – while simultaneously optimising costs and improving performance.

Safety thanks to high strength

The high strength permits larger payloads while also increasing the durability of the products. The automotive industry is increasingly turning to high strength steels in order to improve the safety characteristics of its end products while simultaneously optimising costs.

Optimum processing and improved performance

Advanced high strength steel products from SSAB have outstanding processing characteristics, resulting in less production waste. This means that the utilisation of high strength steels also results in optimised production costs.

With Docol Roll we have taken yet another step: Take advantage of the benefits of this ultra-high strength steel in order to fully utilise and expand upon the possibilities offered by current forming technologies.

Automobile manufacturers are increasingly turning to high strength steels. They make it possible to reduce weight while also improving vehicular safety.



Ultra-high strength steels adapted for roll forming: Docol Roll

Not every steel is the same. Special processing methods require materials which are suitable for the production processes in question. Now with Docol Roll there is an ultra-high strength steel available which has been specially developed for roll forming.

We developed Docol Roll in response to the increasing utilisation of roll forming in the automotive, construction, electronics and furniture industries, making Docol Roll our contribution to improving the competitiveness of our customers.

Roll forming continues to increase in popularity

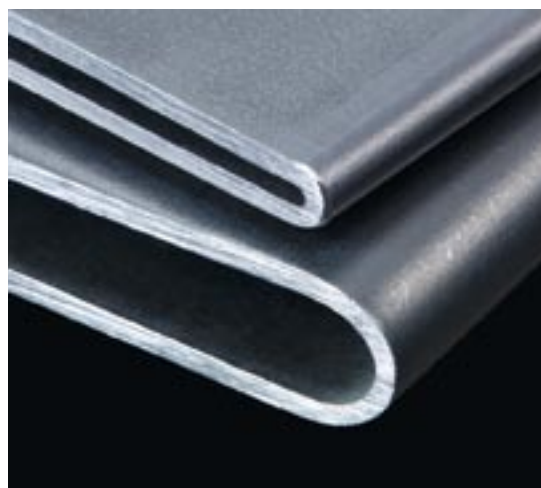
With roll forming, a piece of sheet metal is continually shaped by being fed through various pairs of rolls as it approaches the desired final shape. Unlike with standard punching or stamping, this allows for more elaborate constructions while reducing the number of individual work steps. In addition, the production lines can be expanded to include welding, punching, hydroforming and conventional stamping facilities. It is considered to be a very cost-effective manufacturing process for complex profiles, especially in large production runs. Other advantages of the roll forming process include the use of less material than with stamped parts and a minimisation of production waste.

Docol Roll – made especially for roll forming

Seat manufacturers and the automotive industry worldwide expressed a great deal of interest in Docol Roll even during the development phase. This material has been subjected to an extensive series of tests and adapted to the specific requirements of roll forming.

Docol Roll allows for **tighter radii** in a roll forming process than do comparable steel grades of similar strength. The finished profiles have high **dimensional stability** and are **well suited to welding**. It is possible to create more complex constructions with Docol Roll. The improved roll forming characteristics are a result of the **homogenous microstructure** of Docol Roll. During roll forming, Docol Roll **greatly reduces the springback** demonstrated by the finished components.

Docol Roll 1000 roll formed to a radius of 1x thickness and 2x thickness.



Docol Roll:

New steel, new possibilities

Docol Roll is an ultra-high strength steel that allows for extremely tight radii in a roll forming process.

Keeping the roll formed radii as tight as possible allows for the construction of more rigid and thus lighter components. When this is achieved using advanced high strength steel products, production is rendered a great deal more economical. It is possible to use less material to produce a lighter profile that is still capable of withstanding higher loads.

Best test results

In an extensive range of tests, Docol Roll has demonstrated markedly better results in the forming process than do conventional steel grades of the same strength. The improved microstructure leads to avoiding the formation of cracks, while also ensuring that there are no problems with evenness. Docol Roll also makes it possible to maintain very good straightness and dimensional stability even with long profiles. Docol Roll has high microstructural purity. The welding characteristics are good, not only for MAG, but also for high-frequency and

laser welding. This is due, among other things, to the small amount of alloying elements contained in this material. Docol Roll is suitable for the manufacture of seat rails and bumper reinforcements, as well as for any other applications which demand the tightest radii and highest level of strength in combination with high geometric tolerances.

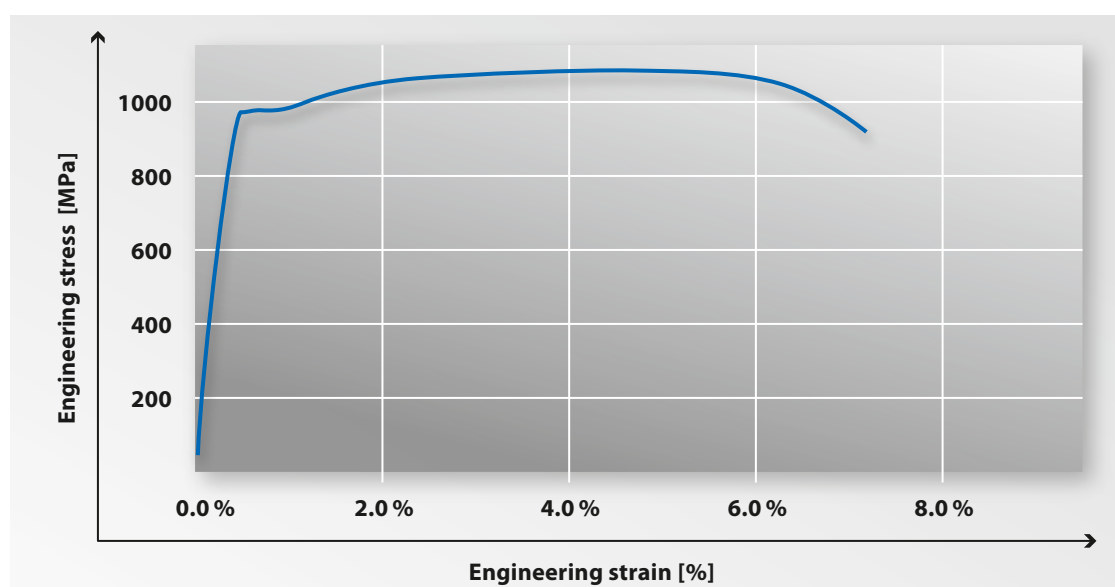
Very suitable for other forming processes

It is not only roll forming that benefits from the outstanding material characteristics of Docol Roll, for it is also very suitable for other forming processes.

Supply possibilities

High strength cold-rolled Docol Roll steel is available with a guaranteed minimum tensile strength of 800 N/mm² or 1000 N/mm². We also offer the following corrosion protected surfaces finishes – hot-dip galvanised and electro-galvanised.

The stress-strain curve of Docol Roll 1000.

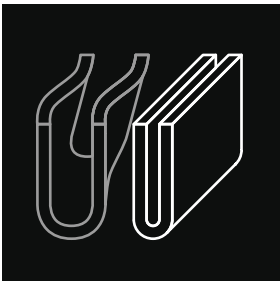


Five good reasons to choose Docol Roll



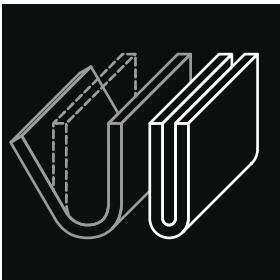
Tighter radii

Docol Roll allows for tight radii when roll formed, and makes it possible to produce constructions that are more rigid and lighter in weight while using less material.



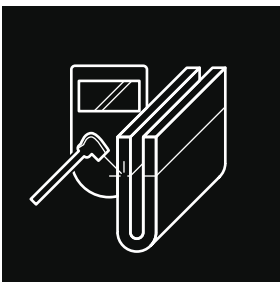
Less torsion

Docol Roll provides better straightness and dimensional stability even for longer profiles than do other high strength steel grades. Torsion and longitudinal bending are reduced to a minimum.



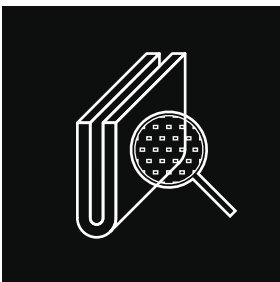
Greatly reduced springback during roll forming

During roll forming, Docol Roll shows greatly reduced springback in finished components.



Good welding characteristics

Docol Roll ultra-high strength steel has good welding characteristics. This is also true when it comes to welding it to other components produced from softer steel grades. Good results are also achieved with laser welding.



Homogenous microstructure

Docol Roll has high microstructural purity and a uniform hardness distribution, which is one of the reasons that this steel offers such good formability.

For more information on the individual material characteristics, as well as on what benefits they can offer for your production process, please visit our website at www.docolroll.com or speak directly with your SSAB sales engineer on location.



Top: Various roll-formed seat rails made from Docol Roll 800.



Right / top: An example of a car seat construction with seat rails.

Right / bottom: Seat rails made from Docol Roll 800. Manufactured by Johnson Controls South Korea.

Extremely tight radii: Seat rail manufacturers profit from Docol Roll

Manufacturing seats for the automotive industry presents tremendous challenges for component suppliers. There is increasing demand for intelligent seating systems that allow for a wide range of adjustments while also being compatible with various car bodies for different automotive manufacturers. In addition, the weight of such systems is also to be reduced in order to reduce vehicles' fuel consumption, all while safety standards continue to increase.

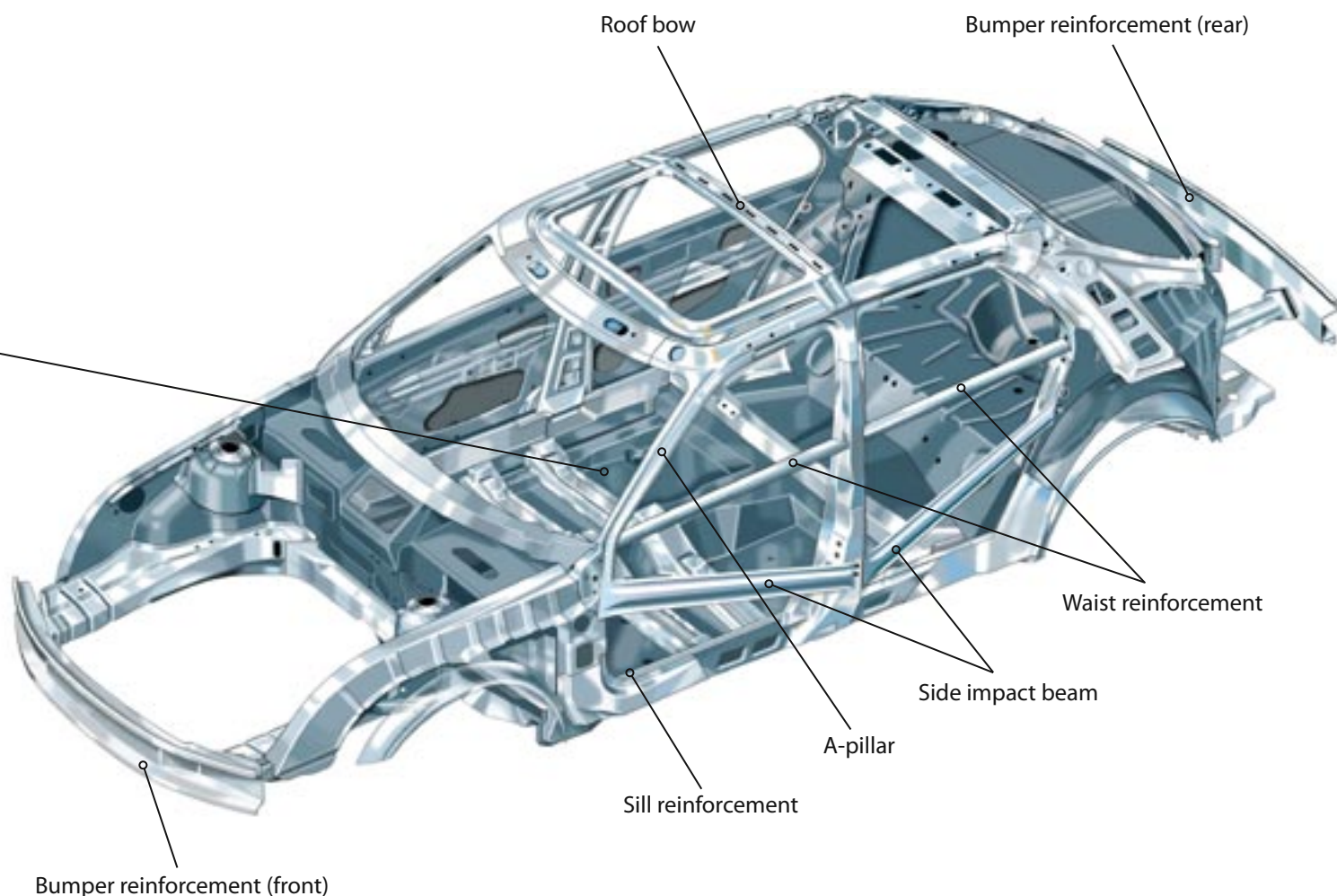
Johnson Controls places its trust in Docol Roll

The utilisation of Docol Roll in production makes more complex profiles possible thanks to the fact that this steel is perfectly suited to forming. It allows for radii that have not been possible with comparable steel grades without creating cracks. Automotive supplier Johnson Controls South Korea is not only impressed by this steel's outstanding roll forming characteristics, but also by the high material quality of Docol Roll.

Greatly reduced springback with roll forming

This ultra-high strength steel also offers optimised thickness tolerances in accordance with the highest standards. During roll forming, it is possible to minimize isolated cases of springback.

Using Docol Roll for roll forming allows for a marked reduction in profile thickness, facilitating the efficient production of elaborate mechanical components with improved straightness, especially in large production runs.



More options for the automotive industry

Design, comfort, safety and environmental protection: these all pose complex demands on modern automotive manufacturers, and cannot be considered in isolation.

Now with Docol Roll there is a steel available which is not only suitable for reducing weight, and thus fuel consumption, but which is also able to meet the most demanding safety requirements. In addition, savings in the field of materials create new spaces for additional components, making it possible to increase the comfort and safety of vehicles even further.

Docol Roll is also suitable for the production of other components of relevance to safety, such as side impact beams and bumper reinforcements.

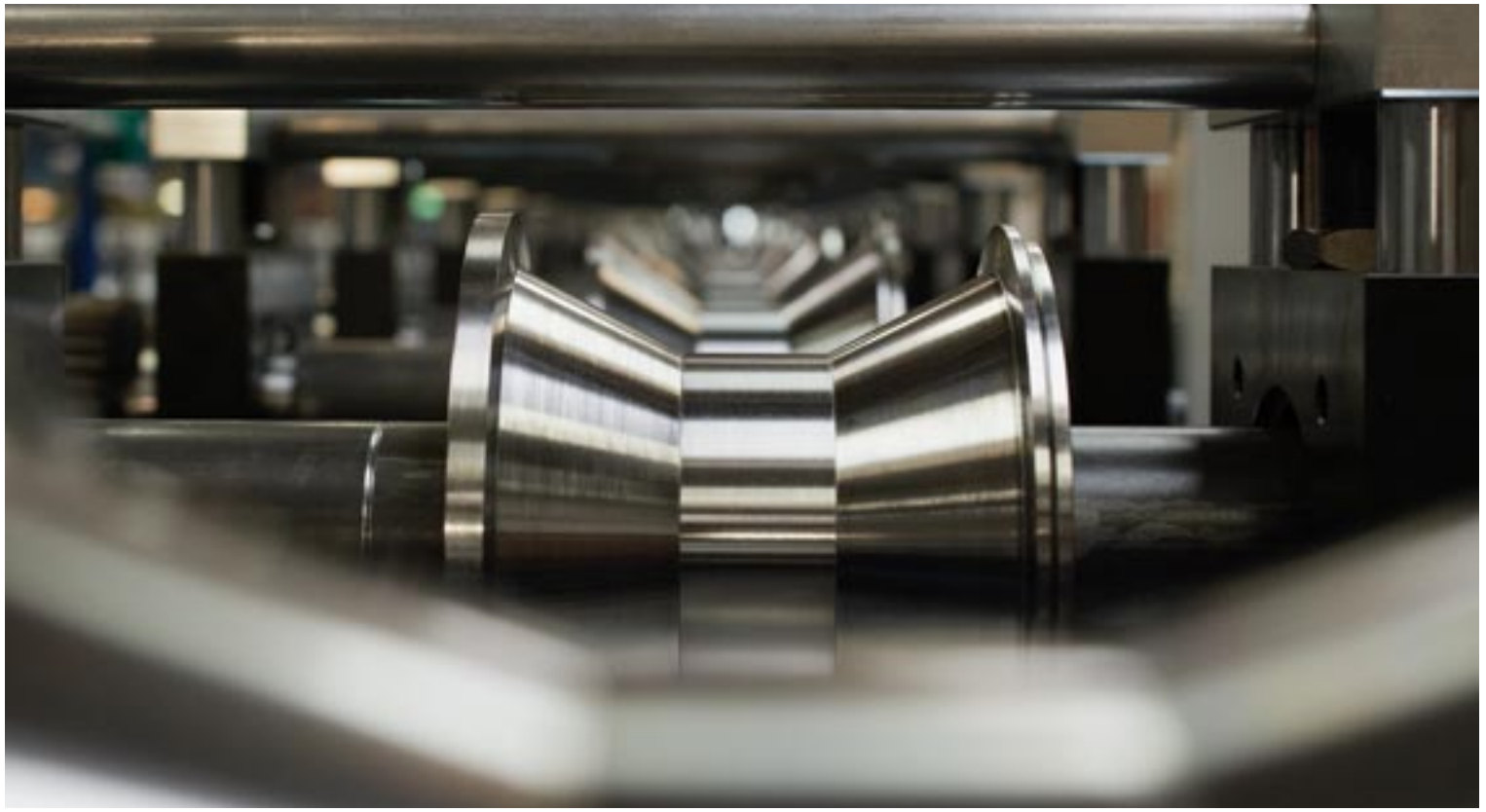
Developments for the future

The economy of the cars of the future will be determined by the materials on which we are working today. We see ourselves as a partner to our customers, working together to develop innovative concepts which ensure their competitiveness.

Other industries also benefit

It is not only the automotive industry. Other industries also benefit: from the advantages offered by Docol Roll. There are already a whole range of profile manufacturers in the furniture industry, construction industry, electrical industry and machine-building industry that are using the roll forming process, and these industries are also increasingly interested in processes which make it possible to produce thinner profiles that can withstand higher loads. Advanced high strength steel products are also able to achieve significant reductions in weight and cost here as well.

This model shows which components are suited to roll forming with Docol Roll.



More efficient production thanks to roll forming

Roll forming is considered to be a very cost-effective manufacturing process for complex profiles, especially in large production runs.

Steel formers are increasingly placing their trust in roll forming, a process which is cost-efficient, precise, consistent and reliable. With Docol Roll it is now possible to take even greater advantage of the possibilities of roll forming.

Steel strip is the starting material for a whole range of different rails and profiles in vehicle manufacturing and other industries. One of the two following procedures is generally used in order to get the sheet metal into the desired form: classic stamping or roll forming, which is also known as profile rolling. This process makes it possible to create more elaborately formed profiles than would be possible with the classic stamping process. Docol Roll does not form cracks even with very tight radii – which

means that the full potential of roll forming can be utilised with Docol Roll. Any springback manifested by the profiles is minimised when the roll forming process is used with Docol Roll. Practically any profile can be produced efficiently using this process – this reduces unit costs, especially with large production runs, thanks to the lower material consumption vis-à-vis stamped parts.

Impressive: The product characteristics in numbers

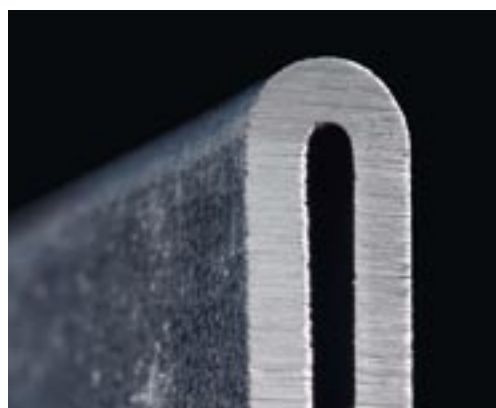
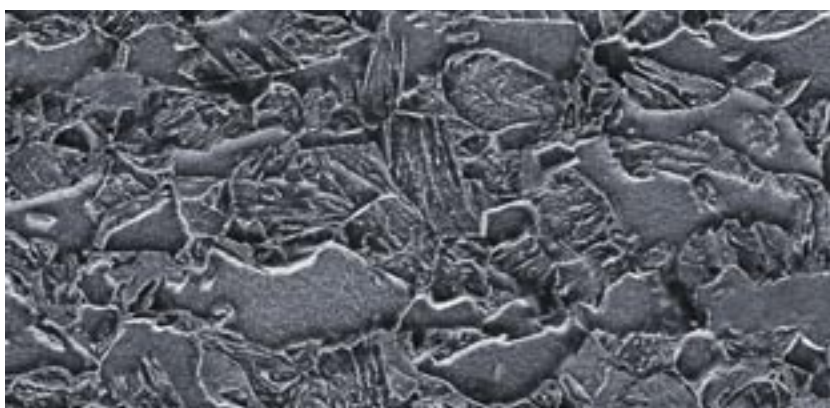
Mechanical properties

Steel grade	Yield strength (MPa)	Tensile strength (MPa)	Elongation A ₈₀ (%)	
	min	min	max	min
Docol Roll 800	600	800	950	10
Docol Roll 1000	850	1000	1200	5

In a well designed rollforming line it is possible to achieve a very tight radius as shown in the photo bottom right.

Chemical composition

Steel grade	C %	Si %	Mn %	P %	S %	Al %	Other alloying elements
	max	max	max	max	max	min	
Docol Roll 800	0.16	0.6	1.6	0.02	0.004	0.015	Nb
Docol Roll 1000	0.18	0.6	1.6	0.02	0.004	0.015	Nb



Dimension Range

Thickness: 0.50 – 2.10 mm

Width: max 1500 mm

The maximum width depends on steel grade and thickness.



Always a step ahead: Innovation is top priority at SSAB

SSAB is the largest steel producer in Northern Europe. We are pioneers and market leaders in the field of advanced high strength steel products, with more than 100 years of market success.

We have more than 40 regional offices which are available to you any time you require professional consultation.

Actively cultivating market niches

An important decision had to be made right at the start of this success story: should we produce for the mass market, or should we devote our energies to demanding projects in promising market niches? We decided to focus on the niches, with the objective of improving the competitiveness of our customers. This is why we strive to actively participate in configuring these niches, something which can only be done in close exchange with all market participants – and through the continuous development of our products. We also benefit from the optimised products of our customers, which is why we are willing to work with them when desired right from the early phases of construction and product development, assisting with advice as well as with concrete action. We see innovation as a vibrant process which can only reach its full potential in close cooperation with our customers.

Constant quality and professional consultation

We produce all of our advanced high strength steel products solely at our steel mill in Borlänge, Sweden. This allows us to maintain the continuous high quality of our products.

Present worldwide – regionally accessible

SSAB sells its branded products in more than 100 countries. Thanks to our more than 40 regional offices worldwide, we are able to guarantee professional service on location, making it possible to avoid time- and cost-intensive projects.

Certifications

SSAB is environmentally certified in accordance with ISO 14001, and has also obtained the ISO/TS 16949 and ISO 9001 certifications.

Test Docol Roll in your own production!

Three ways to get to know our products and the engineers behind them:
Call, click, request.

CALL

We have consultant engineers around the globe who will be happy to provide you with prompt assistance should you have any technical questions. They are specialised in the implementation and optimisation of our advanced high strength steel grades and Roll products for all manner. For your benefit.

CLICK

Would you like to find out more right now? If so, simply visit our website at www.docolroll.com, where you will find such things as a film that documents how easy it is to form Docol Roll into even the tightest bending radii. In addition, our website also offers additional information on the new possibilities which you have thanks to Docol Roll. If you have any queries you would like to send by email, please direct them to docolroll@ssab.com.

REQUEST

Request Docol Roll for test purposes today! It is available as slit strip, coil or sheet steel. You will receive your test material in the requested form soon thereafter. We will be happy to assist you with the utilisation of this steel in your production process, something which requires only minor adjustments.





SSAB Swedish Steel is the largest steel producer in Northern Europe and is the market leader in the field of advanced high strength steel products.

In 2007 the SSAB Group employed 10,000 people and achieved annual sales of approx. 48 billion Swedish krona (approx. 5.1 billion euros). The production capacity of the SSAB Group is approx. 6.5 million tonnes per year.

We work together with our customers to optimise processes in order to be able to provide products that are able to increase the economic competitiveness of our customers.

We produce the following products in our efficient state-of-the-art production lines and rolling mills:

DOMEX – Hot-rolled steel

DOCOL – Cold-rolled steel

DOGAL – Hot-dip galvanised steel

Our strengths include the quality of our products, our high delivery reliability and our customer service, which is renowned for its flexibility and technical expertise.

Find out about the outstanding material characteristics of Docol Roll for yourself: request test material and test it in your own production to see what all it can do. We supply test material worldwide within only a short period of time, and do so either as coil, sheet or slit strip.

For more information on the advantages of Docol Roll, contact our sales representatives or visit our website at www.docolroll.com.

Let's ROLL IT!



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