

# The Art of Engineering



**WELDOX<sup>®</sup>**  
STRUCTURAL STEEL



**W**ELDOX structural steel can help you to develop your company's engineering. By switching to WELDOX, you can manufacture lighter and more advanced products that are more competitive on the market.

The explanation for this lies in the steel's high yield strength. WELDOX is simply stronger than ordinary steel. You can consequently reduce the weight of your products without sacrificing strength. Alternatively, if you retain the weight you can enhance product features; for example, extending a telescopic boom, increasing the carrying capacity of a wheel-loader or reducing the number of axles on a mobile crane.

WELDOX is the world's leading high-strength structural steel. Among other accomplishments, we were the first in the world to introduce structural steel with a yield strength of 160 ksi. Our steel also has the market's recognized highest and most uniform quality.

WELDOX lets you develop products that are more attractive to your customers – and that push the boundaries of the art of engineering.

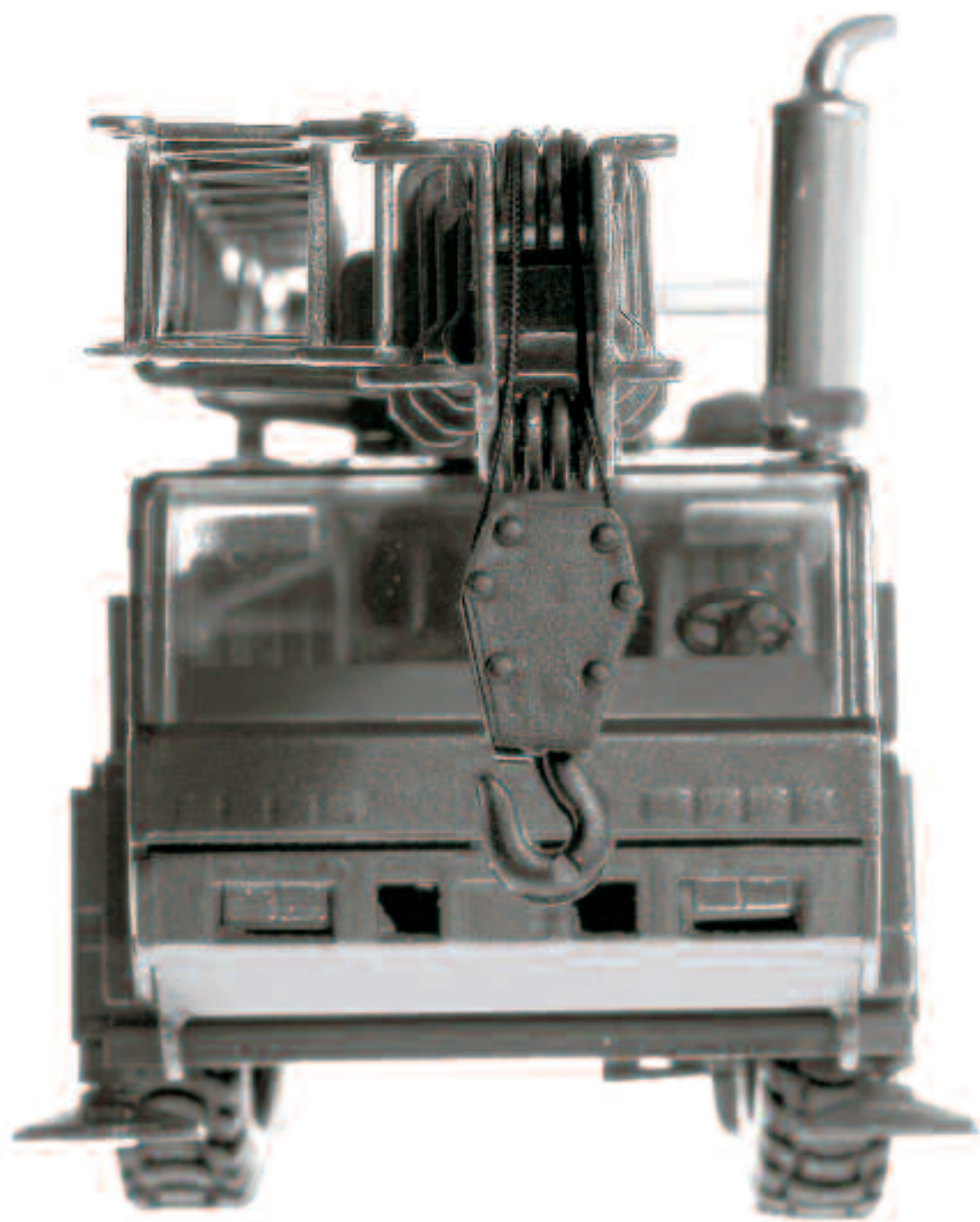
# WELDOX means lower weight. And higher profits.

WELDOX structural steel provides manufacturing companies with better overall economy.

Because WELDOX is stronger than ordinary steel, you need less material to achieve equivalent strengths in your products. Consequently, you can manufacture products that are lighter – and low weight is always attractive to end-users. This enables you to sell more and obtain a higher price per sold unit.

WELDOX has a higher price per ton than ordinary steel. Despite this, your material costs may decrease if you switch to WELDOX. This is because less material is used; in some cases only half as much. If a lot of welding is involved, you can reduce both the amount of consumables and welding hours. And save even more.







# What our customers have achieved



**Company:** Kocurek Excavators

**Contact person:** David Kocurek

**Location:** Ipswich, England

**Product:** Extra long booms for excavators

**Material replacement:** From A572-50 to WELDOX 100 and WELDOX 130

**Period:** Continual upgrading for 10 years

**Results:** Longer booms as the company changes to stronger steel

# with WELDOX.



**Company:** VM Trailer AB

**Contact person:** Peter Lindström

**Location:** Härryda, Sweden

**Product:** Trailers

**Material replacement:** From 70 ksi steel  
to WELDOX 100

**Results:** About 10 per cent lower weight



**Company:** AMPM

**Contact person:** Fabien Dillet

**Location:** La Motte Achard, France

**Product:** Sailboat keels

**Material replacement:** From A572-50 to  
WELDOX 160

**Period:** 1998–99

**Results:** Improved weight distribution, static  
strength and fatigue properties





**Company:** SM TRIPLEX AS  
**Contact person:** Jan Geir Kristiansen  
**Location:** Averøy, Norway  
**Product:** Deck cranes  
**Material replacement:** From A572-50 to WELDOX 100  
**Period:** 2001  
**Results:** 30 per cent lighter crane and base weights enable less ballast to be used, which reduces the vessel draught and fuel consumption

**Company:** Sany Heavy Industry Co Ltd  
**Contact person:** Liang Wengen  
**Location:** Changsha, China  
**Product:** Concrete pumps  
**Material replacement:** From import of finished booms to own production in WELDOX 130  
**Period:** 1999  
**Results:** Thanks to WELDOX being available in China, the company was able to switch to local production at its own facilities







**Company:** Liebherr – Werk Ehingen GmbH

**Contact person:** Josef Hauser

**Location:** Ehingen, Germany

**Product:** Mobile cranes

**Material replacement:** From WELDOX 140 to WELDOX 160

**Period:** 2001

**Results:** Increased lifting capacity and unchanged crane weight

# Three properties that make WELDOX number one among high-strength steels ...

**Closer thickness tolerances.** WELDOX has the market's closest thickness tolerances thanks to the plate being produced in one of the world's most advanced four-high rolling mills. Computers check plate thickness more than a hundred times per second during each pass. Between passes, the rolls are automatically adjusted to compensate for any deviations. After the plate is rolled, we measure and record the thickness to guarantee that the thickness tolerance complies with our precision guarantee – AccuRollTech™.



**Higher surface quality.** SSAB Oxelösund is continuously fine-tuning each process step – from metallurgy to stocking – to guarantee the highest possible surface quality for each plate. We take special care in minimizing the amount of oxide scale by constantly improving the rolling process and by descaling prior to rolling. To guarantee that the surface quality is high even after transport or storage, we coat the plate with shop primer paint after final processing.



**Improved flatness.** WELDOX has exceptionally good flatness, with the groundwork laid when the plate is rolled. Additionally, SSAB Oxelösund's quenching plant is designed to distribute cooling water evenly over the entire surface of the plate. This lets the plate cool more evenly and retain its flatness throughout the entire hardening process. Together, these processes combine to make WELDOX flatter than competing plate.



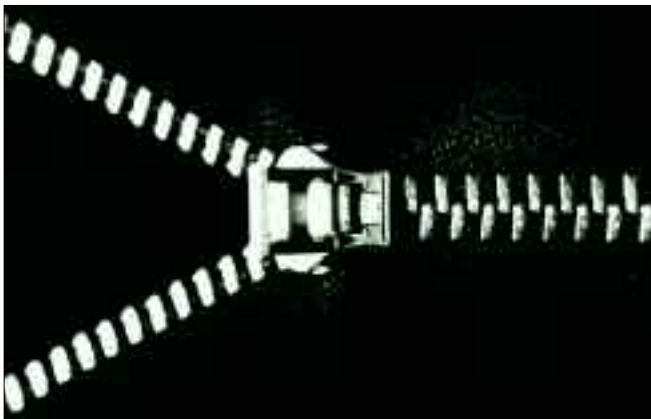
# ... and what they mean for you.



**More precise weight calculations.** Thanks to the close thickness tolerances, you can calculate weights more precisely than with other steels. With larger structural components, even small deviations in thickness can entail many unnecessary tons in weight. Because WELDOX plate thickness is very close to the nominal, you can also reduce your safety margins. This enables you to utilize the material more economically and further optimise your applications.



**Better surface finish.** It's no longer just consumer products such as automobiles that require good surface finishes. Demands for aesthetically attractive surfaces are increasing for most products, including construction machinery and mobile cranes. WELDOX' high and uniform surface quality helps you to meet these demands. Shop primer paint guarantees surface quality all the way to your plant, and at the same time, contributes to a cleaner work environment.



**Better fit.** The excellent flatness of WELDOX reduces the need to flatten and clamp the plate prior to welding and cutting, which simplifies production. The flatness also minimizes the effects of thermal stresses that can occur when welding, and subsequently improves the shape tolerances of your finished products.

# Some people think it's hard to work with WELDOX. Even though they've never tried.

You can work WELDOX using all standard mechanical and thermal processing methods. You can continue to use the same machines, methods and staff – regardless of whether you weld, cut or bend.

However, the steel places higher demands on work being carried out in accordance with the provided recommendations. Thick plates with the highest yield strengths, for example, should be preheated prior to welding.

It's easy to work WELDOX in the shop. This is primarily because the plate has exceptional purity and that the chemical composition resembles that of ordinary structural steel.

Compared to other high-strength steels, WELDOX has more uniform material properties, which contribute to the ease of workability. The world's most advanced process control and thermal treatment give the plate its consistently low content of non-metallic inclusions, evenly distributed internal stresses and uniform mechanical properties.

For more information on working with WELDOX, refer to our brochures *Machining, Welding, Cutting and Bending/Shearing*.





**Welding.** You can weld WELDOX together with all other types of steel, and use all common welding methods and consumables. To increase assurance against cold cracking, however, you may need to preheat the material. The preheating temperature doesn't need to be as high as when welding with other high-strength steels because WELDOX has lower content of alloy elements.

**Cutting.** You can cut WELDOX using all common cutting methods – gas, plasma, laser and abrasive water jet. WELDOX is easier to cut than most other high-strength steels. The plate doesn't move as much on the cutting bed because the internal stresses are lower and more uniformly distributed.



**Bending.** Because WELDOX is stronger than ordinary steel, more force per millimetre of plate thickness is required to bend the material. But thanks to WELDOX being stronger, the plate doesn't need to be as thick. This means that in practice, the requisite bending force is often lower.

Compared to other high-strength steels, WELDOX has closer thickness tolerances and more uniform mechanical properties. Repeatability is thus higher and bending results more consistent.

# The right steel for the right application. Neither more nor less.

Do you presently use ordinary structural steel? Or have you already switched to a high-strength steel such as WELDOX? Whatever the case, you can probably benefit by going up a strength class to reduce weight, utilize material more effectively and raise profit margins.

You have to find the right balance between the plate's performance, safety and weight. The plate must comply with strength requirements without being oversized.

Many choose plate without closer analysis of these parameters. When you buy WELDOX, we help you to make the right decision based on your circumstances. Together, we can analyze your present products and production processes. Thereafter, we recommend the plate with the most appropriate strength.

But the choice isn't always between different types of plate. Many components that are forged or cast can instead be manufactured in WELDOX at lower cost – primarily special, short-series products.

Our highest-strength steel, WELDOX 160, has the same weight-to-strength ratio as many high-strength aluminium alloys and can therefore be a cost-effective alternative to these materials as well.

WELDOX is currently available in four strength classes, with yield strengths from 100 to 160 ksi – and the product line is being constantly broadened. We direct development towards plate that optimizes properties such as weldability, bendability and toughness. We can also customize plate that fulfils your specific requirements.

**WELDOX 100**

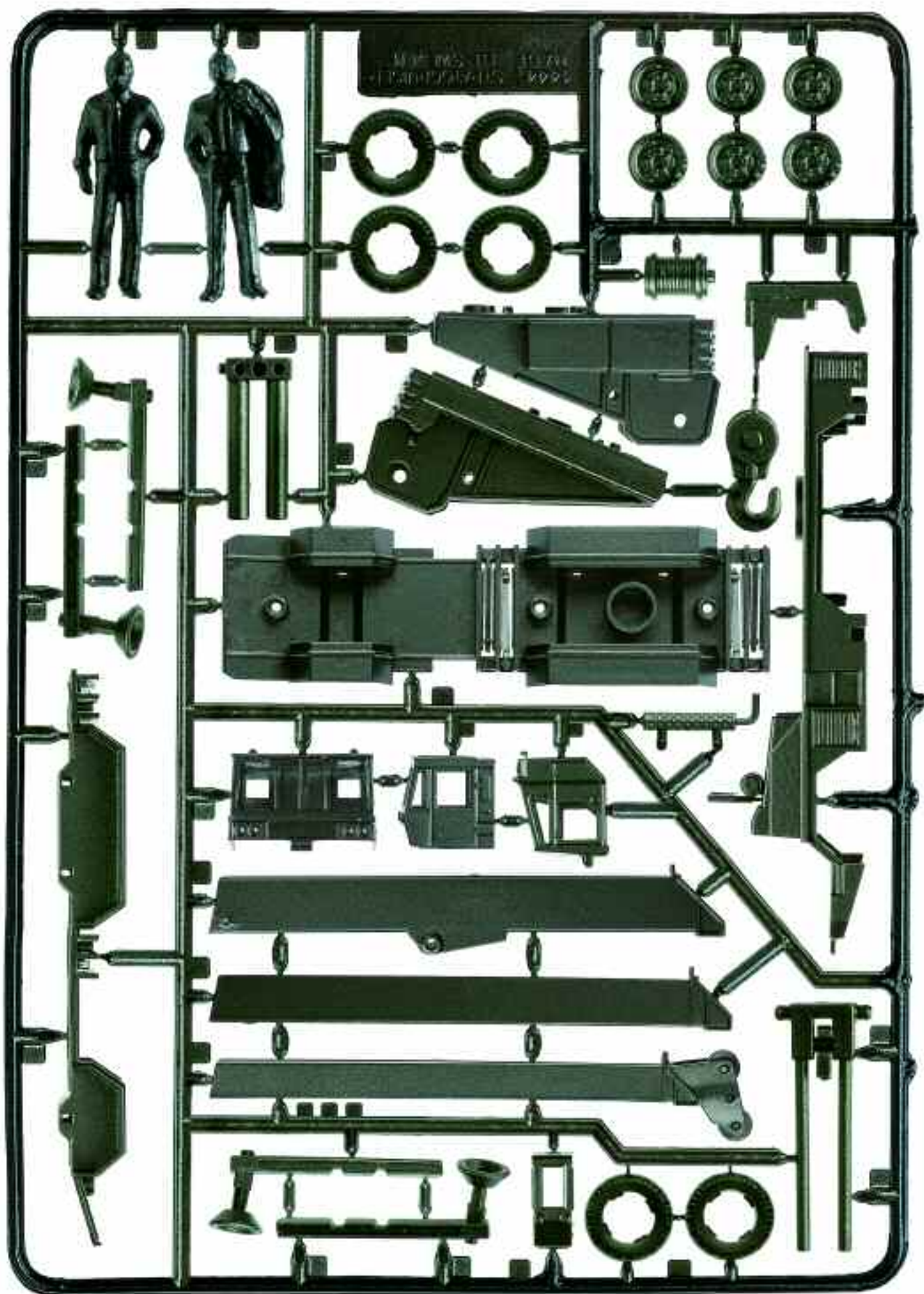
**WELDOX 130**

**WELDOX 140**

**WELDOX 160**









# You know your market, we know our steel. Together we refine your products.

The right structural steel is a good beginning. But to exploit the advantages of WELDOX, knowledge of its capabilities and limitations is required. We have that knowledge.

Our application engineers guide you to optimal utilization at no extra cost. Among other things, you'll receive tips on how you can design and produce smarter with WELDOX.

The transition to WELDOX may, for example, entail that you replace an expensive process step with an inexpensive one. Because the strength is higher, you can choose lighter plate that in many cases can be sheared instead of cut – or bent instead of welded.

But when reducing the plate thickness, you have to take special care to avoid global or local buckling and fatigue. At the same time, some aspects of your production may need to be adjusted. We'll help you with all this.

Application engineers are stationed in most markets the world over. Our global presence is especially advantageous when you have operations in several countries, since we can provide the same service and information to all of your offices or plants.

Our customers provide us with continuous feedback on how WELDOX performs in practice. In this way, we constantly gain new knowledge, which benefits you in the form of better advice.

# We're close to you wherever you are.

Our customers are located in more than 100 countries worldwide.

We have offices staffed by our own personnel in over 40 countries; our colleagues speak your language and understand the conditions that apply in your local marketplace.

Thanks to our global distribution network, we can guarantee delivery of stocked items within 48 hours – wherever you are.

Call our main office at +46 155-25 40 00 or visit our website at [www.ssabox.com](http://www.ssabox.com) for information on your closest distributor.



**This is where you'll find our offices and distributors:**

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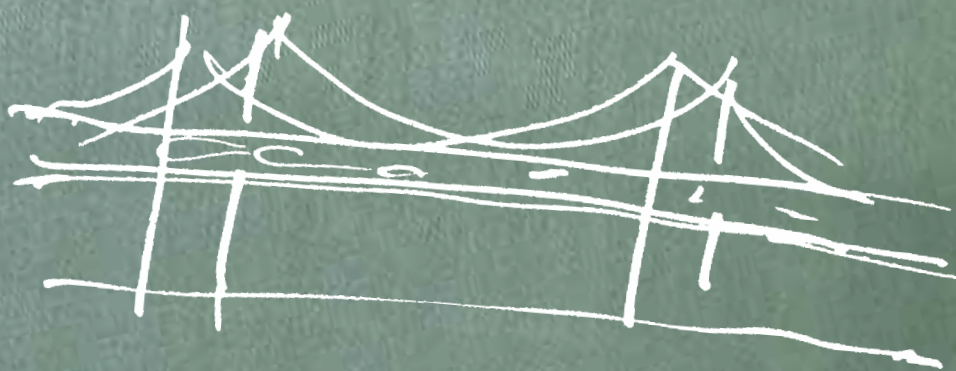
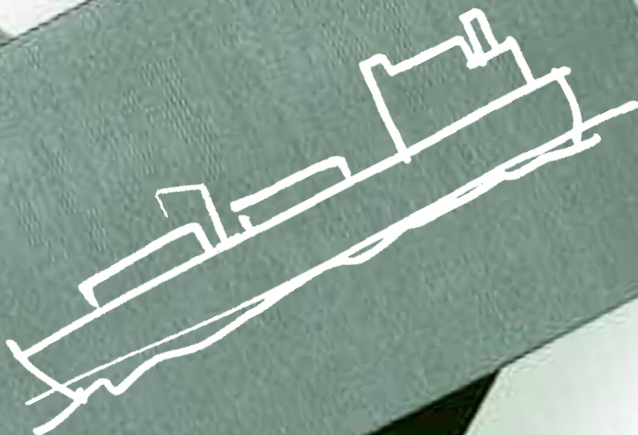
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$$\frac{t_2}{\gamma} \sim \sqrt{\frac{R_{e2}}{R_r}}$$



SSAB Oxelösund – a subsidiary of the SSAB Svenskt Stål steel group – is the world's leading manufacturer of quenched and tempered heavy plate, with renowned brands like HARDOX and WELDOX.

HARDOX is a wear-resistant steel plate for applications demanding high durability and long service life, such as excavator buckets and tipper bodies. WELDOX is an especially strong structural plate for many applications; for example, bridges and cranes.

The steels are internationally recognized for their high and uniform quality, and with consideration to their extreme material properties, ease in bending, welding and cutting.

Our experienced application engineers work closely with customers all over the world in helping them to draw full benefit of the steel's unique properties and in achieving optimal overall economy.



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