TOOLOX®
ENGINEERING & TOOL STEEL

“ONCE TOOLOX® ALWAYS TOOLOX®”

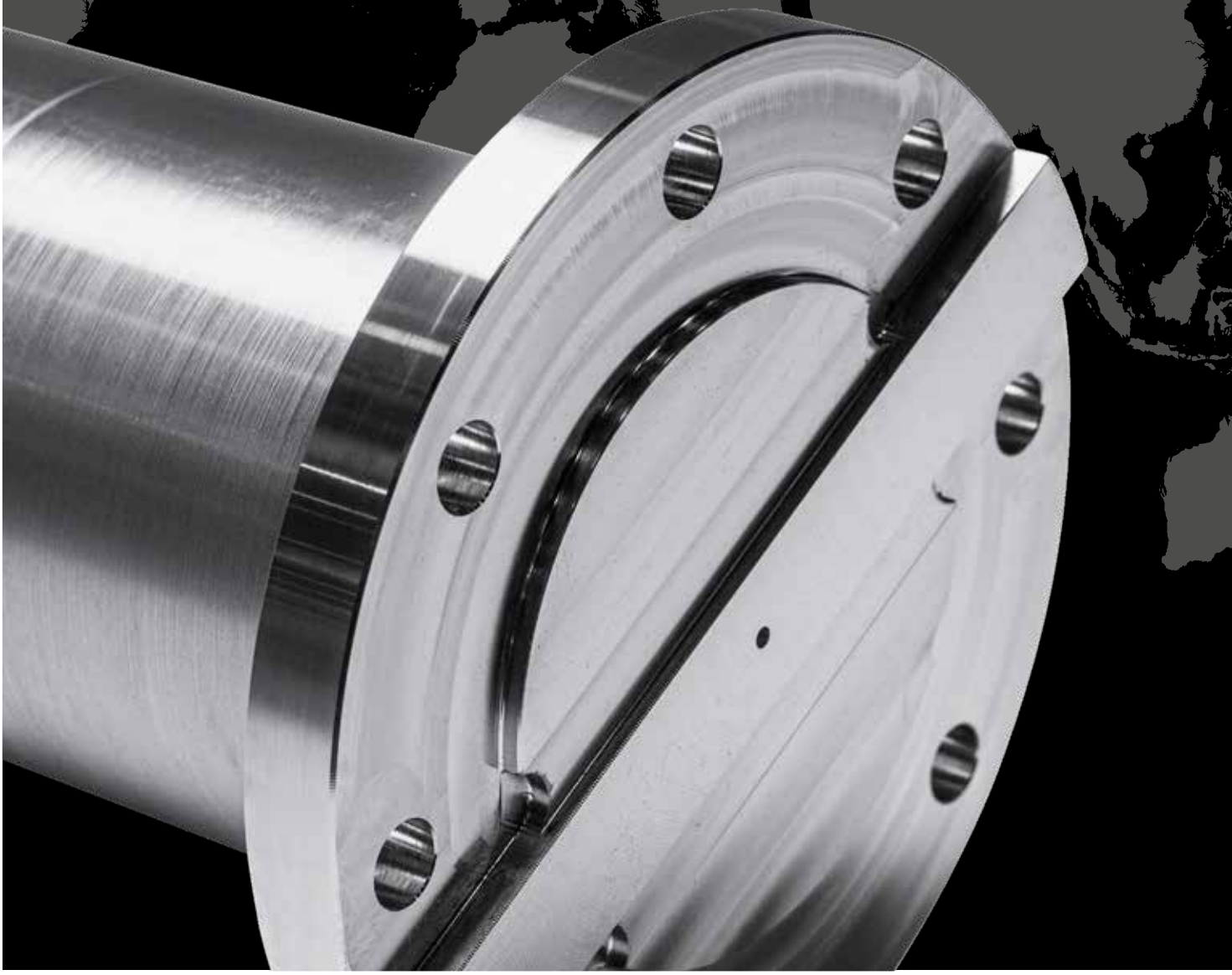
FROM THE GLOBAL LEADER IN HIGH-STRENGTH STEEL

SSAB

TOOLOX®

ENGINEERING & TOOL STEEL

Oxelösund, Sweden



FROM SWEDEN WITH STEEL

SSAB has been in the steel business since 1878, when Domnarvet Ironworks started making steel using high-quality iron ore from Swedish mines. We have continued this proud tradition by developing new and innovative steels, based on clean iron ore, world-leading production technologies and material expertise.

Our company vision is to contribute to a stronger, lighter and more sustainable world. Together with our customers, we will go further than anyone else in realizing the full potential of lighter, stronger and more durable steel products.

Specializing in special steels
SSAB is a highly-specialized steel company with a global leadership in value-added high-strength steels. Our product portfolio contains not only Toolox® engineering and tool steel, it also includes our other well-known brands, Hardox® wear plate, Strenx® performance steel and Armox® protection plate. These brands are part of SSAB Special Steels, which is the largest international producer in this segment.

As a Toolox® customer – whether you are in precision machinery, automation, maintenance, high pressure die casting, punch and die tooling, press forming or platic moulds – the applications where your components are used will benefit from superior performance and service life.

TOOLOX® ENGINEERING & TOOL STEEL
HARDOX® WEAR PLATE
STRENX® PERFORMANCE STEEL
DOCOL® THE AUTOMOTIVE STEEL

A CULTURE OF COLLABORATION

Forming close partnerships with our customers has always been a cornerstone of SSAB's business model. Working together on the design and development of new products leads to faster production processes and optimized performance.

Close collaboration also gives us a good understanding of present and future customer and end-user needs, which guides our development of steel grades that will satisfy new market demands.

SSAB's way of working is always focused on creating maximum customer value. This applies to more than providing premium high-strength steel. The entire company is fine-tuned to take care of all our customers' needs in a direct and personal way.

Maybe it's our Nordic heritage of building flat and customer-focused organizations that makes a difference to your advantage. Whatever the reason, we know it is something that customers all over the world appreciate.

THE WAY WE MAKE TOOLOX®

Toolox® starts with pure iron ore being melted at our Swedish mill in Oxelösund. The steel is vacuum degassed and continuously cast, using a special process developed in Sweden called CSR (Controlled Soft Reduction). This process gives a homogenous steel with low levels of inclusions.

Thanks to the high metallurgical purity, the cleanliness and very low sulphur content Toolox® corresponds to an ESR (Electroslag Remelting) quality material.

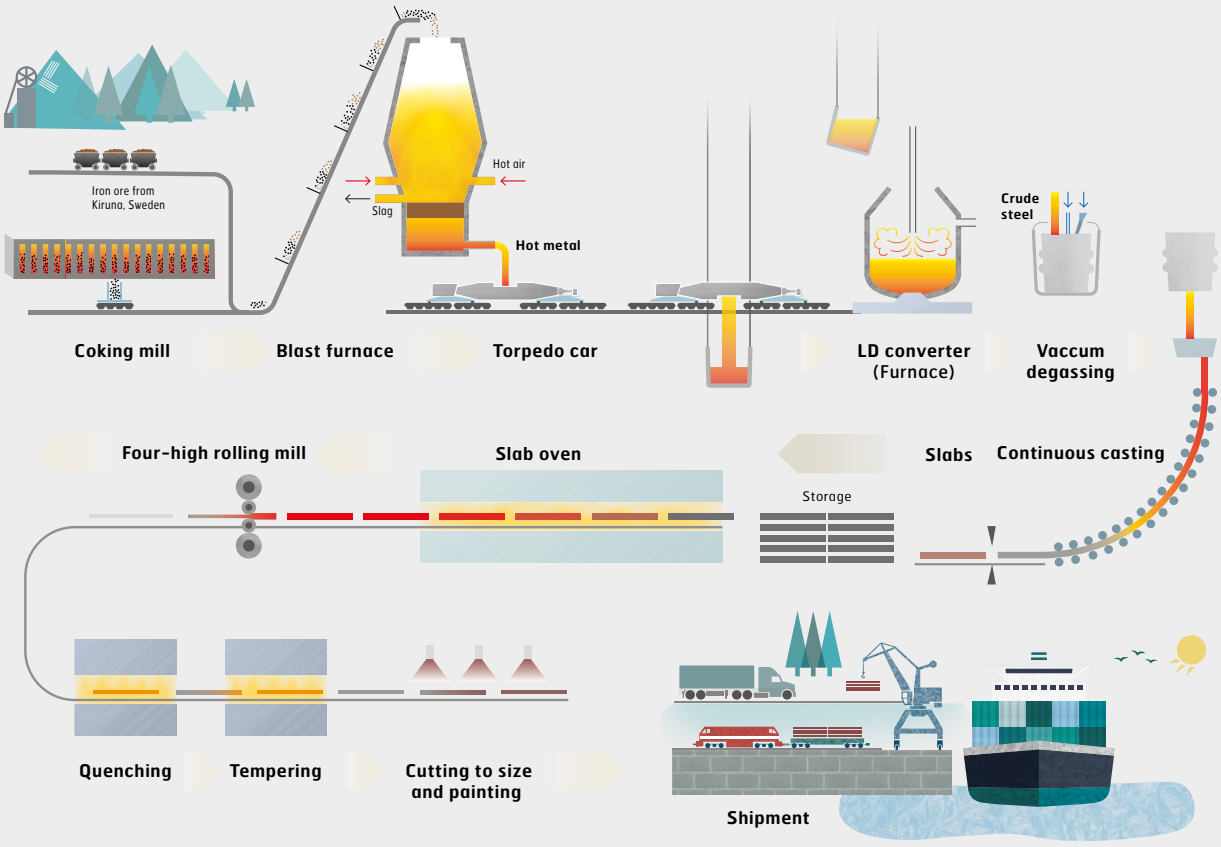
The next step is rolling of the slabs to the desired thickness and width. SSAB's four-high rolling mill in Oxelösund can apply a force of 100,000 kN (10,000 tons) to the steel, making it one of the world's most powerful rolling mills.

Rolling is a high-tech process that requires the rolling masters in the control room to have many years of experience.

Every grade of Toolox® has its own rolling parameters, preparing the steel for the final step: Quenching by rapid cooling with water and tempering to give Toolox® its final properties.

Toolox® engineering and tool steel is made to exact specifications at SSAB's Oxelösund steel mill in Sweden. From iron ore to finished products, the Oxelösund mill produces steel that makes machinery more efficient, withstands extreme wear and is exceptionally strong.

Scan the QR code to learn more



TOWARDS A FOSSIL-FREE FUTURE

The basic technology for producing steel has been virtually unchanged for centuries. This is about to change. With HYBRIT – Hydrogen Breakthrough Ironmaking Technology – SSAB aims to be the first steel company in the world to bring fossil-free steel to market by 2026. The first step has already been taken, with the completion of a globally unique pilot plant using hydrogen for the production of fossil-free iron.

Sweden has unique conditions for such a project. We have access to the purest iron ore in Europe, which is processed in a highly specialized and innovative steel industry. In addition, we have access to the fossil-free electricity required to produce hydrogen gas in a sustainable manner.

Since hydrogen will act as the reducing agent, the by-product of the process is water rather than carbon dioxide – practically eliminating CO_2 emissions from the steel production. The aim is to have full-scale production of fossil-free steel using the HYBRIT technology by 2045.

TOOLOX®, A SWEDISH STEEL DEVELOPED FOR WORLD-CLASS PERFORMANCE

”Once Toolox®, always Toolox®”. It’s our way of summarizing the performance of this premium engineering and tool steel. Toolox® outperforms a wide range of conventional steels for machining and tooling.

Toolox® is developed to save time when manufacturing all kinds of high-quality components, as well as ensuring that the final products deliver maximum performance, productivity and service life.

THE IDEA:
Develop an engineering and tool steel that is extremely consistent and meets the requirements of today’s processing equipment.

THE PROCESS:
Utilizing SSAB’s experience in making high-strength steel to reach a unique combination of properties.

THE RESULT:
A versatile engineering and tool steel for high workshop performance and end user satisfaction.

> To me “Once Toolox®, always Toolox®” is a good description of the material. If you have an application where Toolox® is the solution for today, it will be also the solution tomorrow, because you can trust the Toolox® quality and metallurgy.
>
> Peter Recknagel, Gebrüder Recknagel Präzisionsstahl GmbH.

All in one steel
For starters, Toolox® had to have excellent machinability and dimensional stability in machining operations. We also combined the machinability with high hardness by prehardening the steel to avoid the need for additional heat treatment after machining. This was made possible by a low carbon content, a suitable mix of alloying elements and a carefully controlled quenching and tempering process.

The machinability and prehardened properties save time and make your production much more cost-effective compared to standard steels. When your customers say they want it fast, you can deliver without compromising on quality and performance.

The chemical composition and the production process also gives Toolox® its high impact toughness and crack resistance, properties that ensure flawless performance in the end user’s equipment. Fatigue resistance is another vital property in Toolox® since it gives long service life for the components. This was secured by the steel’s superior cleanliness,making it exceptionally suitable for surface engineering, polishing and texturing.

Scan the QR code to learn more

ONE STEEL – TWO WINNERS

WORKSHOPS
Toolox® makes workshops winners in terms of short lead times and high precision of the final parts.

END USERS
Toolox® makes end users winners since their machine components and tools work harder and last longer.

APPLICATIONS WHERE TOOLOX® SAVES TIME AND IMPROVES PERFORMANCE

MACHINE COMPONENTS

Workshop machinery

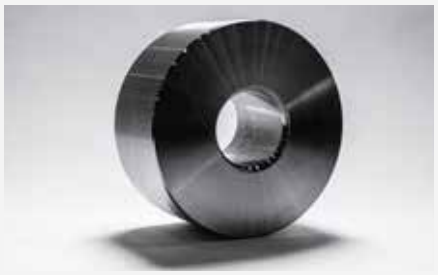
Gears and gear racks

Tool holders

Guideways

Process industry

Chain wheels



Steering wheels

Coke wagons

Recycling

Hammer pins

Knives

Shafts

These are some common applications for Toolox® engineering and tool steel. Visit toolox.com for more in-depth presentations of where Toolox® is used for machine components, molds and dies.

Scan the QR code to learn more

MOLDS AND DIES

Cold work

Cold forming tools

Punching tools

Hot work

Die casting dies

Forging dies

Plastic

Injection molds

Plastic molds

PRODUCT PROGRAM

A WIDE RANGE OF PLATES AND BARS

Toolox® in standard dimensions is available as plates from 6 to 130 mm and bars between diameters of 21 to 172 mm with lengths up to 5000 mm.

For plates up to a thickness of 170 mm and bars with diameters up to 353 mm, please contact SSAB Sales.

Scan the QR code to learn more

Toolox® engineering and tool steel (typical values)

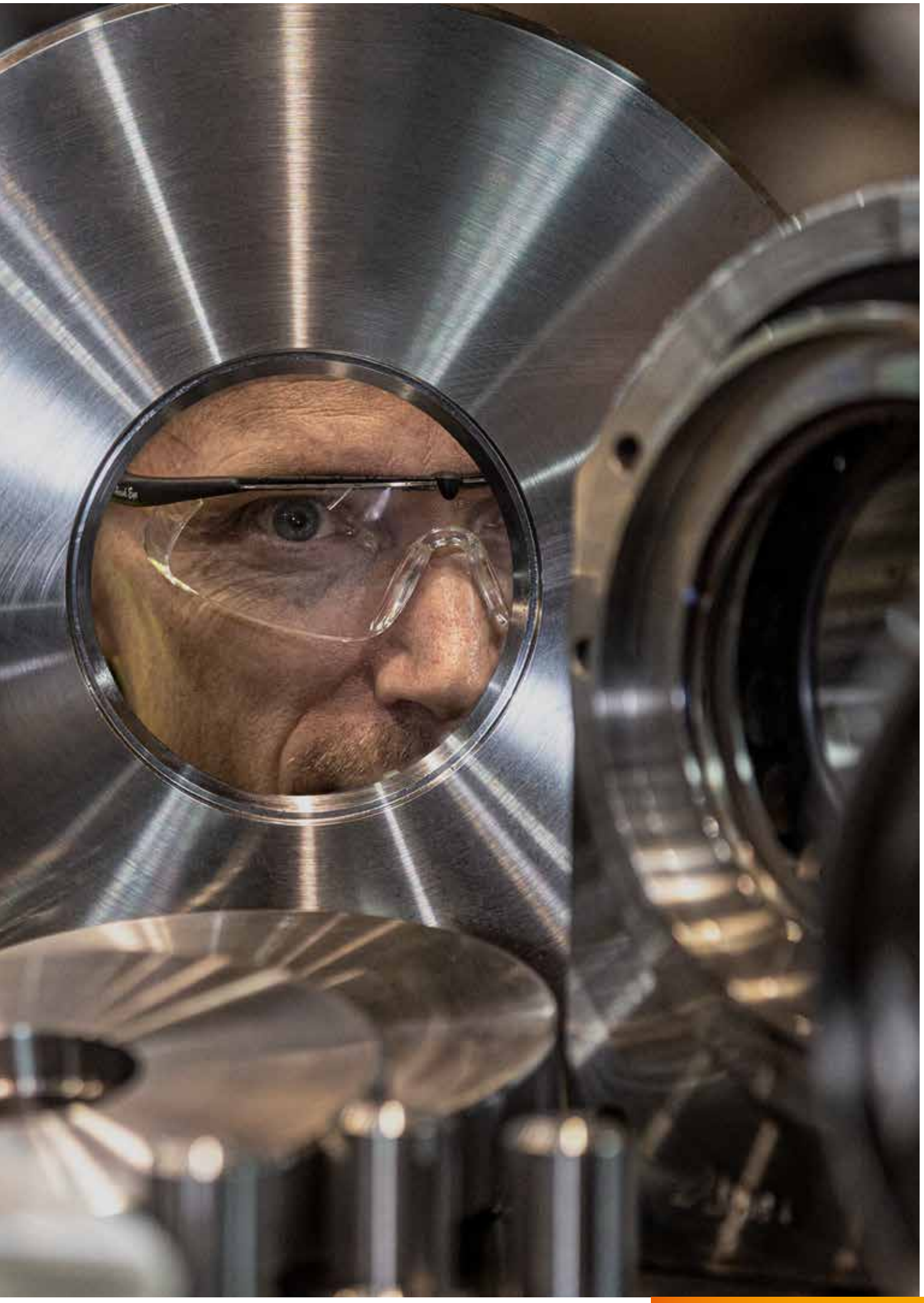
Temperature °C (°F)	Hardness HBW	Impact toughness Charpy-V, J	Yield strength $R_{p0.2}$ MPa (ksi)	Tensile strength R_m MPa (ksi)	Elongation A_5 (%)	Plate thickness mm (inches)	Bar diameter mm (inches)
Toolox® 33 – A quenched and tempered engineering and tool steel, designed to have low residual stresses – resulting in good dimensional stability.							
-40°C (-40°F)						6 – 130 mm (0.236″ – 5.12″)	21 – 141 mm (0.827″ – 5.55″)
-20°C (-4°F)							
20°C (68°F)	300	100	850 (123)	980 (142)	16		
200°C (392°F)	305	170	690 (116)	900 (131)	12		
300°C (572°F)	290	180	680 (99)				
400°C (752°F)	270	180	590 (86)				
500°C (932°F)			560 (81)				

Temperature °C (°F)	Hardness HBW	Impact toughness Charpy-V, J	Yield strength $R_{p0.2}$ MPa (ksi)	Tensile strength R_m MPa (ksi)	Elongation A_5 (%)	$R_{c0.2}$ after 170 hrs soaking time at actual temperature* MPa (ksi)	Plate thickness mm (inches)	Bar diameter mm (inches)
Toolox 44® – A quenched and tempered engineering and tool steel with very low residual stresses. Despite a typical hardness of 45 HRC, it has very good machinability, unmatched in the market.								
-40°C (-40°F)							6 – 130 mm (0.236″ – 5.12″)	21 – 172 mm (0.826″ – 6.771″)
-20°C (-4°F)								
20°C (68°F)	450	30	1300 (189)	1450 (210)	13			
200°C (392°F)	440	60	1150 (174)	1340 (194)	10			
300°C (572°F)	415	80	1040 (151)	1270 (184)	12			
400°C (752°F)	380	80	980 (142)	1190 (173)	14	1060 (154)		
500°C (932°F)	345		825 (120)	1010 (147)	19	910 (132)		

Plates are tested in transverse direction. Bars are tested in longitudinal direction.
The typical testing temperature for Toolox® is room temperature.
All other values are tested randomly and are for information only.

WHY TOOLOX® OUTPERFORMS ON EVERY CHALLENGE

- HARDNESS AND TOUGHNESS
- FATIGUE RESISTANCE
- MACHINABILITY
- SURFACE TREATMENT
- HEAT RESISTANCE
- WELDING AND CUTTING
- PRODUCTION EFFICIENCY
- LONGER LIFETIME
- GUARANTEES

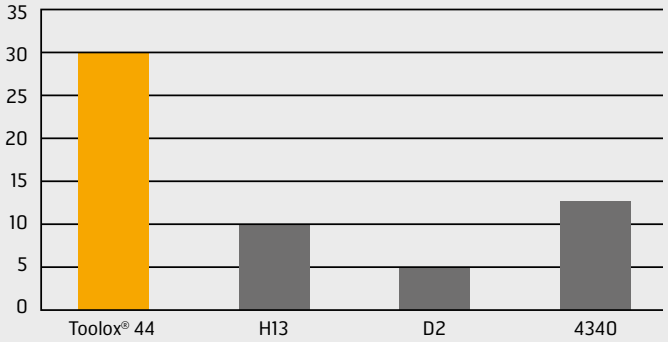


THE BEST OF BOTH WORLDS

Making a hard steel is easy, if you're only looking for hardness. The tricky part is to make a steel that is both hard and tough. A steel such as Toolox®. With hardness that gives a long life time even with highly abrasive applications, and toughness that enables it to withstand cracks and fatigue.

Hard to the core
All Toolox® grades have the same hardness all the way through. You can machine Toolox® plates and round bars to any complex shape, knowing that all surfaces are equally hard.

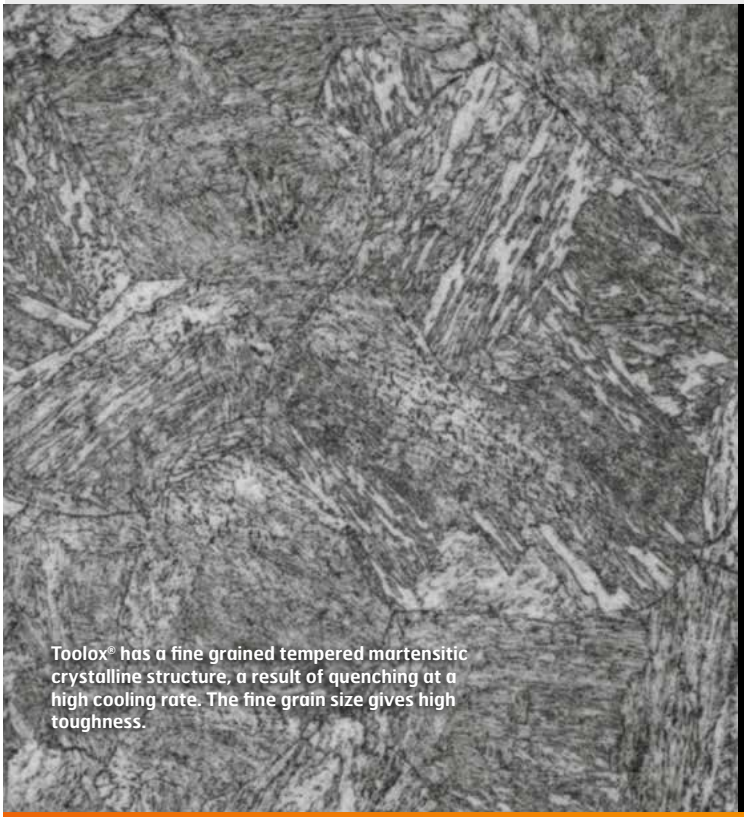
Impact toughness, Charpy-V (J) at 20°C



The table shows the toughness of Toolox® 44 compared to some standard steels that are heat treated to 45–55 HRC. Toughness values for Toolox® at -20°C are stated in the product certificates.

Grade	Hardness (HB)	Yield strength (MPa)	Tensile strength (MPa)	Elongation A_5 (%)	Toughness at +20°C (J)
Toolox® 33	275-325	850	980	14	100
Toolox® 44	410-475	1300	1450	13	30

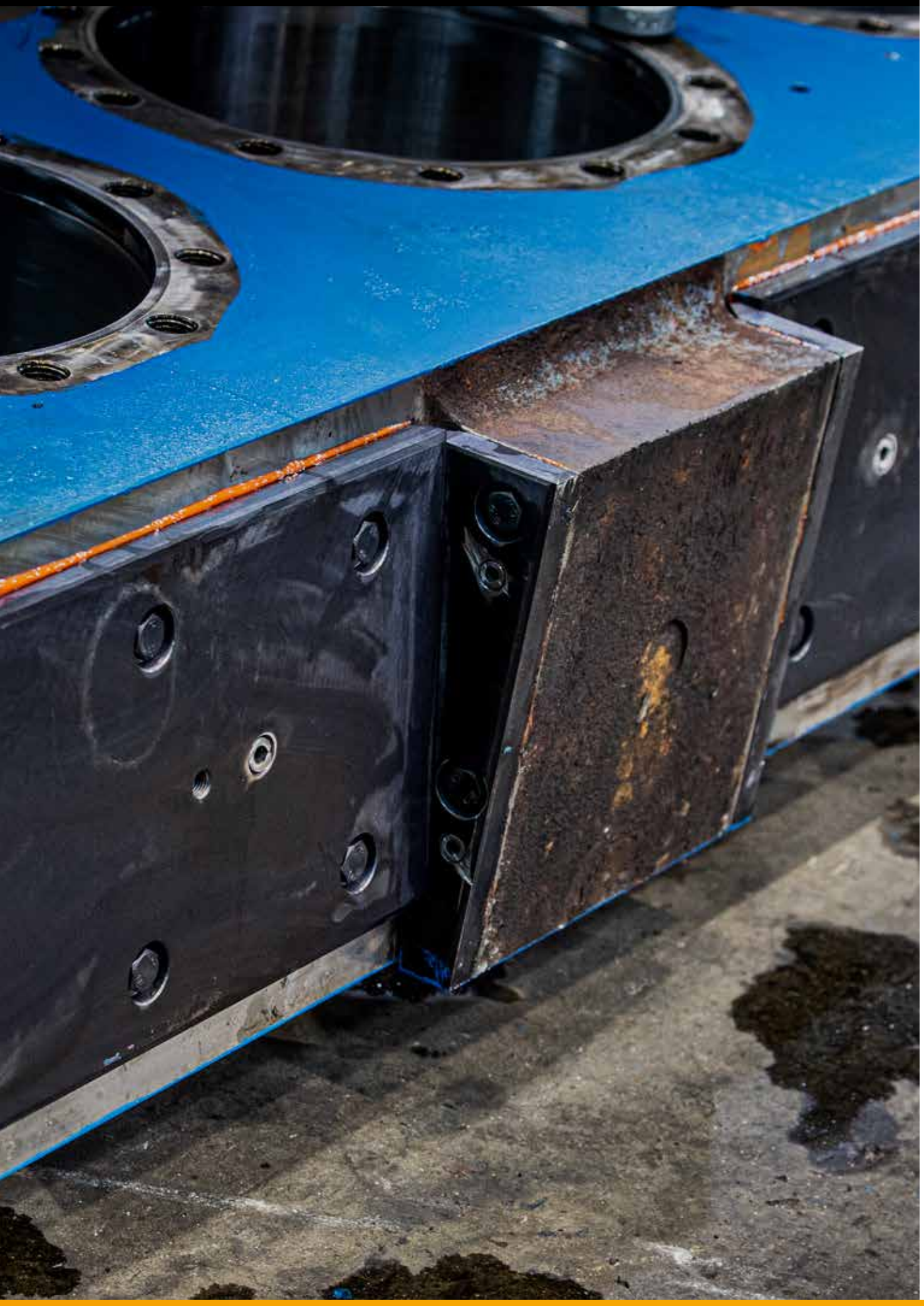
Toolox® 33 has a nominal hardness of 300 HBW. Toolox® 44 has a nominal hardness of 45 HRC, making it the world's hardest fully prehardened tool steel. Datasheets for all Toolox® grades are available at toolox.com.



Toolox® has a fine grained tempered martensitic crystalline structure, a result of quenching at a high cooling rate. The fine grain size gives high toughness.

"We switched from 1.2379 with 56 HRC to Toolox® 44. Instead of cracking after 5,000 pieces the work piece in Toolox® 44 shows no wear after more than 40,000 pieces."

Ulus Metal, Istanbul



HIGH PERFORMANCE IN CYCLIC LOADS

The importance of high fatigue resistance cannot be overstated. It's estimated that 75–90% of engineering components fail due to fatigue after a certain number of load cycles, even if the steel is stressed well below its yield strength.

The fatigue resistance of a steel is directly related to its cleanliness. Thanks to SSAB's world-class metallurgy processes, Toolox® has a cleanliness similar to the highest quality ESR (Electroslag Remelted) tool steels.

Ensuring long service life
The fatigue resistance of components made of Toolox® increases the reliability and service life of all kinds of machines. This makes Toolox® a natural choice for demanding customers.

High fatigue performance tested and confirmed
Toolox® 44 has been subjected to extensive fatigue testing by SWERIM, a Swedish metal research institute. The purpose of the tests was to compare different samples of Toolox® —in delivery condition, plasma nitrided and induction hardened — to a 42CrMo4 steel.

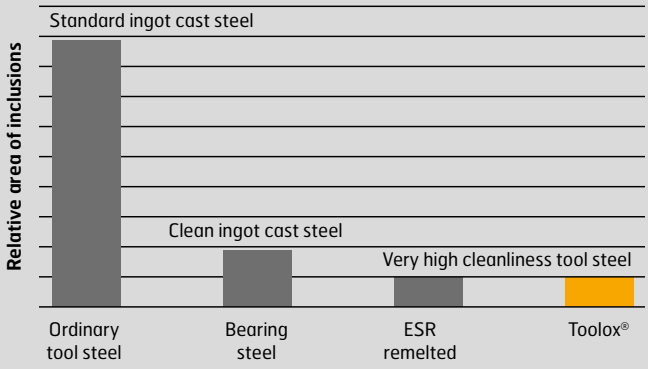
The high core hardness of Toolox® 44 means that this steel doesn't need as deep induction hardening as 42CrMo4. Surface hardening results in higher compressive stresses in the surface, which is always beneficial to the fatigue strength.

The fatigue tests were carried out with notched round bar samples in a rotary bending machine with a 2 million revolutions target. The tests showed that Toolox® 44 has a high fatigue strength in as-delivered condition. Through surface hardening with plasma nitriding and induction hardening the fatigue strength is increased even further, as shown in the table Fatigue limit. SWERIM concludes that Toolox® 44 is suitable for fatigue loaded components and surface hardening is recommended for the most demanding applications.

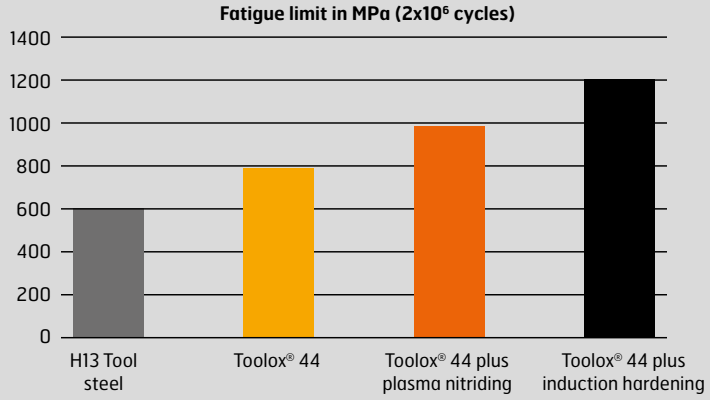
Toolox® properties that improve fatigue life

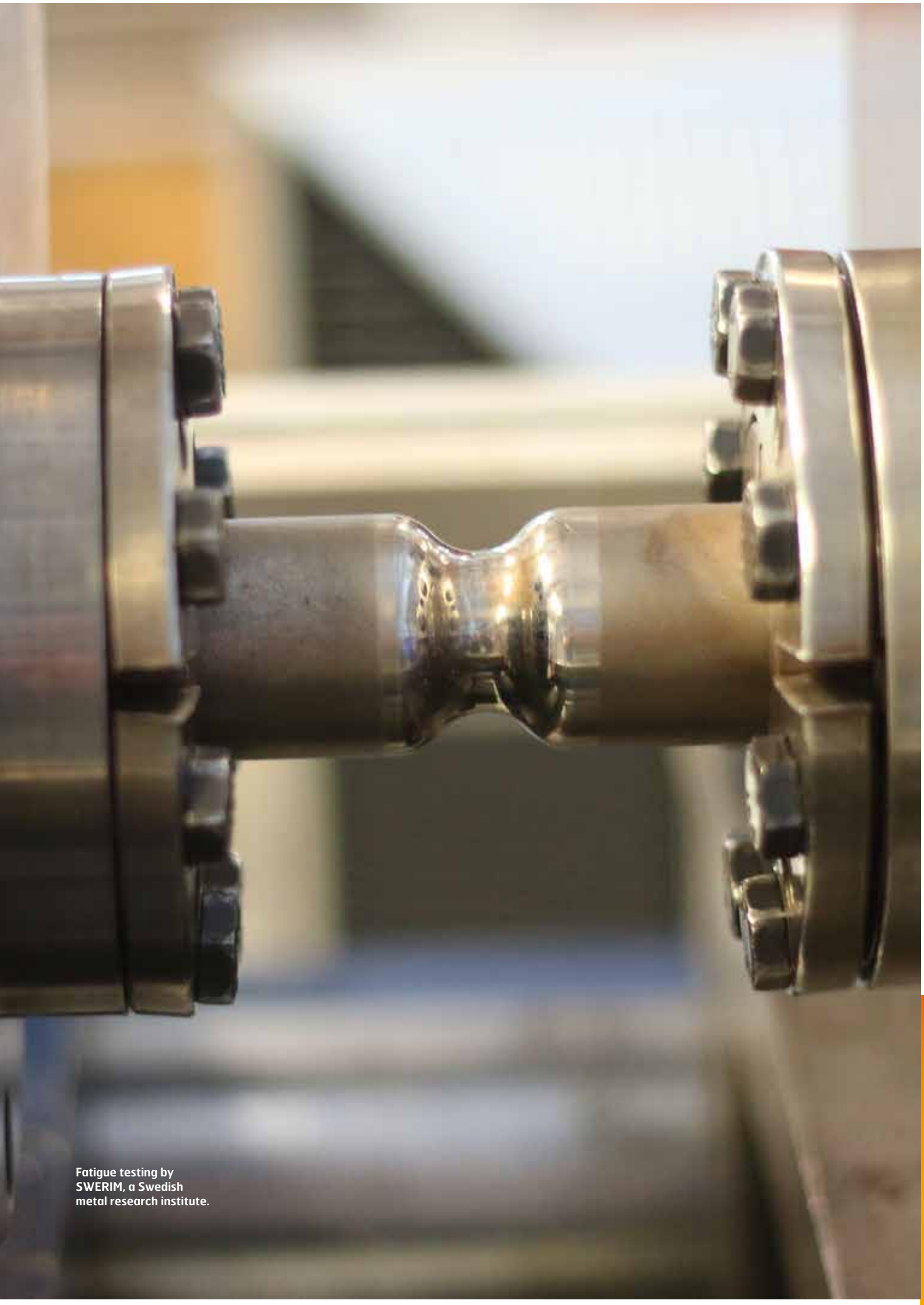
- **Exceptionally clean steel**
- **High surface smoothness possible**
- **High core strength withstands heavy loads**
- **High toughness resists fracture**
- **No need for heat treatment**
- **Suitable for surface hardening**

Exceptional cleanliness ensures high fatigue resistance



Fatigue limit for Toolox® 44 as tested by SWERIM





Fatigue testing by SWERIM, a Swedish metal research institute.

MACHINABILITY

HIGH MACHINABILITY FOR HIGH PRODUCTIVITY

Toolox® is based on a low carbon concept, with a low carbide content. Carbides are hard to machine so the low carbide content is the reason for the excellent machinability of Toolox®. The steel is also alloyed with molybdenum, niobium and other alloying elements which further improve machinability.

The homogenous structure of Toolox® is another property that improves machinability and reduces wear on the tool inserts.

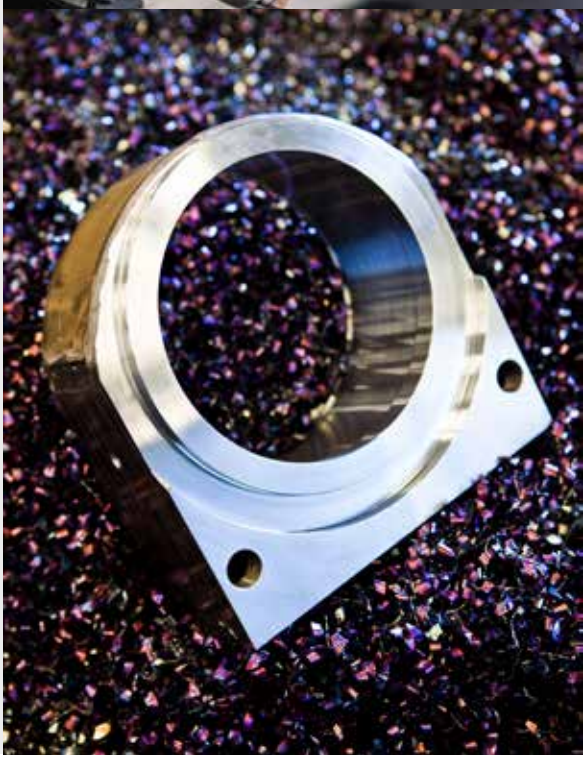
Cutting tools in Toolox® 44 allow deeper cuts and longer insert lifetime compared to traditional tool steels. Tool manufacturers can provide their customers with tools that give a higher material removal rate and better surface finish in the machined piece.

Milling Toolox® will generate bluish chips which indicates that the heat generated is transferred into the chips and not into the workpiece.

Fast and cost-efficient production confirmed
Comparing Toolox® 33 with the standard steel 1.2312/P20 at the same milling speed shows three times longer insert life length or 20% faster milling speed for Toolox®.

Another machining trial has shown the benefits of using Toolox® compared to 1.2312/P20 in terms of maximum possible cutting speeds and elimination of a stress-relieving heat treatment. The study showed a reduction in overall component cost and a 16% reduction in time to manufacture. Since Toolox® didn't need any stress relief operation after machining, the manufacturer saved two days of lead time.

The machinability and prehardened properties cut production time and make your production much more cost-effective compared to standard steels. When your customers say they want it fast, you can deliver without compromising on quality and performance.

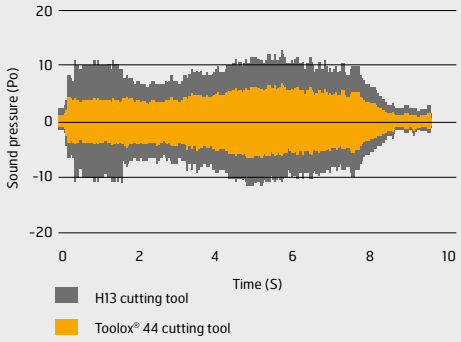


> The gear racks we made were absolutely straight: 0.004 mm sidewise deflection and 0.136 mm longitudinal deflection on 1.8 m measuring length!
>
> Tommy Petterson, Stena Stål

Stress-free after machining
Even after heavy machining, Toolox® is dimensionally stable and normally requires no stress relieving. This is especially useful when machining long thin sections such as gear racks. Even if machined mainly from one side the material stays extremely flat, requiring no straightening and no secondary machining.

Vibration dampening properties
Tools made of Toolox® give higher productivity and better surface quality to machined parts because of the steel's unique vibration dampening properties.

A study carried out at KTH, the Royal Institute of Technology in Sweden, shows that cutting tools made from Toolox® are more resistant to vibrations.



Scan the QR code to download Toolox® machining recommendations.

ON TOP OF TOOLOX®

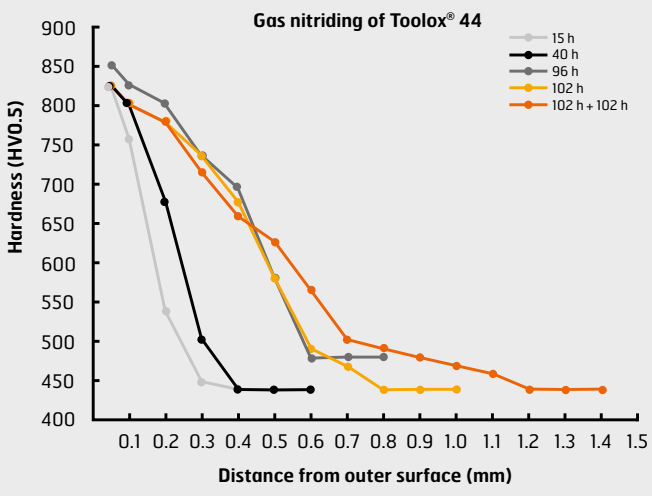
The hardness, toughness and homogeneity of Toolox® make it a perfect substrate for surface treatment. Nitriding, PVD (Physical Vapor Deposition), plasma, laser and induction hardening can all be used to further increase the surface hardness of the material.

Surface treatment on Toolox® adds performance in a wide range of applications exposed to high surface pressures and wear, such as machine components, clamping and holding equipment, recycling knives and blades, injection molds and more.

Toolox® can also be polished, etched and textured with excellent results. The purity and very low inclusion content of Toolox® makes it suitable for the most demanding surface-finish applications, reaching an A1 gloss in polishing.

Increased fatigue resistance
Surface hardening will increase the component's fatigue resistance, giving a longer service life. If a crack would appear in the surface layer, the toughness of Toolox® will resist further propagation into the substrate.

By nitriding Toolox® you can reach a surface hardness of 58-65 HRC for highly wear-resistant applications with a long service life. By coating the nitrided surface through PVD it's possible to achieve even greater hardness or resistance to corrosion. The high strength of Toolox® minimizes the risk of cracking and chipping of the surface layer.



Making prototypes into production parts

Hardened by laser
Laser hardening of Toolox® is a very efficient method of achieving a high surface hardness with a relatively large thickness. Depending on the application, the hardened layer can reach 0.2 to 2 mm.

Laser hardening of Toolox® 44 gives exceptionally good results due to its high yield strength. It improves the lifetime of machine components working under highly challenging conditions. SSAB uses laser hardened Toolox® 44 for cutting Hardox® and Strenx® steel plates.

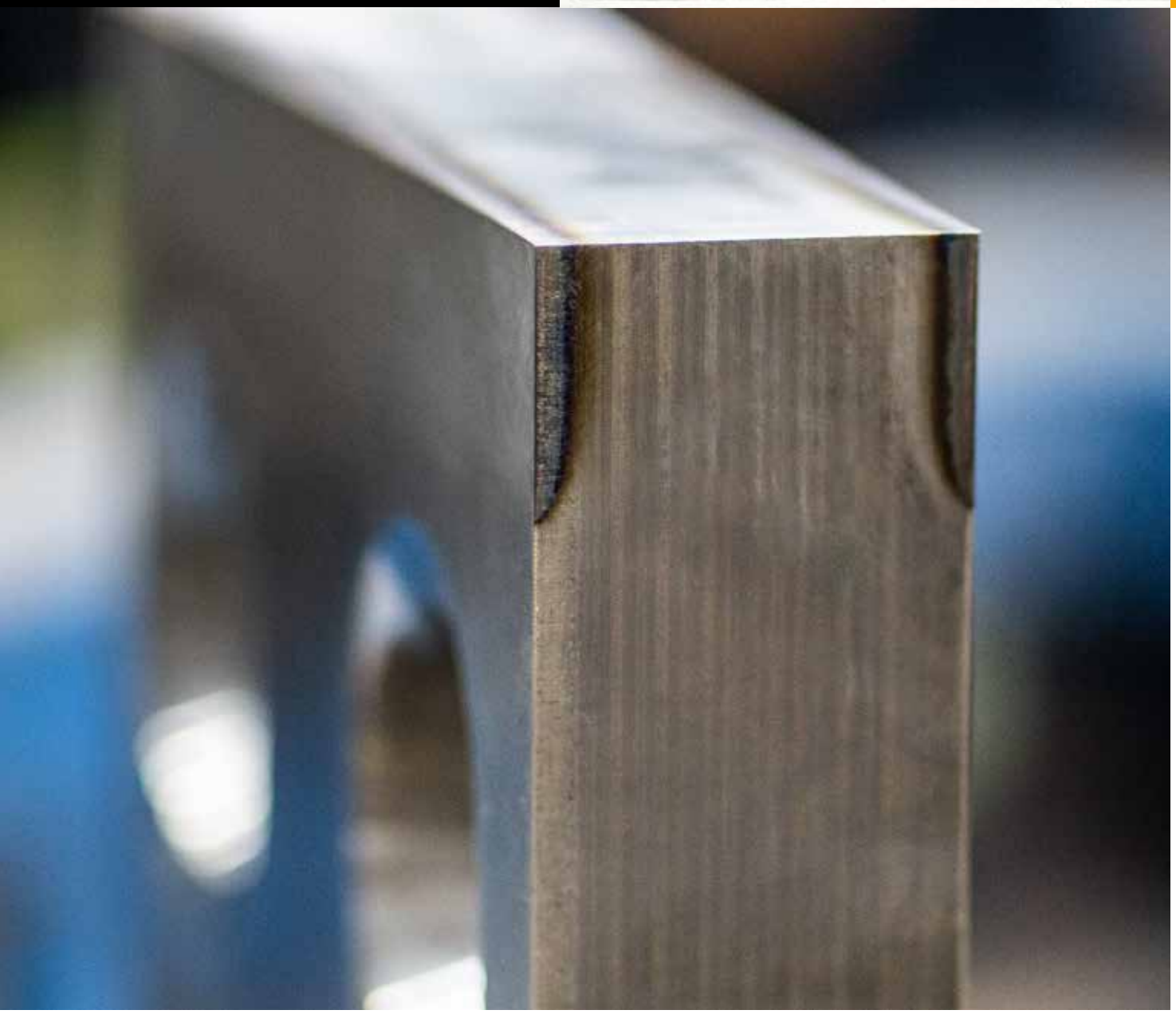
Laser hardened surfaces have the further advantage of being very smooth. This reduces friction and the risk for material sticking to the surface.

To further enhance the hardness of the surface, carbon powder can be used to cover the metal surface during the process. In this way, Toolox® can reach a surface hardness as high as 800 HV. For Toolox® 33, 700 HV can be obtained.

Scan the QR code to learn more

A die used for stamping thick steel sheet was previously made in tool steel heat treated to 60 HRC. After only 2,000–3,000 stampings the die cracked. Changing to laser hardened Toolox® 44 improved the lifetime to more than 100,000 stampings. The smooth surface also decreased the need for maintenance.

Swedish customer



HEAT RESISTANCE

TOOLOX® LIKES IT HOT

Most steels can't stay hard and tough after having been exposed to high temperatures. Fortunately, Toolox® is not like most steels. Even if heated up to 590°C, Toolox® keeps its original hardness when cooled.

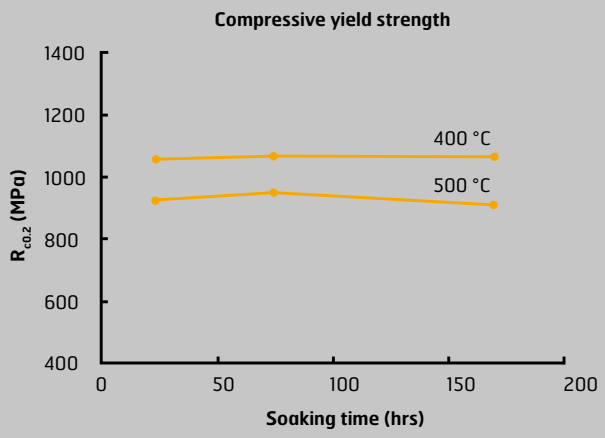
The high-temperature properties of Toolox® make it a perfect steel for casting and forging dies, for tools and machine components in steel mills, cement industries, power plants and in other areas where materials are handled at very high temperatures.

Toolox® 33 in coke quenching car and cooling bed

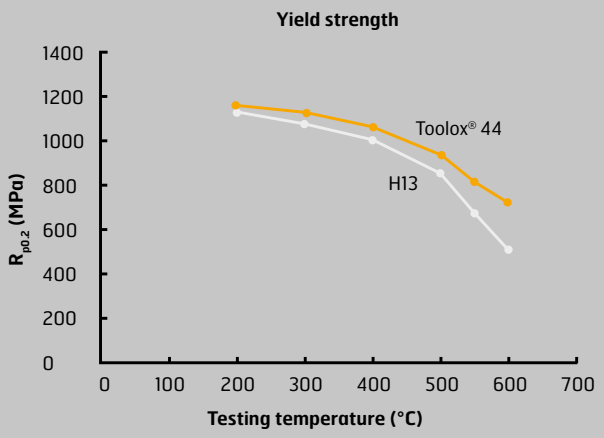
Toolox® 44 is used in a hot forging die for chain production. The chain steel is heated to around 890°C before forging, and the die works continuously at 400–500°C.

Buckets made in Toolox® 44 can take both wear and heat when handling red hot slag without losing its properties.

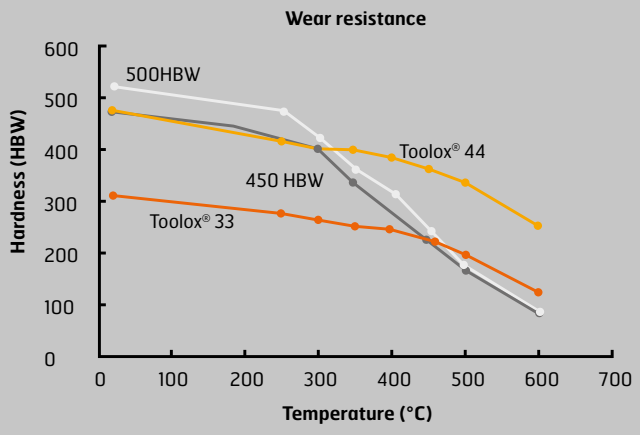
Brass handles are pressed in a Toolox® 44 die in one stroke at 730–750°C.



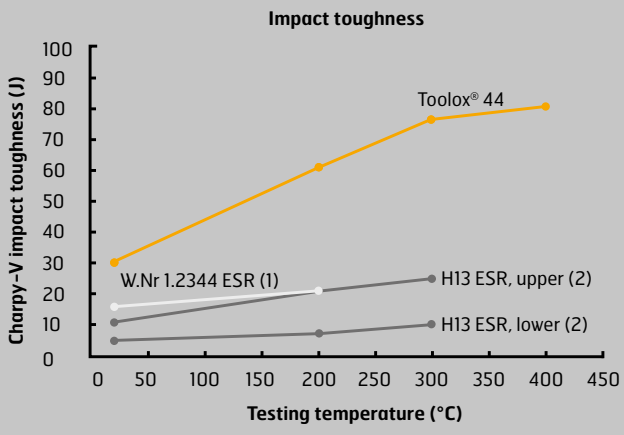
Toolox® 44 compressive yield strength at elevated temperatures and after prolonged soaking times.



Toolox® 44 has better yield strength at elevated temperatures compared to a H13 standard steel.



Both Toolox® 33 and Toolox® 44 have better hot wear resistance than Q&T 450 HBW and 500 HBW abrasion-resistant steels at elevated temperatures.



Toolox® 44 has much better toughness compared to conventional hot work tool steels at both room temperature and at elevated temperatures.

WELDING AND CUTTING

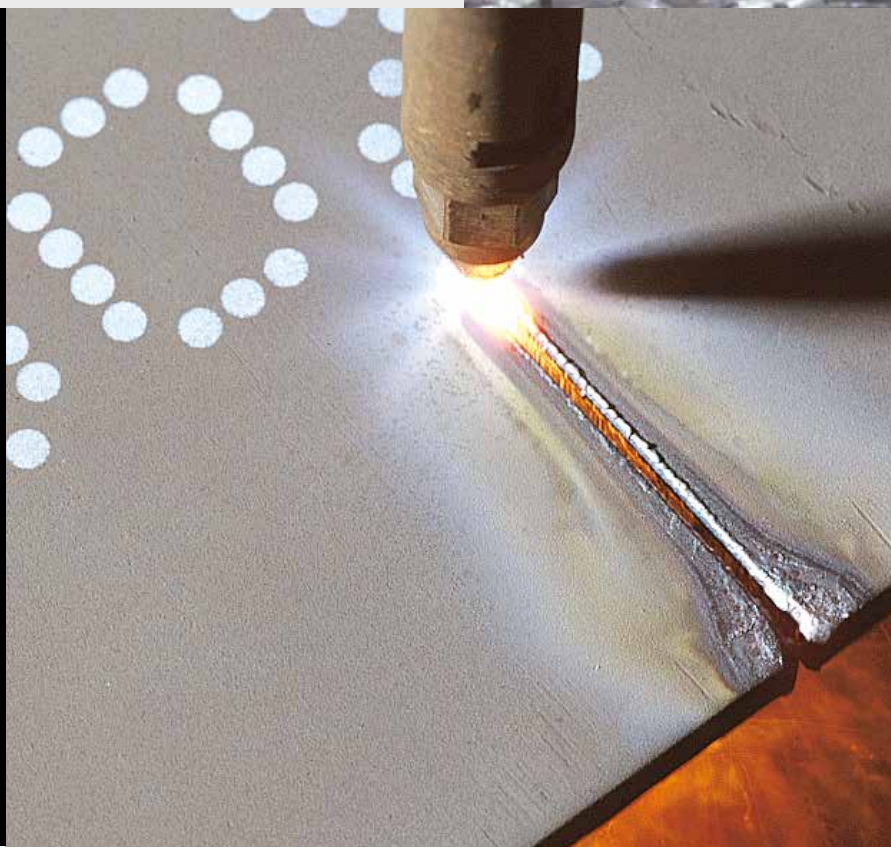
SUITABLE FOR WELDING AND OXY-FUEL CUTTING

Toolox® engineering and tool steel is designed for favorable welding and cutting properties. As for all types of engineering and tool steels the level of requirements increases with increased hardness of the steel. Toolox® steel is fully weldable in all grades and dimensions.

Any conventional welding and cutting method can be used for these steels and they can be welded to other kinds of weldable steels. Joint preparations can be made with all conventional methods such as thermal cutting, machining and grinding. Shearing and punching is suitable for plate thicknesses up to about 10 mm.

Easy welding and cutting thanks to low level of alloys
The low level of alloys in the Toolox® grades makes both welding and thermal cutting easy and reliable. The favorable carbon equivalent values leads to high resistance to hydrogen cracks.

> When making curved brackets we used to saw square pieces of 2738 steel, which required a lot of machining to reach the final shape. By changing to oxy-cutting of Toolox® 33 we saved machining time, and could provide our customer with a better product.
>
> Aceros y Servicios, Spain



Welding and cutting recommendations for Toolox®
The full documentation gives recommendations for welding and cutting best practices. Welding recommendations include joint preparation, suitable welding consumables, preheating and welding sequences.

Thermal cutting recommendations for gas and plasma cutting are also covered, including preheating and postheating recommendations to control hydrogen levels in the cut edge.

Abrasive water jet cutting is an alternative method to thermal cutting. Since this method does not apply heat the risk of hydrogen cracks is very low. Water jet cutting can be done with the same parameters as for cutting of mild steels.

Scan the QR code to download Toolox® welding recommendations.

PRODUCTION EFFICIENCY

FAST TRACK TO PERFECTION

Toolox® allows you to reach perfection faster than with other machine steels. This applies to a wide range of production processes and applications.

Toolox® is a prehardened steel with excellent machining performance. The stable mechanical properties shorten the production time since Toolox® parts can be machined to meet the desired specifications in one step.

The high cleanliness of the steel saves time in polishing and other surface treatment processes such as nitriding, etching and PVD coating.

Streamline your stock with Toolox®
A large number of standard grades can be replaced by Toolox® 33 or Toolox® 44. The excellent versatility of the Toolox® grades means you can speed up the design process, simplify your logistics, keep a lean stock and still have the material you need for making quality machine components and tools.

Scan the QR code for customer cases

Standard production process vs Toolox® production process

Save time in machining
With Toolox® there is no need for unclamping and stress relieving as would be the case for a common machine steel.

Standard production process

1. Design
2. Machining
3. Unclamping, stress relieving
4. Machining
5. Finishing, mounting

Toolox® production process

1. Design
2. Machining
3. Finishing, mounting

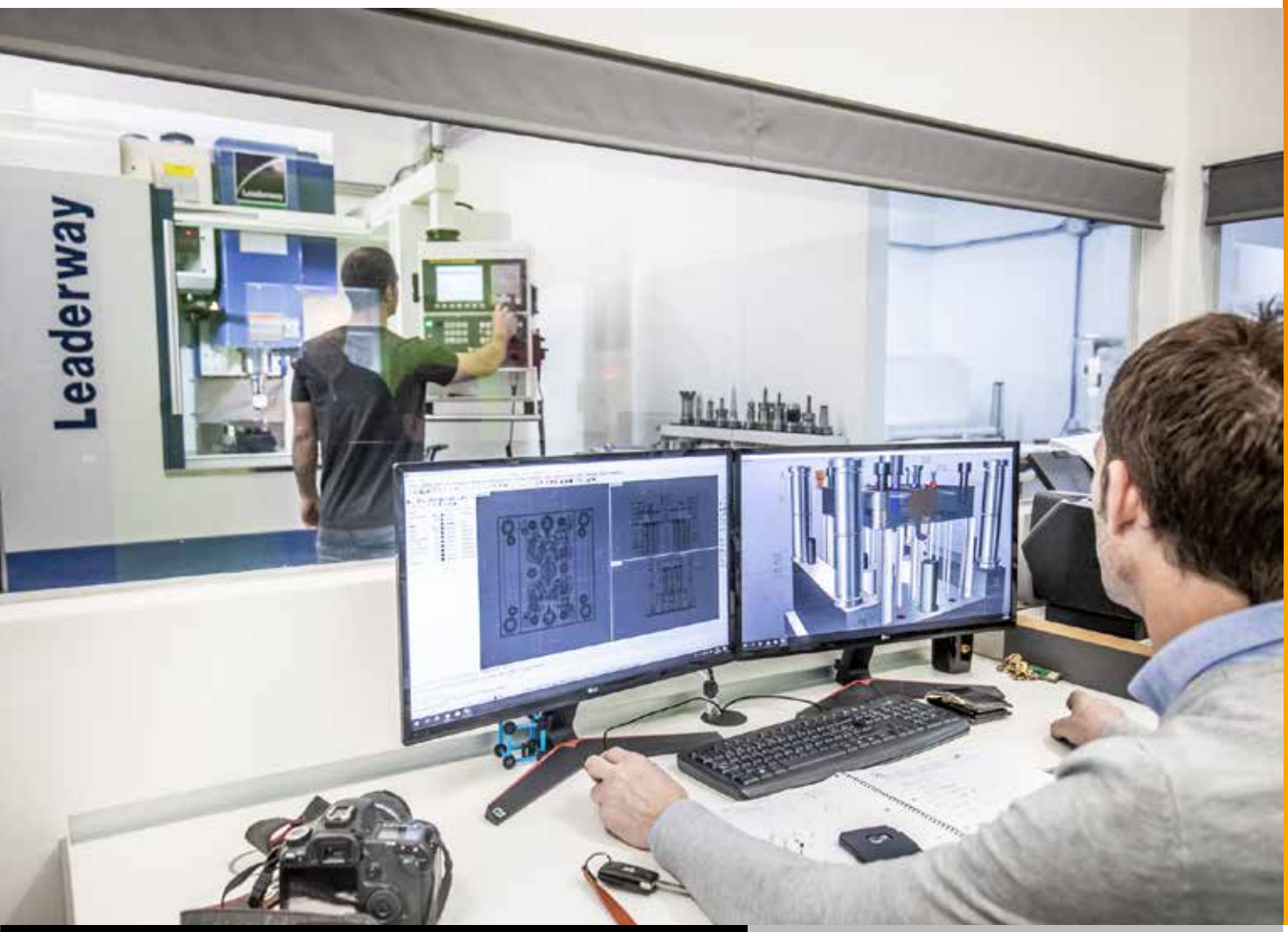
Save time without heat treatment
The fact that Toolox® is prehardened cuts production time and costs. Toolox® doesn't need any further time-consuming and costly heat treatment after machining. It is still easy to machine due to the low carbon concept.

Standard production process

1. Design
2. Machining
3. Transport
4. Quenching and tempering
5. Adjusting after treatment
6. Finishing, mounting

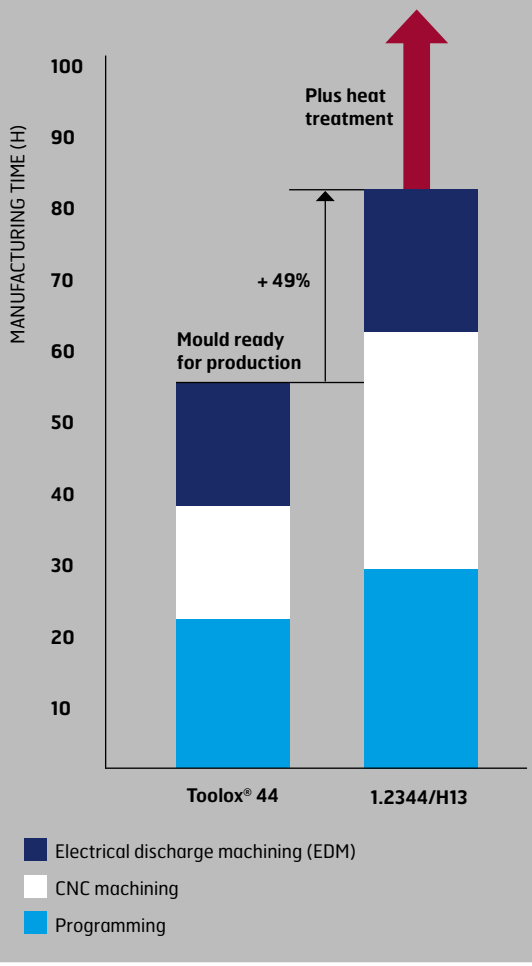
Toolox® production process

1. Design
2. Machining
3. Finishing, mounting



We changed to Toolox® from C45 (1.1730) due to multiple manufacturing steps and high straightness demands. This reduced the manufacturing time from 6-7 weeks to 4 weeks.

Swedish distributor



LONGER LIFETIME

MEETING END USER DEMANDS

Whatever the application, Toolox® has a proven track record of giving end users superior service life and productivity. Machine components as well as molds and dies made in Toolox® outperform standard steels thanks to a combination of chemical and physical properties.

Toolox® hardness makes the parts extremely resistant to wear. The toughness gives excellent crack and fatigue resistance. The high yield strength adds durability even when the steel is subjected to heavy loads.

Other factors that give end users longer service life are the surface treatment capability and the high temperature performance without losing hardness and toughness.

18 TIMES LONGER FORMING TOOL LIFE

An automotive producer of parts for brake systems had big problems with cracking of the former tool steels H13 and P21. The tools could only process 3,000 pieces before the tool wore out. This was not a sustainable situation and a solution had to be found. The customer turned to nitrided Toolox® 44 and reached a dramatic increase in tool life – 50,000 pieces processed before maintenance. The high surface hardness and toughness made the tools resistant to fatigue-related chipping and cracking.

15 TIMES LONGER LIFE FOR TOOL HOLDER

GTECH generally used heat-treated AISI 4340 and DIN 1.2344 steels at different hardness levels for its end milling tool holders. The main problem was long production times caused by the heat treatment. Even if the heat treatment improved the hardness, the steel became brittle which led to cracks. Toolox® 44 was a better option. It is already hardened and tempered, resulting in a tougher tool that lasts 15 times longer, and is faster to produce.

45% LONGER LIFETIME FOR PRESS BRAKES

Press brake tools are commonly made from 1.2312 steel. Changing to Toolox® 33 improved the lifetime of the tools by up to 45%. Not only that, the total cost of the tools was reduced by up to 28% thanks to fewer production steps. Toolox® 33 can be welded and laser hardened or nitrided without changing the shape which makes repair work easy. Toolox® 33 can be used in all OEM machines.

DOUBLE THE SERVICE LIFE FOR SHAFTS

A steel rim producer generally used 4140 Q&T and 1.8550 Q&T type steels at hardness levels of 30 HRC when manufacturing shafts with a 250 mm diameter for steel rim production. These shafts were too brittle and suffered cracking. When testing Toolox® 44 on five different shafts the toughness of the material gave twice as long a service life.

THREE TIMES MORE CARS SCRAPPED

An Italian customer with a car scrap recycling plant experienced high wear of the rotating hammers' pins. The pins in hardened 39NiCrMo4 could scrap around 20,000 tons before maintenance was needed. Hardening lowered the toughness of the material, making it more prone to break. With Toolox® 44 the customer could scrap 55,000 tons before changing the pins.

70% LONGER LIFETIME FOR HYDRAULIC HAMMERS

The customer had problems with its current pins in heat treated 42NiCrMo14. The heat treatment reduced the toughness, and resulted in unpredictable breakdowns. Testing Toolox® 44 with a higher toughness as delivered resulted in a 70% increase in the lifetime of the pins. Toolox® 44 also saves time in production due to fewer manufacturing steps.

GUARANTEES

ENSURING PERFORMANCE AND PRODUCTIVITY

The last few decades have seen extensive developments in production efficiency, service life analysis, and machining technology. More powerful CNC machines have the capacity to process steel at great speed and accuracy. This puts great pressure on the steel to live up to the machines' capacity.

Most steels used in the market are made according to decades-old standards. The standards are not very strict and can't really keep up with the realities and requirements of today's workshops and end customers.

Even if these steels are within the standard window, every batch delivered can be different. This can give unexpected performance deviations due to different chemical and mechanical properties that are not always covered by the standards.

Good for the workshop, good for the user
Guaranteed properties are key to reliable production. Not only that, you can be certain that the parts you deliver always meet the end users' expectations. Mechanical strength, alloy content, hardness, toughness, stable dimensions – whatever properties that are most important for the end user, Toolox® meets them every time.

Save on steel
With guaranteed thickness and flatness you don't have to allow for extra margins when ordering a particular dimension. The dimension you want is the dimension you get. This can save steel, as well as reduce the time for machining since less material has to be removed to reach the final shape of the component.

> Toolox® products are are subjected to ultrasonic tests according to SSAB's internal demands that are more strict than international standards. Each product has a unique certificate with the testing values.
>
> Quality controller, SSAB

Scan the QR code to learn more

Toolox® keeps its promises

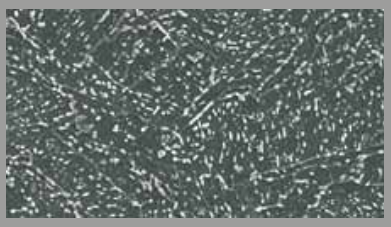
Toolox® is produced by SSAB at the same mill under strict quality control. The steel is cast, rolled, quenched and tempered to meet SSAB's very strict specifications. Every plate and round bar of Toolox® is tested to ensure the properties are consistent. You can use the same machine settings every time, knowing that the steel will behave in the same way. Toolox® keeps its promises, so you can keep yours.

EVERY PIECE OF TOOLOX® IS TESTED AND GUARANTEED

Guaranteed and measured properties

- Impact toughness
- Hardness
- Machinability
- Thickness
- Flatness
- Surface condition

Modified carbide morphology



Toolox® 33 – area of carbides 6.4%

W.Nr.1.2311 /P20 – area of carbides 10.0%

The high cooling rate during quenching and a low carbide concept has allowed us to modify the carbide morphology. This is the basis for the high toughness, machinability and weldability.

AVAILABILITY

GET YOUR TOOLOX® HERE

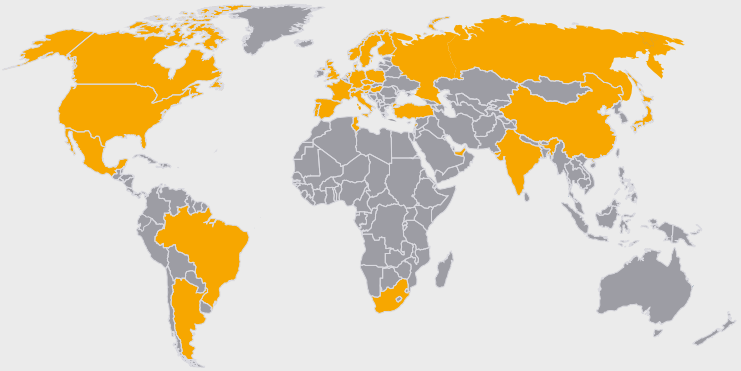
To make sure you can access high quality Toolox® pieces in the most efficient way, SSAB cooperates with a worldwide network of specialist distributors. Most of these distributors have been working with Toolox® for many years, and can provide recommendations on how to get the most out of this engineering and tool steel.

Plate and bar in stock
The distributors have an extensive stock of Toolox® plates and bars. They can pre-cut the steel to size for easier production. Other services such as machining can usually also be offered.

All distributors are part of the official SSAB Approved Toolox® Dealer network. SSAB supports the distributors with product and technical advice and has a close ongoing cooperation with the distributors.

SSAB stocks and sales offices are located in Belgium, Brazil, China, Germany, the US and Sweden.

Toolox® sales offices



Scan the QR code to learn more


DEMAG
6.4-6.4 ton

SUPPORT

BEING THERE WHEN IT MATTERS

SSAB has a long history of supporting its customers in product development, from innovation and the design of new applications to the choice of material and workshop recommendations.

24/7 support at your service
SSAB Tech Support is staffed with experienced engineers on call around the clock, providing assistance in your own language or in English. Technical support handles all your practical, day-to-day questions about suitable steel grades, machining recommendations, welding parameters and much more. SSAB Tech Support can be reached by phone or via email. You'll find phone numbers and email addresses at ssab.com.

Scan the QR code for Tech Support

SSAB Knowledge Service Center
SSAB Tech Support cooperates closely with SSAB's specialist groups at the SSAB Knowledge Service Center for questions requiring more in-depth expertise. Going beyond traditional support, the SSAB Knowledge Service Center is a unique resource for application and production development. Our material and production specialists focus on making your products easier to manufacture and on delivering more value to the end users.

+46 243 729 29

Just a phone call away:

- Material selection
- Machining recommendations
- Tooling advice
- Production efficiency
- Fatigue and wear calculations
- Welding recommendations

SSAB's Global Customer Portal
The Customer Portal operates as a digital hub where you can manage your business with SSAB and find the information you need in a simple, efficient way.

In the portal, you can track your mill orders, search for stock materials and confirm stock availability directly with your SSAB sales representative. In addition, you can search and download material certificates associated with your orders.

Scan the QR code for Customer Portal

Read all about Toolox®
At the download page for Toolox® you can find more detailed information about all kinds of processing methods, as well as technical specifications for the different Toolox® grades.

Scan the QR code for downloads

Chat online with our support
When visiting toolox.com you will have access to our online chat function. Just type your question and get a quick answer on any kind of Toolox® topic, whether it's about processing, material properties, availability or any other issue. If we can't give an immediate answer, we will direct you to the right source. We look forward to be of assistance!

Scan the QR code for toolox.com

TOOLOX®
ENGINEERING & TOOL STEEL

SSAB is a Nordic and US-based steel company. SSAB offers value added products and services developed in close cooperation with its customers to create a stronger, lighter and more sustainable world. SSAB has employees in over 50 countries. SSAB has production facilities in Sweden, Finland and the US. SSAB is listed on Nasdaq Stockholm and has a secondary listing on Nasdaq Helsinki. www.ssab.com. Join us also on social media: Facebook, Instagram, LinkedIn, Twitter and YouTube.

630-en-Toolox Once Toolox, always Toolox -V2-2021-AplusM

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