



TOOLOX[®]

PREHARDENED TOOL & MACHINE STEEL

A better concept.

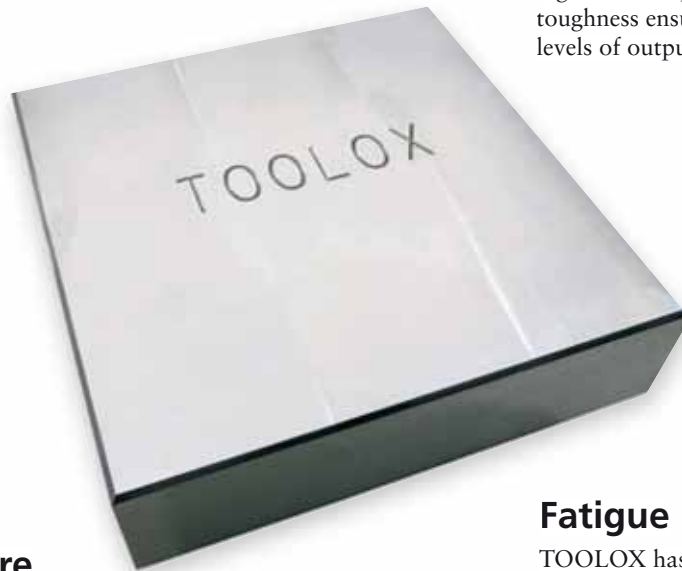
**Saving
time to
market.**

Ready to use

TOOLOX® is a modern quenched and tempered prehardened tool and machine steel, delivered with measured and guaranteed mechanical properties. The basic idea is to save you time by delivering TOOLOX heat treated and ready to use. TOOLOX is based on the low carbon metallurgical concept of HARDOX® and WELDOX®, the well known quenched and tempered abrasion resistant and structural steels from SSAB Oxelösund.

Two hardness levels

TOOLOX is available in two grades: TOOLOX 33 with a hardness of 300 HBW and TOOLOX 44 with a hardness of 45 HRC – the world's hardest fully prehardened tool steel with the same hardness all the way through.



Toughness

By working with a low carbon concept and a very high cooling rate, we have produced a steel that is two to three times tougher than comparable steels of similar hardness. The high hardness, in combination with excellent toughness ensures lower tool wear and high levels of output when the tool is in service.

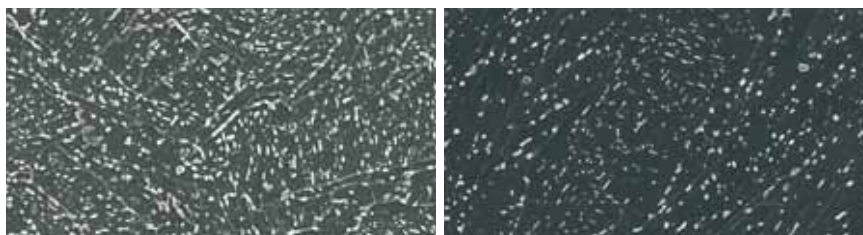
High temperature properties

TOOLOX 44 has high strength and toughness at elevated temperatures, even with extended contact times. This heat resistance makes TOOLOX 44 excellent for tools and components working at high temperature.

Fatigue

TOOLOX has unique toughness and fatigue properties, which remarkably increase the lifespan of the tool or machine component. Thanks to its ultra-high cleanliness, the surface and not the steel is the critical question for the fatigue properties.

Modified Carbide Morphology



With high cooling rate during quenching and a low carbide concept we have been able to modify the carbide morphology. This is the base for the high toughness, machinability and weldability.

**Saving
machine
hours.**

Designed to be shaped

TOOLOX is a steel with ESR properties. The CSR casting process together with the low carbon concept gives a high degree of cleanliness and a homogenous structure. Fundamental factors to provide you with an excellent substrate for machining, polishing, texturing and EDM.

Low residual stress

TOOLOX is delivered in a quenched and tempered condition. The high tempering temperature gives very low residual stress levels. Even after heavy machining TOOLOX does not require stress relieving.

Machining

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.



Etching, Polishing & EDM

Thanks to our advanced CSR casting technology, TOOLOX is effectively free of segregation and has a very high level of cleanliness. This makes TOOLOX excellent for etching and polishing, and the EDM process works with no problems at all.

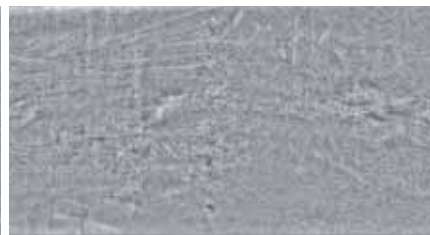
Welding & gas cutting

The effective quenching used when producing TOOLOX gives the possibility to use a low alloy content compared to regular tool and machine steel. This gives TOOLOX a better weldability and makes it easier to cut.

Homogeneity & low levels of inclusions



Without CSR



With CSR

The fundamental idea behind TOOLOX is to deliver a steel that is hardened and ready for use, with tested and guaranteed physical properties. Thanks to CSR method of casting we get homogeneity and cleanliness at the same level as in ESR re-melted material. Every plate is uniquely produced, and each individual plate is tested for hardness, toughness and homogeneity.

**Saving
service
cost.**

With an extra option

TOOLOX is a nitriding steel and an excellent substrate for surface engineering. When needed you can increase the surface hardness to control the service life of your tool or component. Your prototype tool can as a matter of fact be developed into your production tool.

Nitriding

The high hardness and toughness of TOOLOX make it an ideal substrate for surface treatments such as nitriding. Such processes open up a further range of applications where surface pressures are high and when greater wear resistance is required.

Coating

Nitriding creates the base for the coating. The coating should be applied through PVD (Physical Vapour Deposition). Hardnesses between 1000 to 3000 HV can be achieved.



Substrate toughness

The high toughness of TOOLOX is a precondition for surface engineering (nitriding/PVD-coating). A small crack in the hard surface layer will most probably not be propagated into the TOOLOX substrate.

Hardening

Induction-, plasma- & laser hardening can be done and resulting in a surface hardness of 50 – 55 HRC. This is nothing we recommend because it creates residual stresses that create shape changes.

The duplex method



A piece of glass on top of a bed cracks if you sit on it. If you put wood in-between the bed and the piece of glass it will carry your weight. The nitriding layer in-between the coating and the steel works the same way.

**The best
with
TOOLOX.**

Tooling Applications



Plastic moulding – Mould made of TOOLOX 44

Function – top to cover cables.

Plastic – Nylon (PA) with 15 % glass fibre.

Experience – Around 10,000 pieces were made monthly until the production was full-filled with a number of total 50,000 pieces. The mould was still fully functional.



Cold working – Progressive dies made of TOOLOX 44

Function – bottom plate for the compressor of a refrigerator.

Experience – early 2007 the die is still in use and approximately 1.6 million pieces have been produced since 2003.



Hot working – Aluminium pressure die casting mould

Function – covers used in car engines.

Experience – after using TOOLOX 44 for two years parallel with the previous solution the customer has now chosen only to use TOOLOX. The change will represent a significant productivity improvement at the customer.

Machine Component Applications



Clamping/Holding – vices for tensile testing.

Function – clamp for specimen in the tensile test of heavy plate at SSAB.

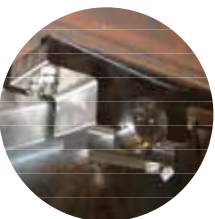
Experience - By changing from WNr 1.2358, (55 HRC) to nitrided TOOLOX 44, 4 pieces instead of 20 a year is used which gives an annual saving of 12,000 euros.



Sliding/Guiding – guide rail in wood and metal working machines.

Function – guide rail made of TOOLOX 33

Experience – after changing from C45 (inductionhardened) to TOOLOX, the rejection rate has gone from 25% to almost zero. The lifetime has also increased due to nitriding. Despite the higher steel cost, the customer saves money.



Hot environment – support used in wagon wheels

Function – in a furnace continuously at a temperature of 560 °C.

Experience – the customer wanted to change material mainly due to a disturbing noise when being in service. The TOOLOX supports are working since Nov. 2006 with satisfactory results. The disturbing noise has disappeared using TOOLOX 44.

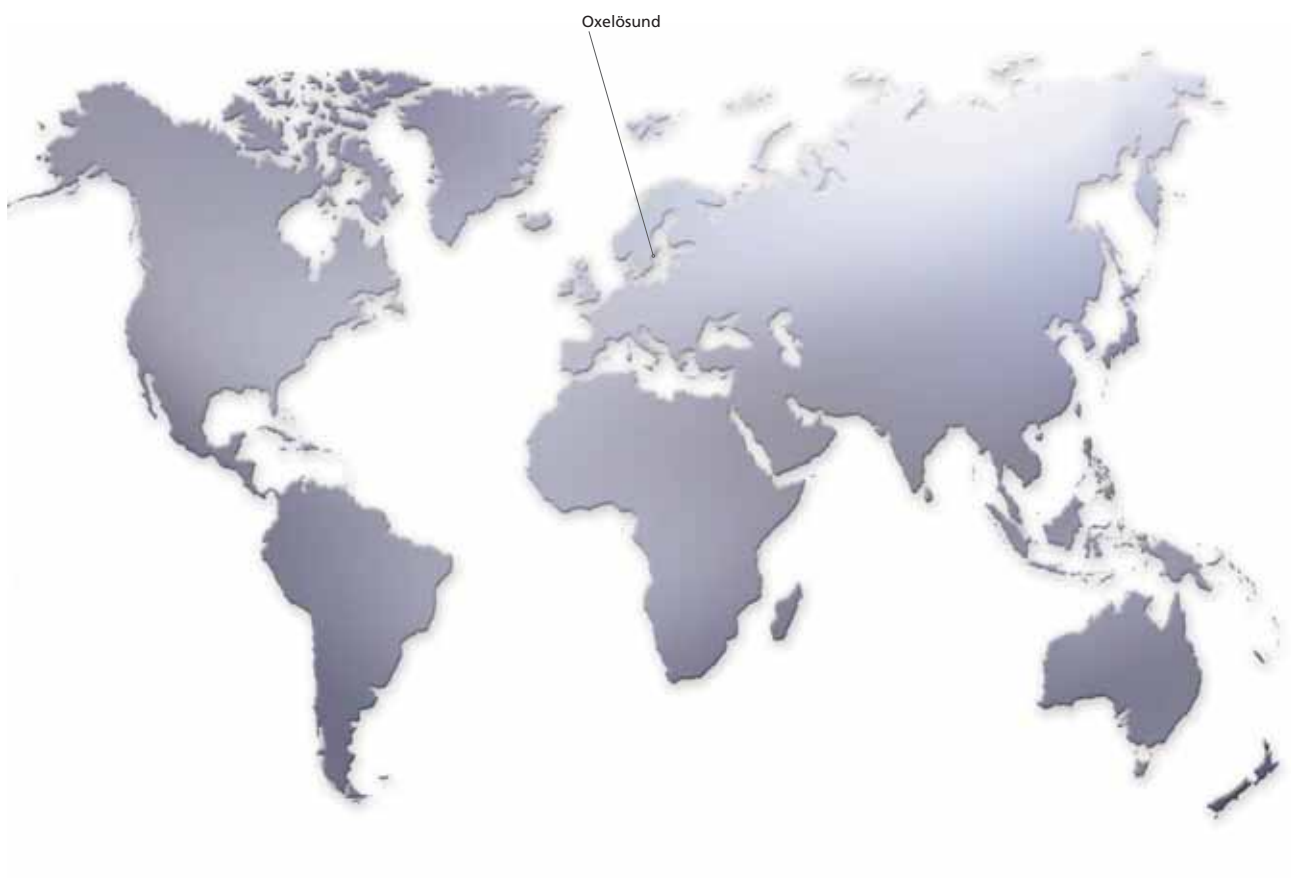
**Welcome
to our
world.**

Working with TOOLOX and SSAB Oxelösund

We welcome you to join the TOOLOX family. You will meet inspiring, knowledgeable and successful people handling steel challenges.

We will do our best to give you a dedicated and competent service organisation.

Throughout the year, seminars and courses are given at the SSAB Oxelösund headquarters in Sweden. You are welcome to join us to get the most out of your TOOLOX. A visit lets you experience both our powerful mill and the beautiful nature of Scandinavia.



SSAB Oxelösund – a subsidiary of SSAB Swedish Steel Group – is the world's leading manufacturer of quenched and tempered heavy plate, marketed under the well known brand names of HARDOX® Wear Plate, WELDOX® Structural Steel Plate, ARMOX® Protection Plate and TOOLOX® Prehardened Tool & Machine Steel. The steels are characterised by the combination of high strength and toughness, derived from the clean steel composition and a unique production process.

SSAB Oxelösund focuses exclusively on developing quenched and tempered steel. With a strong local presence in more than 45 countries we provide our customers with high quality steel as well as commercial and technical support.

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