

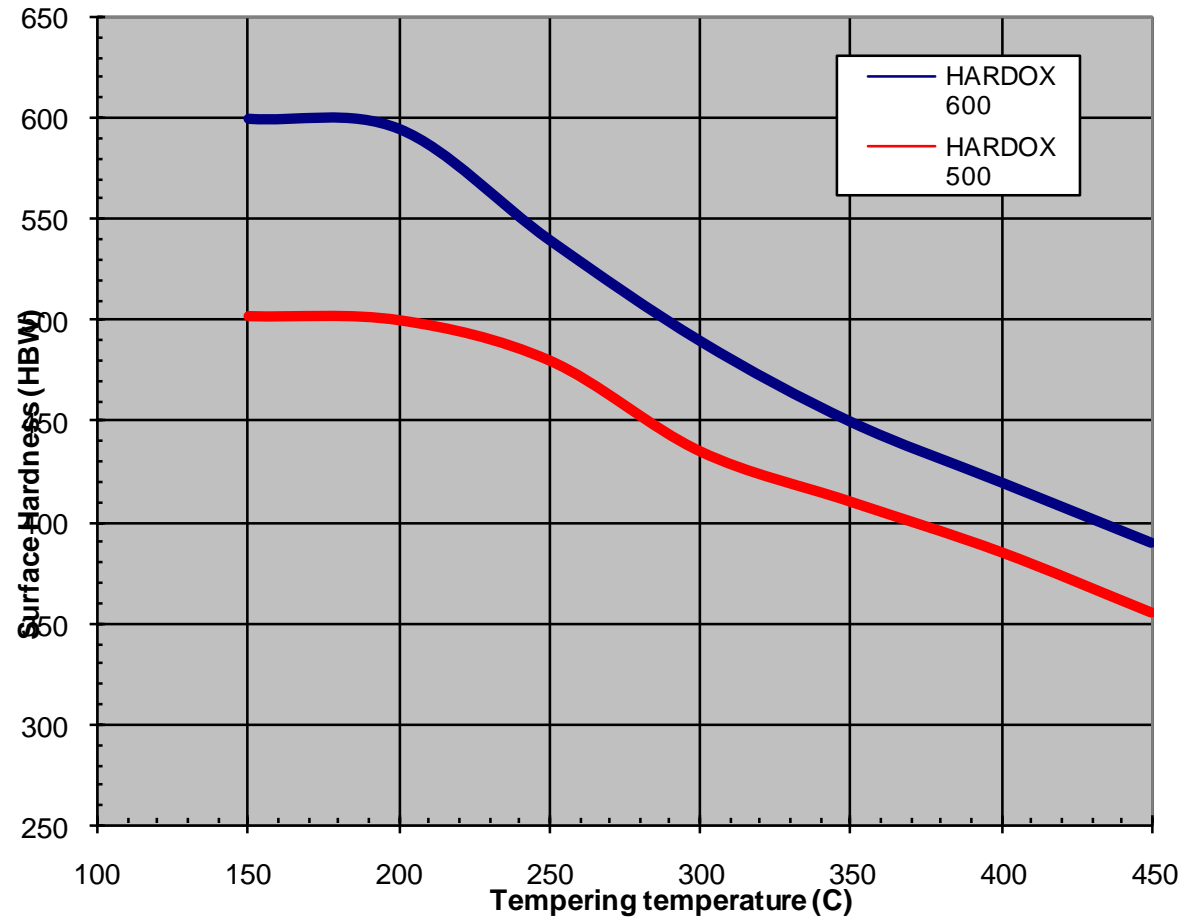
APPLICATIONS IN STEEL MILL / STEEL INDUSTRIES

This presentation contains general suggestions. SSAB hereby expressly disclaims any liability for their suitability for individual applications. It is the responsibility of the user of this brochure to adapt the recommendations contained herein to the requirements of individual applications

Hardness reduction due to tempering

Above 200°C to 250°C Hardox starts losing hardness!

Surface Hardness vs. Tempering temperature



Not for Hardox



BUT...

Hardox applications in a Steel Mill

- Liners
- Sliding plates
- Chutes
- Crushers
- Hammer
- Buckets
- baskets
- Fork lifts
- Containers
- Grabbers
- Cutters
- ..and many more



Hardox in a loader

Wear resistance

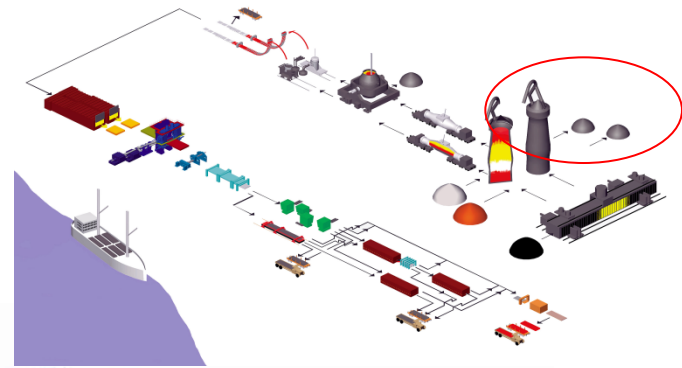
➡ Save weight

➡ Mistreatment

➡ Weldability

➡ Bendability

➡ Toughness

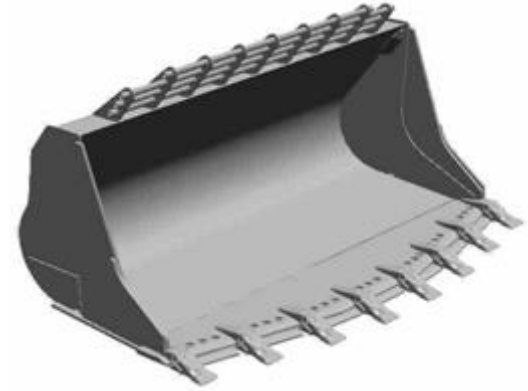
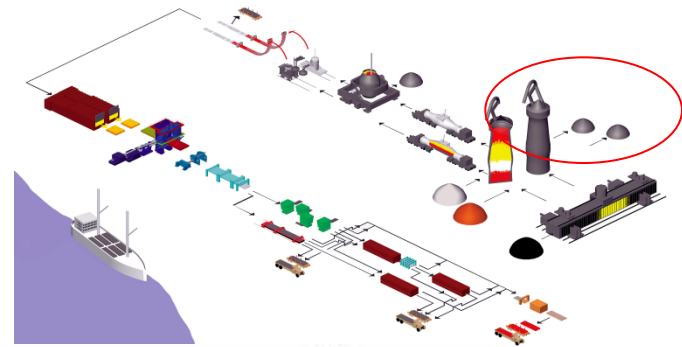


Slag Handling, Buckets

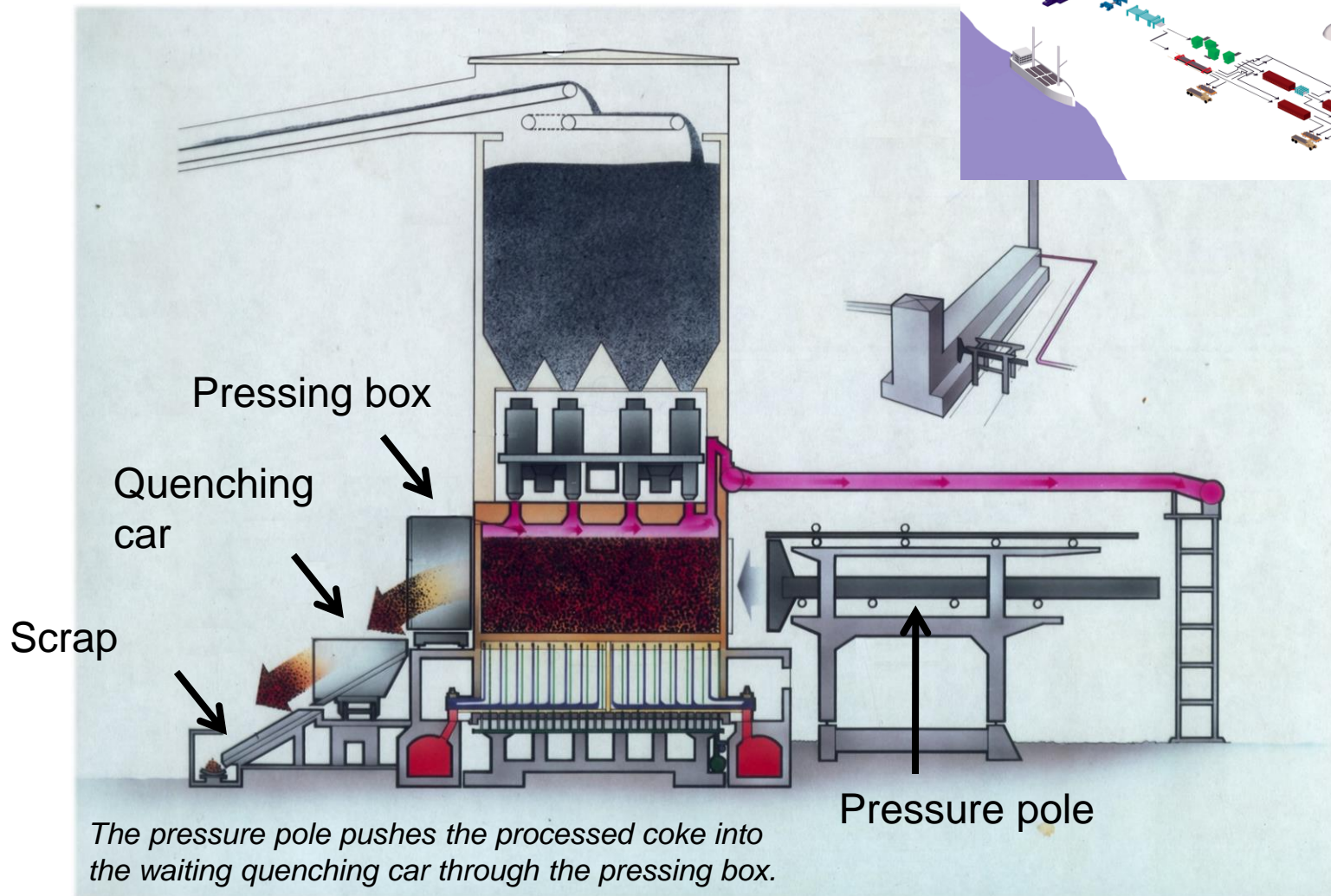
Internal test with Hardox 550

Important!

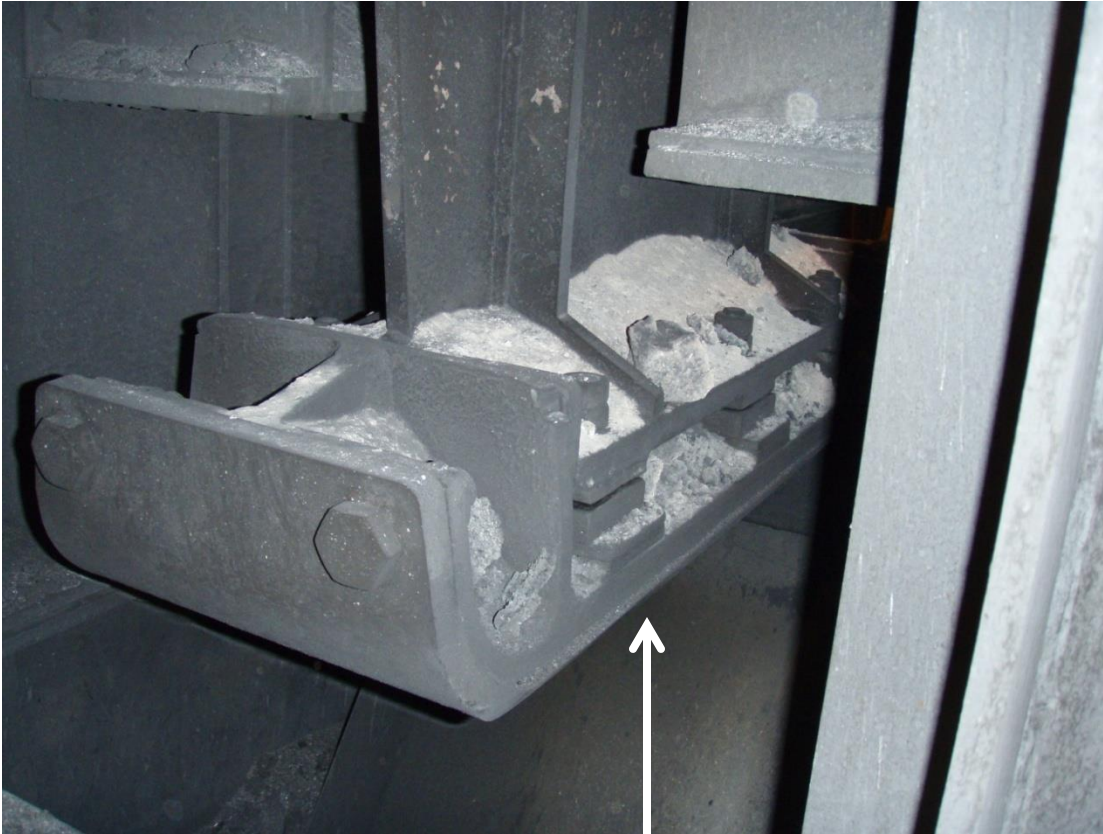
- Small pieces
- Bolt on
- Plasma cutting



Coke plant



Wear Sole for Pressure pole



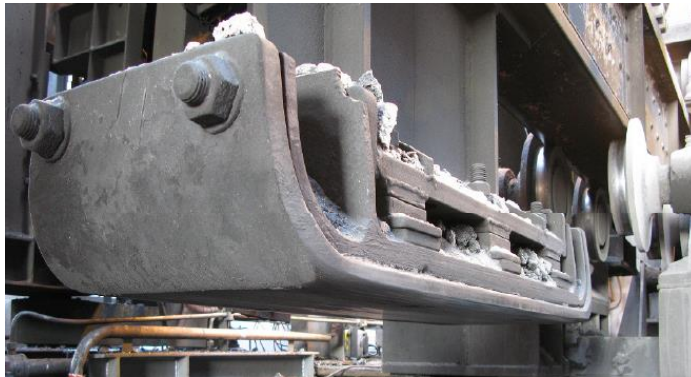
The sole is in the oven for 60 sec. per push and heats up to approx. 550 C° during pushes.

Toolox 44



Hardox 400 after 2 months
in use

Too hot for Hardox



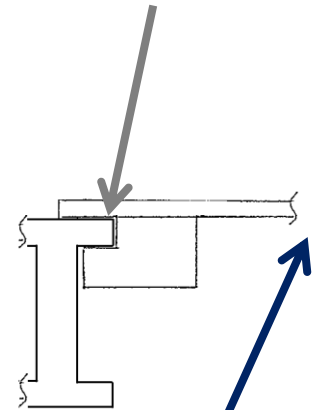
Toolox 44 after 7 months and
still in use

Wear plates in Quenching car



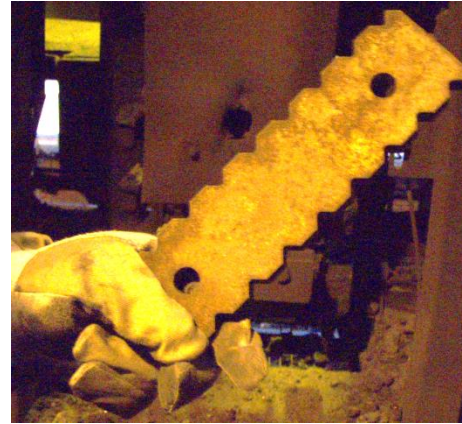
The plates are fastened by welded clips on the back.

SS1311 HE120B



Hardox 400 25 mm

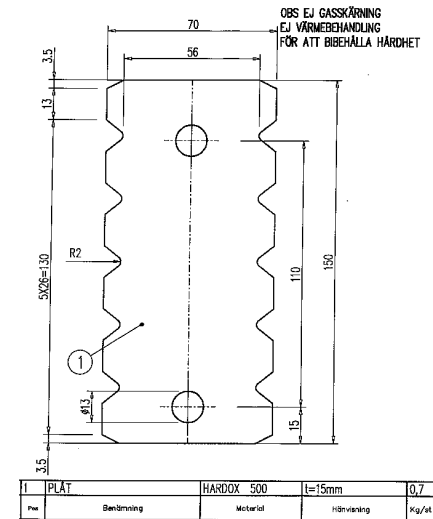
Wear plates in cleaning knives & scrapers



The oven doors evolves a coating of graphite material while processing. This graphite is machined off by the pressing box vessel.



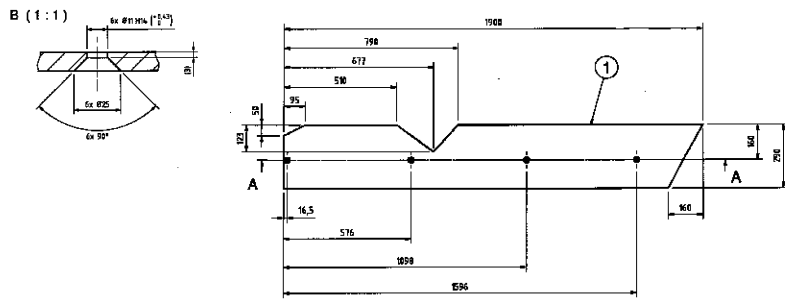
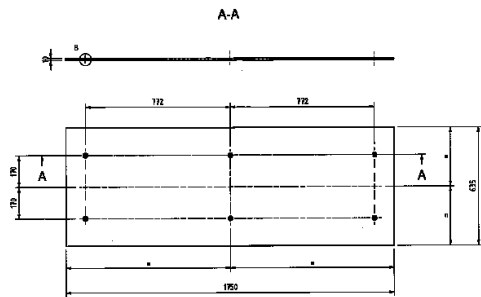
Hardox 500 15 mm



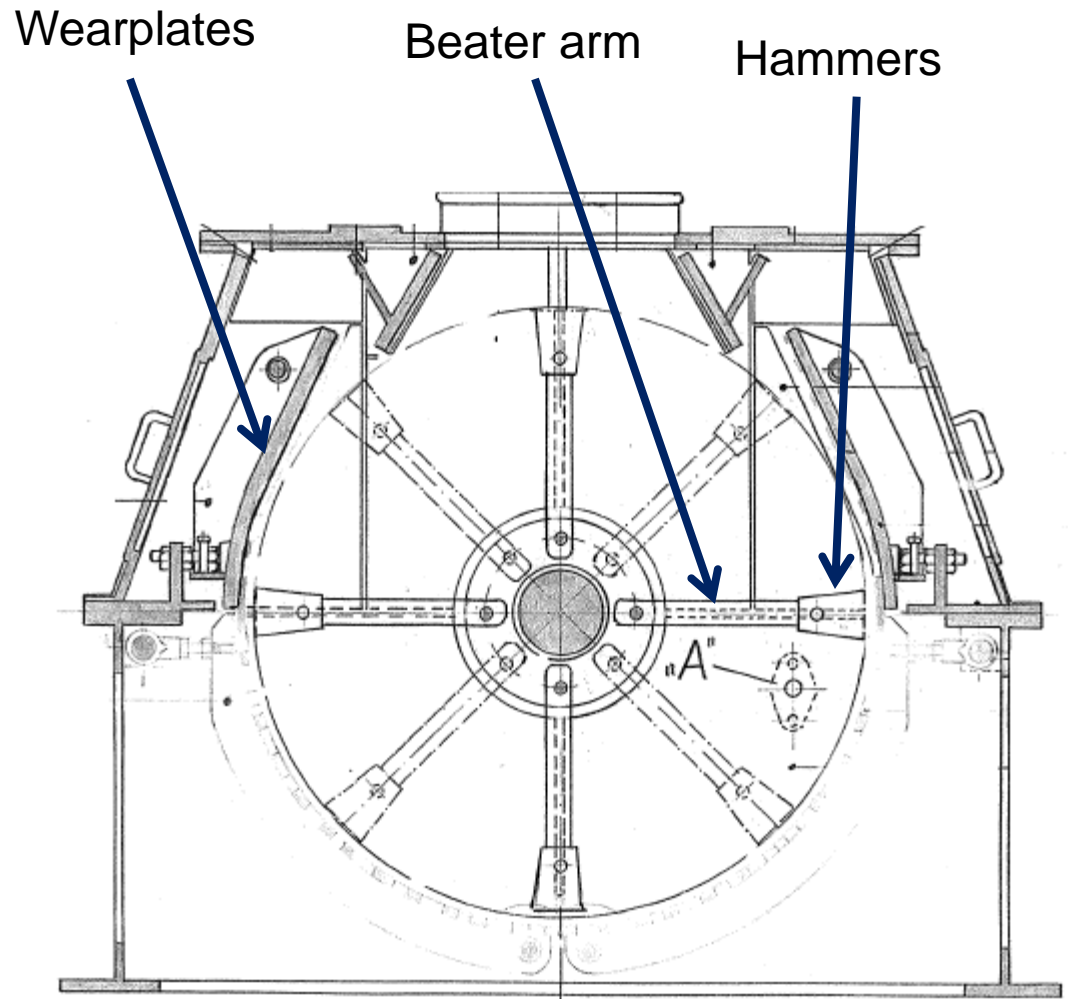
Wear plates in vibrating feeder



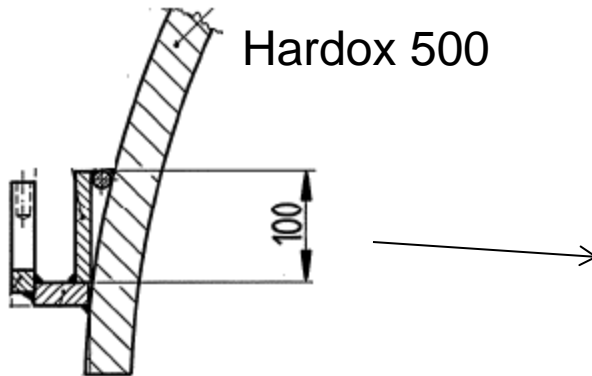
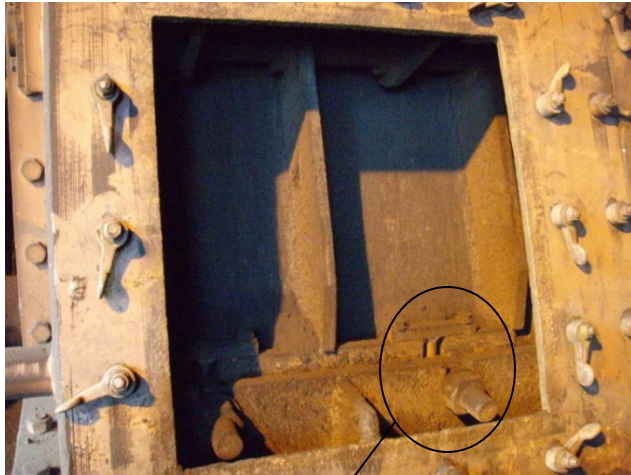
Wear plates in vibrator:
Hardox 400 10 mm



Wear plates in hammer mill



Wear plates in hammer mill

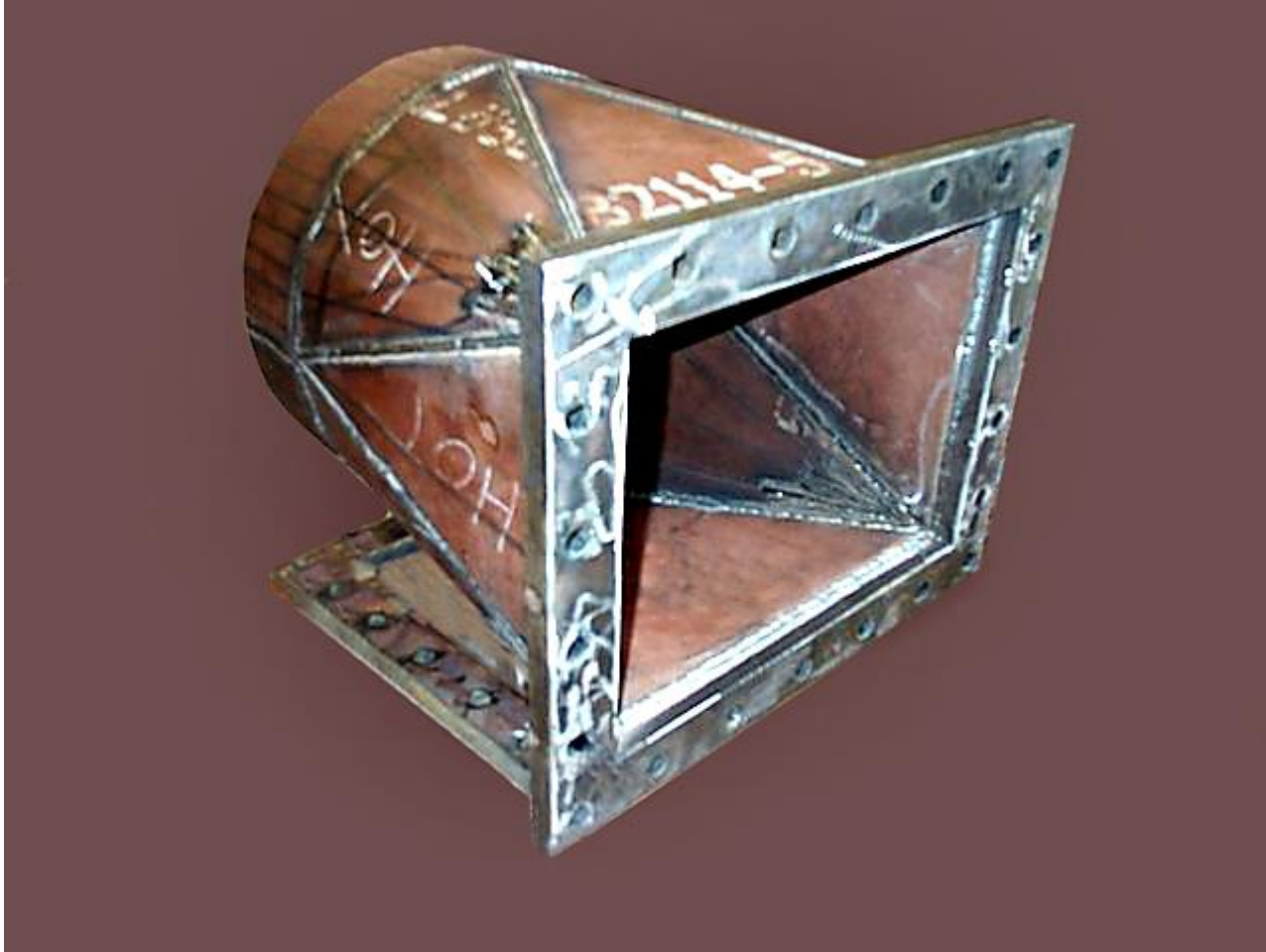


Slab lifter



Weldox 700

12mm Hardox 450 in steel works slag chute





Toolox 33 - support beams and bearing houses for continuous caster

The photographs on the right hand side show
bottom: support beams with Corr-i-Dur, carbo-nitriding surface treatment and
top: support beam mounted with the rolls and bearing houses.

The photographs on the left hand side shows one part of the turning section of the continuous caster with mounted sets of support beam, rolls and bearing houses. The support beams are approximately 2000*200*50 mm. Summer 2010, the first continuous caster was rebuilt with the Toolox 33 pieces put in place. It is since then running perfectly.

Toolox 33 was chosen due to the excellent workshop properties together with the high and even quality of the mechanical properties.

Grates made by Hardox 400 in cooling-beds

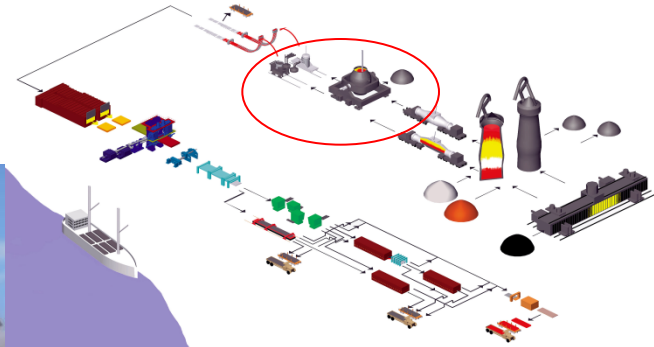


→Grade/thickness.: Was P280, now changed to Hardox 400 / 30mm

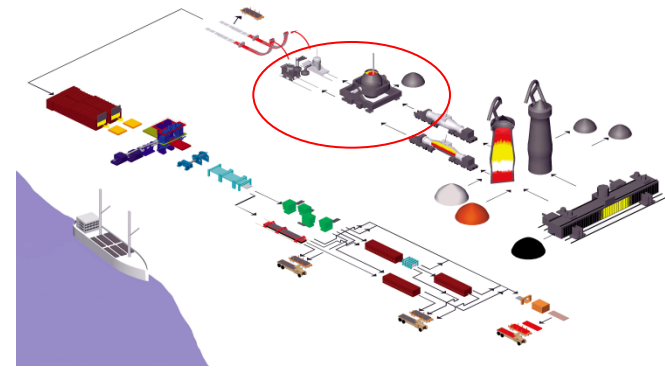
→Water jet cut directly to shape

→Service life so farbetter than P280

Steel scrap handling



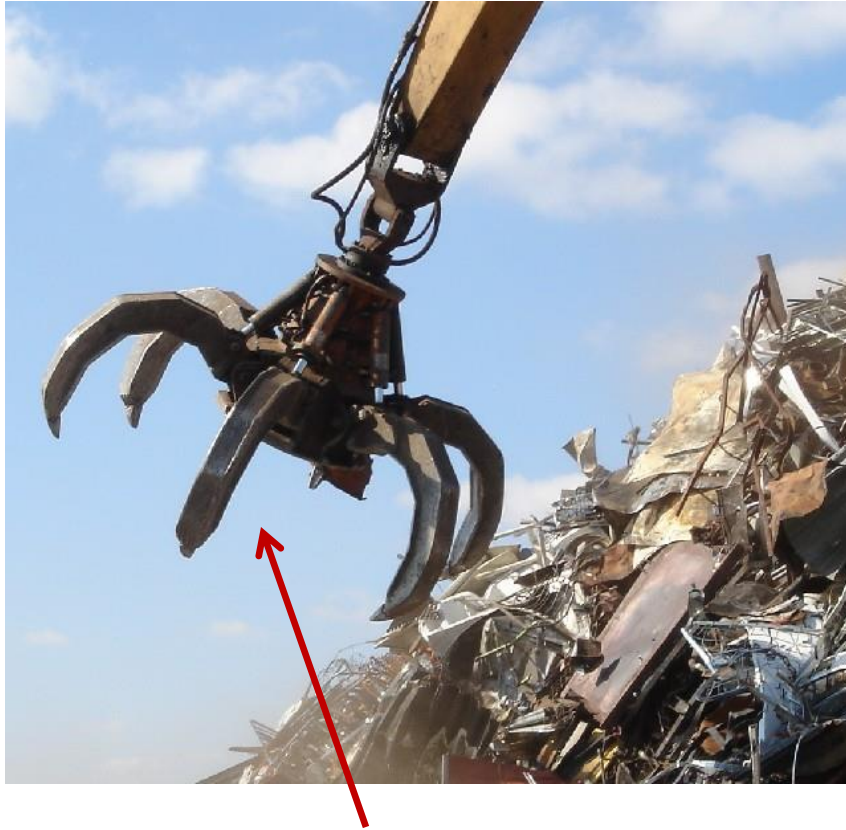
Hardox scrap container



HARDOX 450

- Increase Payload
- Wear life
- Impact resistance

Grabber



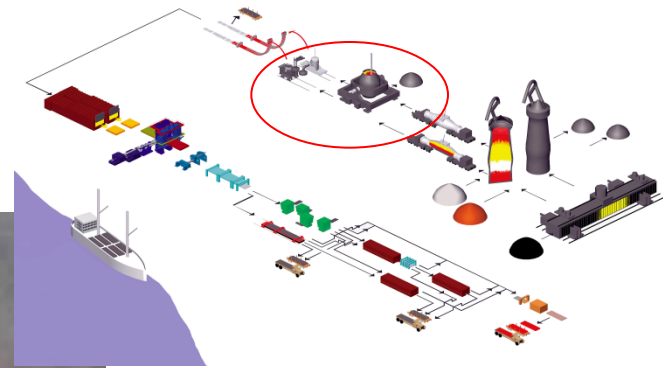
HARDOX 400

Metal shear



HARDOX 500, HARDOX 550

Demolition shear

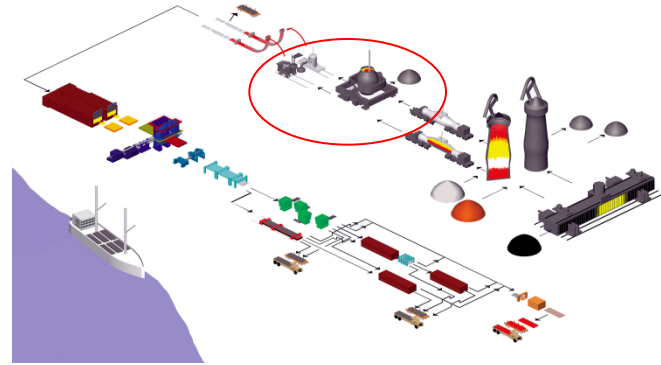


Hardox 400

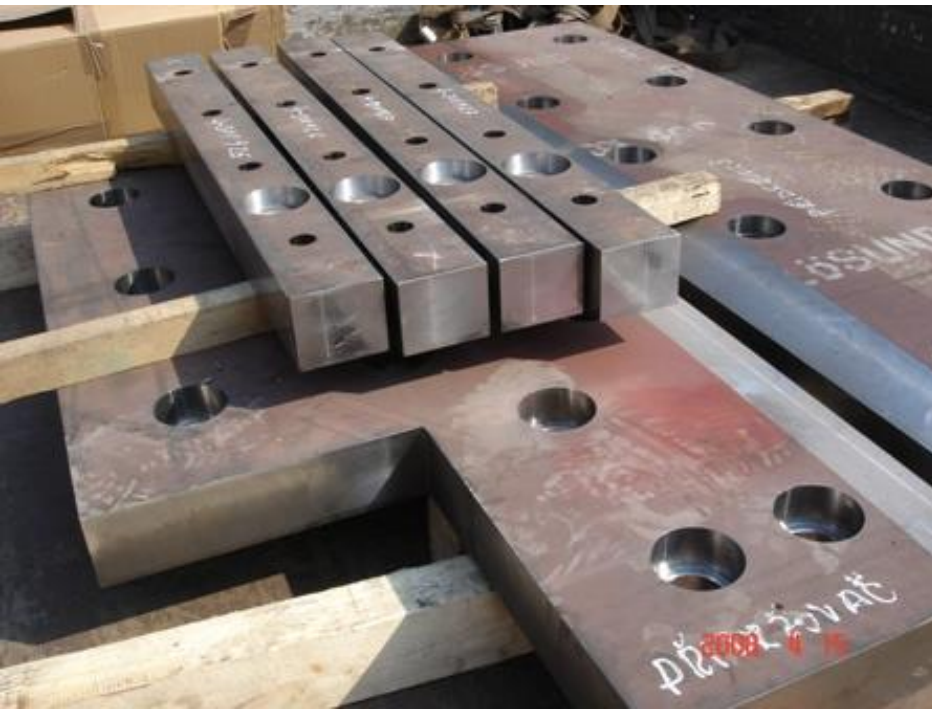
Hardox 600

Chute for Steel scrap (cooling)

**Hardox 400 to Hardox 500 If bending involved.
Otherwise Hardox 550 and Hardox 600
can be a good alternative**



Scrap milling



Hardox 450 in scrap baskets



Less wear

No deformation in structure

Slitting baler

Steel grade

Hardox 450, 10 to 30 mm

Description of the application

The 12mm Hardox450 was used to line a slitting line baler. This baler catches and recoils the slitting line scrap.

Previous material

Mild Steel

Service life

>3 years

Competitive advantage

Service life

Manufacturing steps

Cutting method - Gas cutting;

Welding method - Normal Welding

Status

Success



Lamellar hook for coils



Steel grade

Weldox 700

Thickness range

30 to 60 mm

Previous material

ordinary steel

Manufacturing steps

Cutting method - Gas cutting

Status

Success

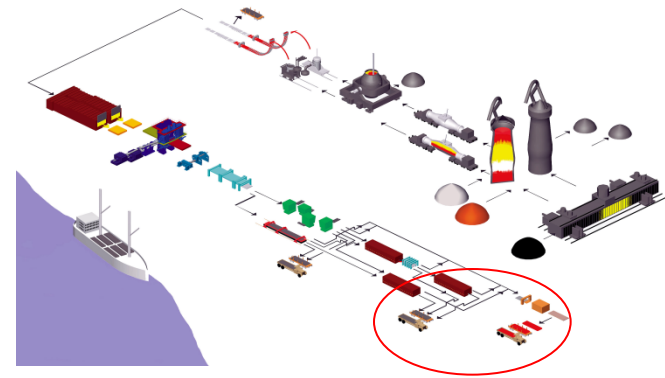
Easier sourcing of mid range thickness plates instead of very heavy thickness.

Fork lift (lamella structure)

HARDOX 400

Important!

- No welds at the bend



Benefits Of Selecting Toolox

- ✓ Ready to use – no heat treatment required
- ✓ Easy to machine
- ✓ Weldable
- ✓ Possible to gas cut
- ✓ Perfect for nitriding
- ✓ Dimensional stability
- ✓ Wear resistance – even high temperatures
- ✓ Crack resistance



/ **SSAB**

Slag Bucket

DESCRIPTION

Bucket for handling hot slag.
Temperatures up to 1500 °C.

Hardox 400, St52, Heat Resistant Steel ⇒ 8 WEEKS

⇒ **Toolox 33** ⇒ 8 MONTHS

EXPERIENCE

Toolox offers high temperature wear resistance.
Reflected in much longer lifetime of Toolox.



Installed January 2011
Photo Taken April 19 2011

Cable Drum

DESCRIPTION

Cable drum used for a wagon in coking plant

► Toolox 44

EXPERIENCE

220 mm forged block machined
with HSS tools to 190 mm.

Combination of strength, hardness, and
toughness very important.

Works perfectly since 2010.



Crane Wheel

DESCRIPTION

Steering wheel in an overhead crane
ø 610 mm L 125 mm

35CrNiMo14 INDUCTION HARDENED ➡ **Toolox 44**

EXPERIENCE

Faster manufacturing.

Water jet cut and directly machined to final piece.

Safer solution due to no heat treatment.

Critical component.

First test in 2006 and introduced as standard.

Wheels typically replaced every 3-4 years.



Crane Wheel

Shear Blade

1.2767 HT 50 HRC ➡ **Toolox 44 NITRIDED**

EXPERIENCE

Each corner used until worn out.

8000 cuts / corner and a life of one month.

Knife rotated so all 4 corners used.

Then short edges of knife remachined and knife put back in use. No need for re-nitriding.

Superior performance

High strength and wear resistance.

Nitriding layer prevents debris sticking to surface

