

Tooling applications



Plastic

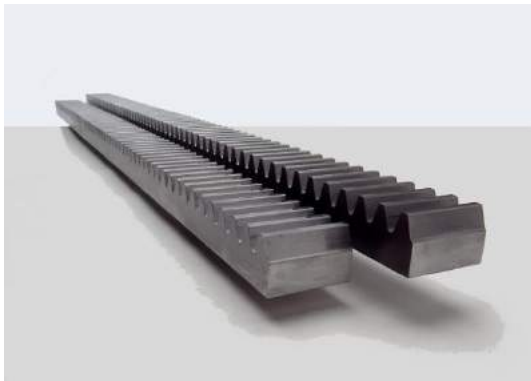


Cold working

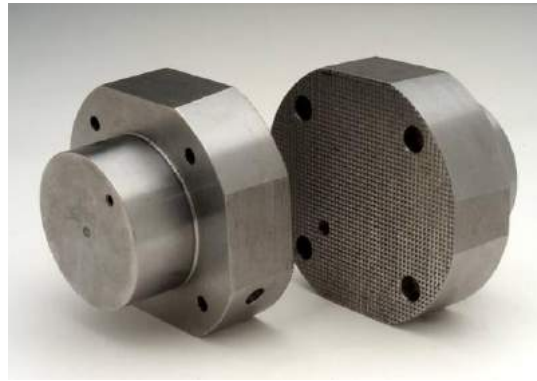


Hot working

Engineering applications



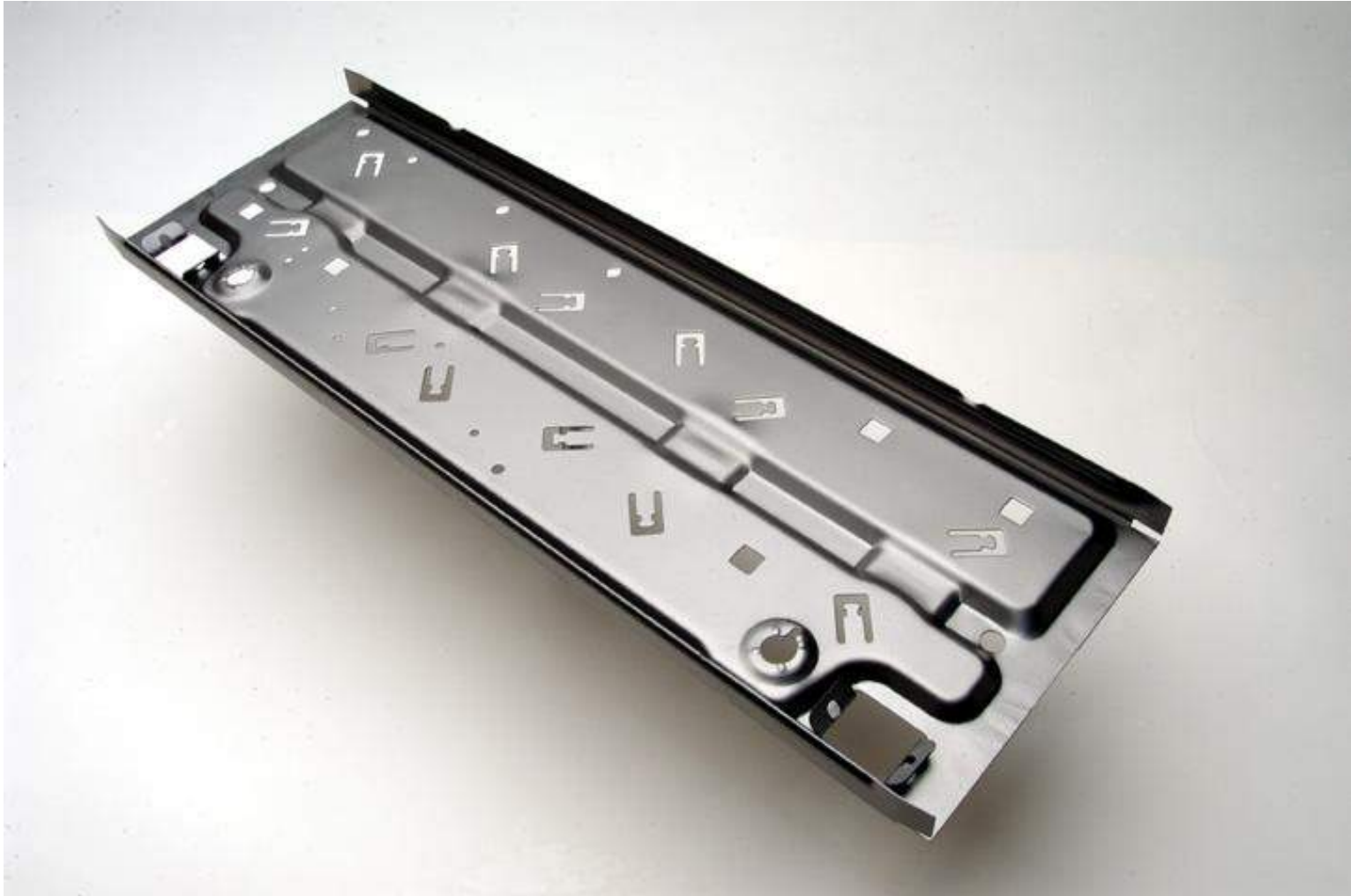
Guiding



Holding



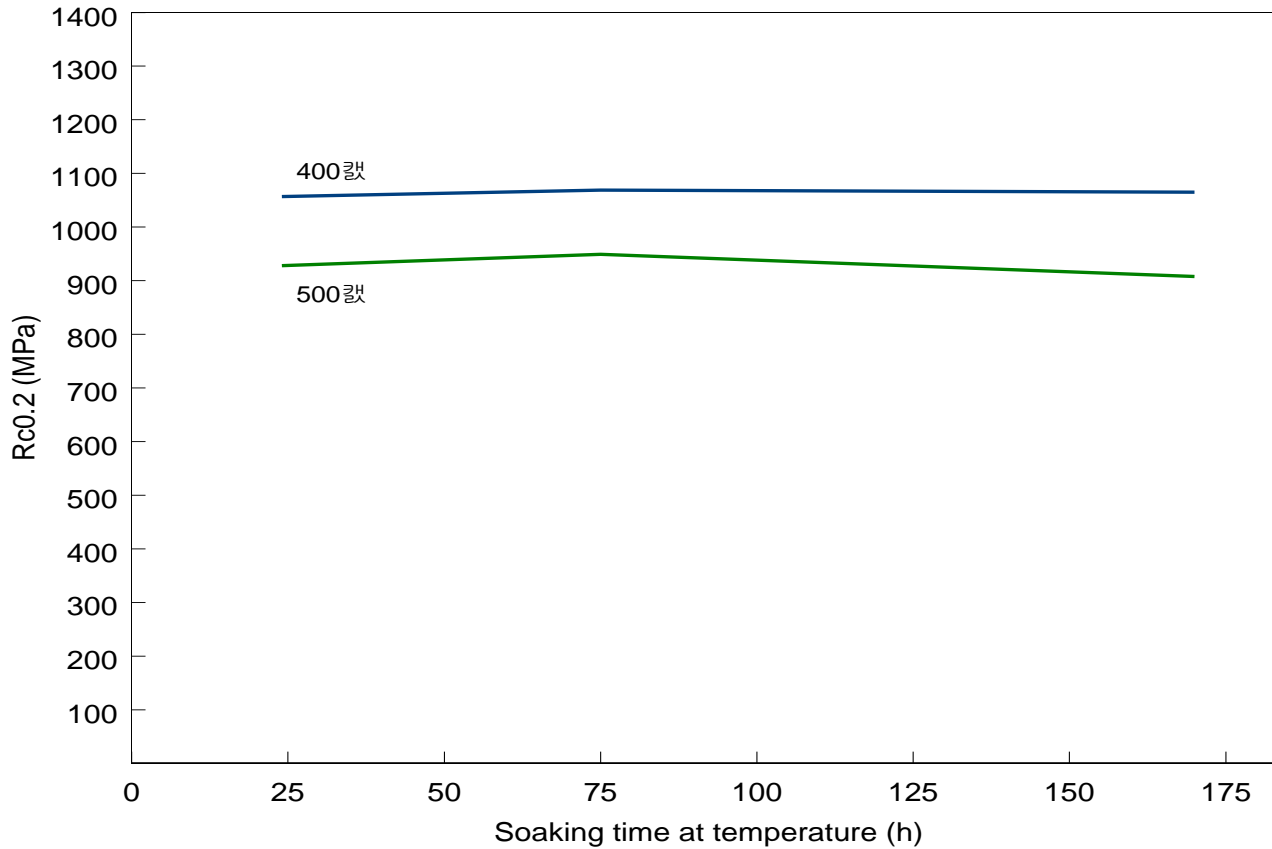
High temperature



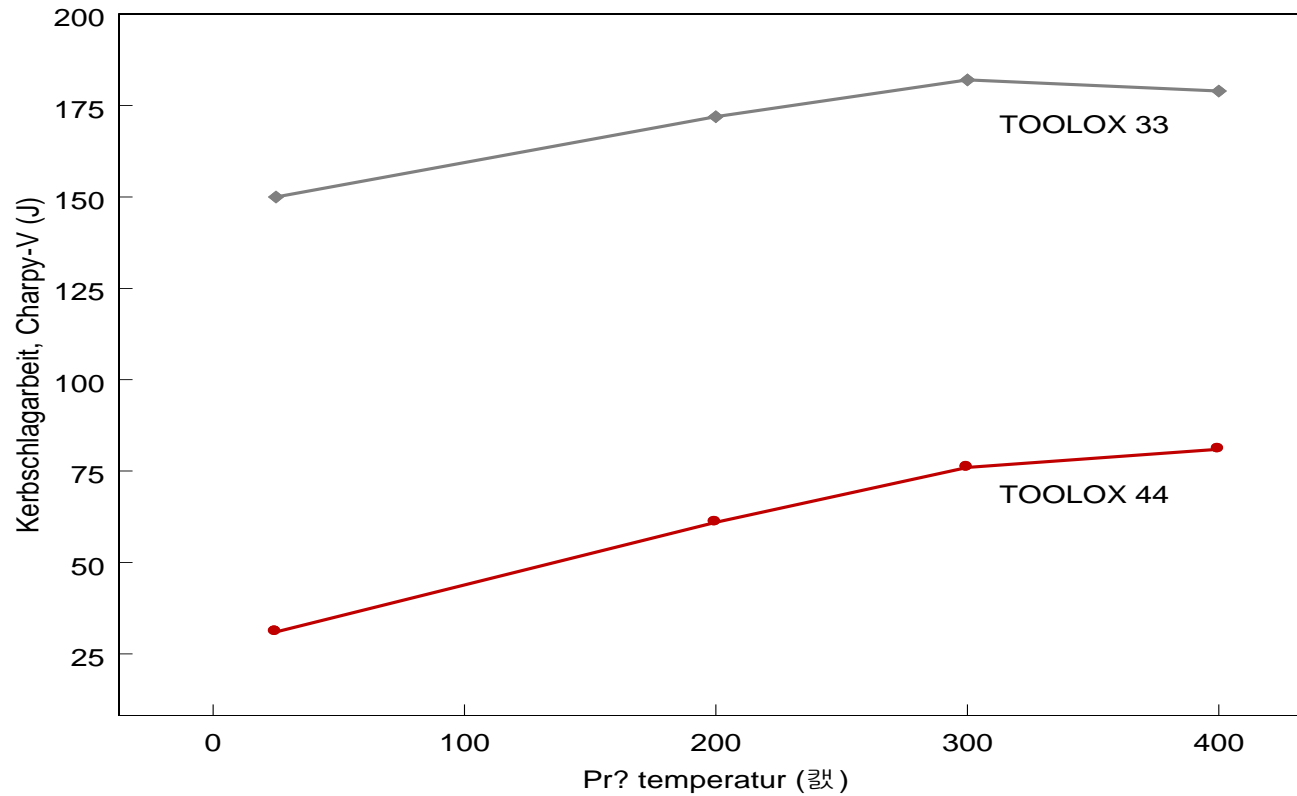
TOOLOX[®]44

Die for extrusion of aluminium profiles made and used by
SAPA Aluminium in Finspång ,Sweden.
Previous solution Dievar

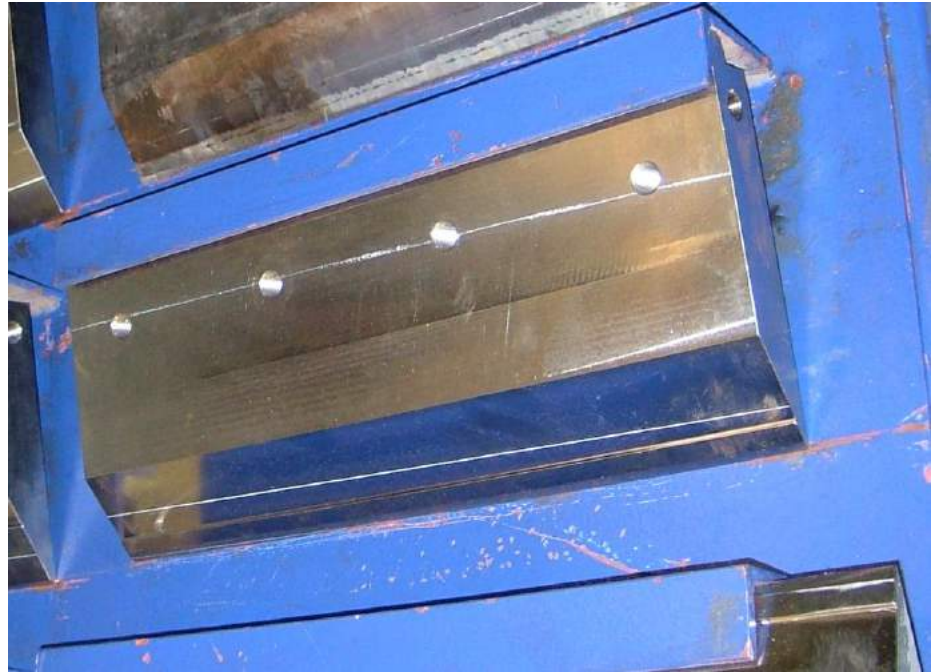
Compressive yield strength of TOOLOX 44



Impact toughness

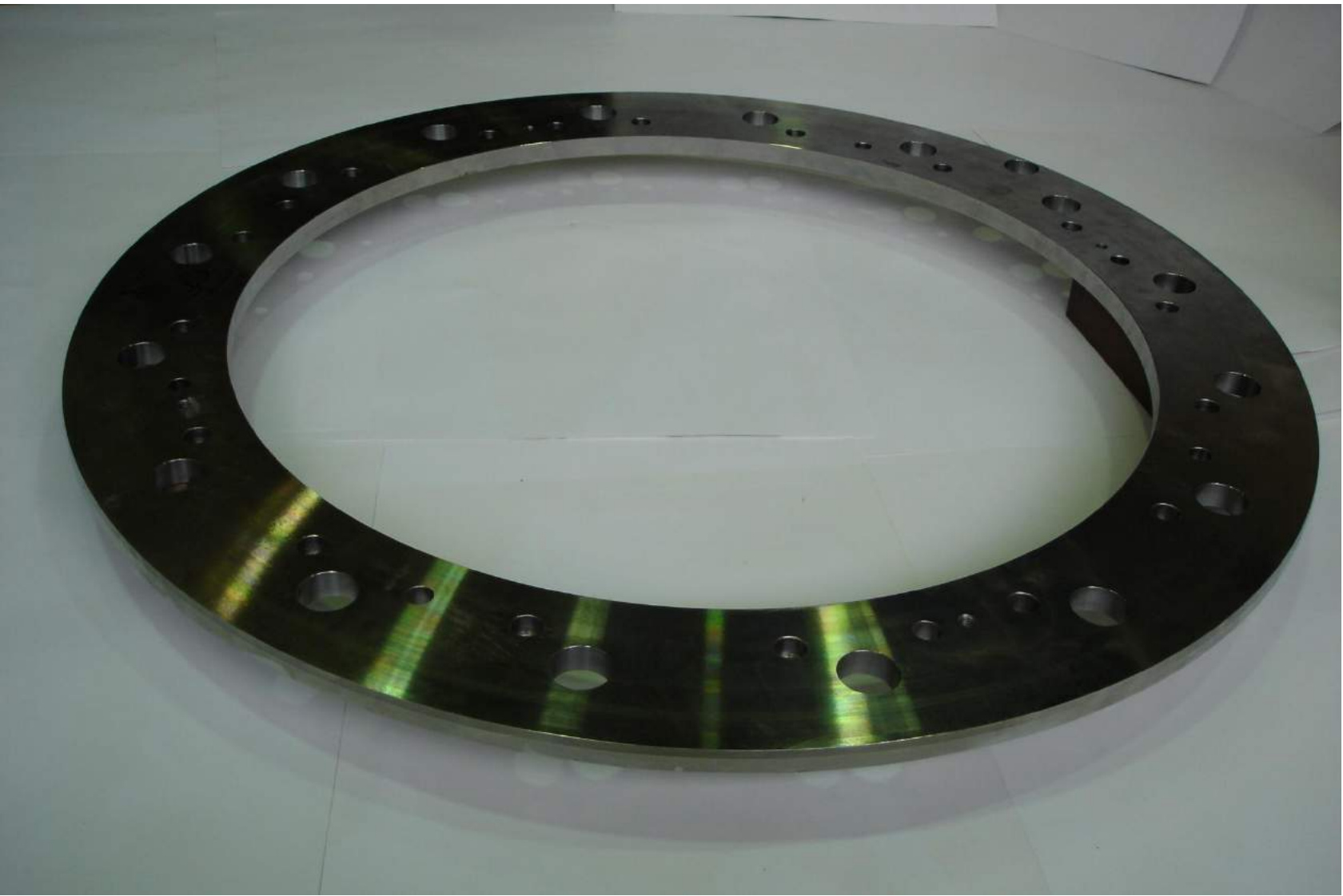






TOOLOX 44 in cutting knives

	Sheet thickness (mm)	Surface eng.	Number of cuts	Result
Docol 600DP	1.2	No	38,000	Failed
Docol 600DL	2.0	No	24,000	Failed
Docol 600DP	2.0	Nitrided	50,000	OK
Docol 1000DP	2.0	Nitrided	50,000	OK



Tool/machine steel substitution...

- TOOLOX 33

- W.Nr 1.2311
 - W.Nr 1.2312
 - W.Nr 1.2738
- } Plastic moulding
- W.Nr 1.2363
 - W.Nr 1.2379
- } Sheet forming
- 42CrMo4
 - C45-C60
- } Machine components

- And others as you find applications...

- TOOLOX 44

- W.Nr 1.2343
 - W.Nr 1.2344
 - W.Nr 1.2761
- } Plastic moulding
Die casting
- W.Nr 1.2363
 - W.Nr 1.2379
 - W.Nr 1.2358
- } Cold work

- And others as you find applications...

TOOLOX

- Can be gascut
- Weldable
- Easy to machine
- Shape stability
- Wear resistant
- Perfect for nitriding
- Heat resistant

TOOLOX 33 in guiding plate

Function

122 meters of guiding plates in rolling mill.
When the rollers are replaced for grinding they are transported at those guiding plates.

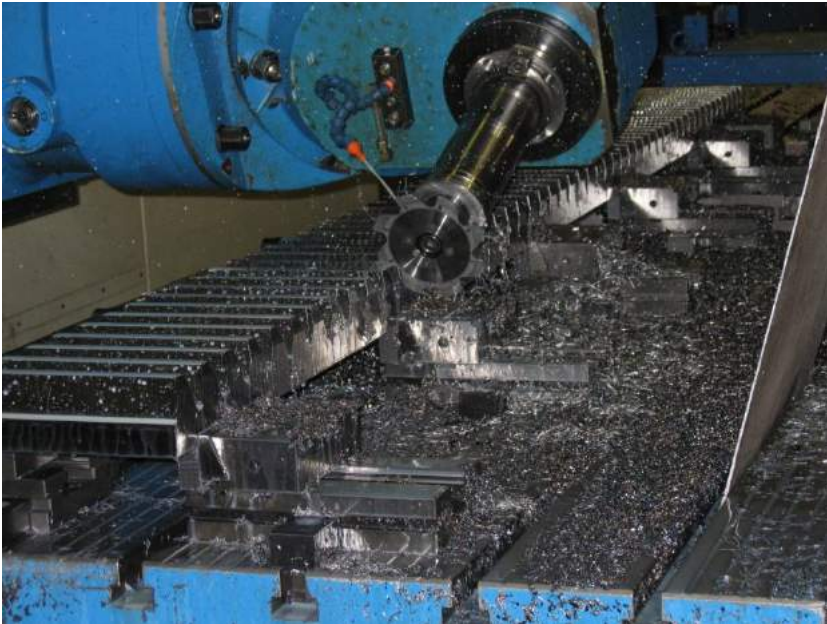
Previous solution

St70-2 alt. 42CrMo4V

Manufacture

TOOLOX 33 pieces were sawed, machined and finally nitrited giving a corrosion resistant and very hard surface, 64-71 HRC.

TOOLOX 33 in gear racks



Function

The gear rack is used in a rolling mill to center the plate.

Previous solution

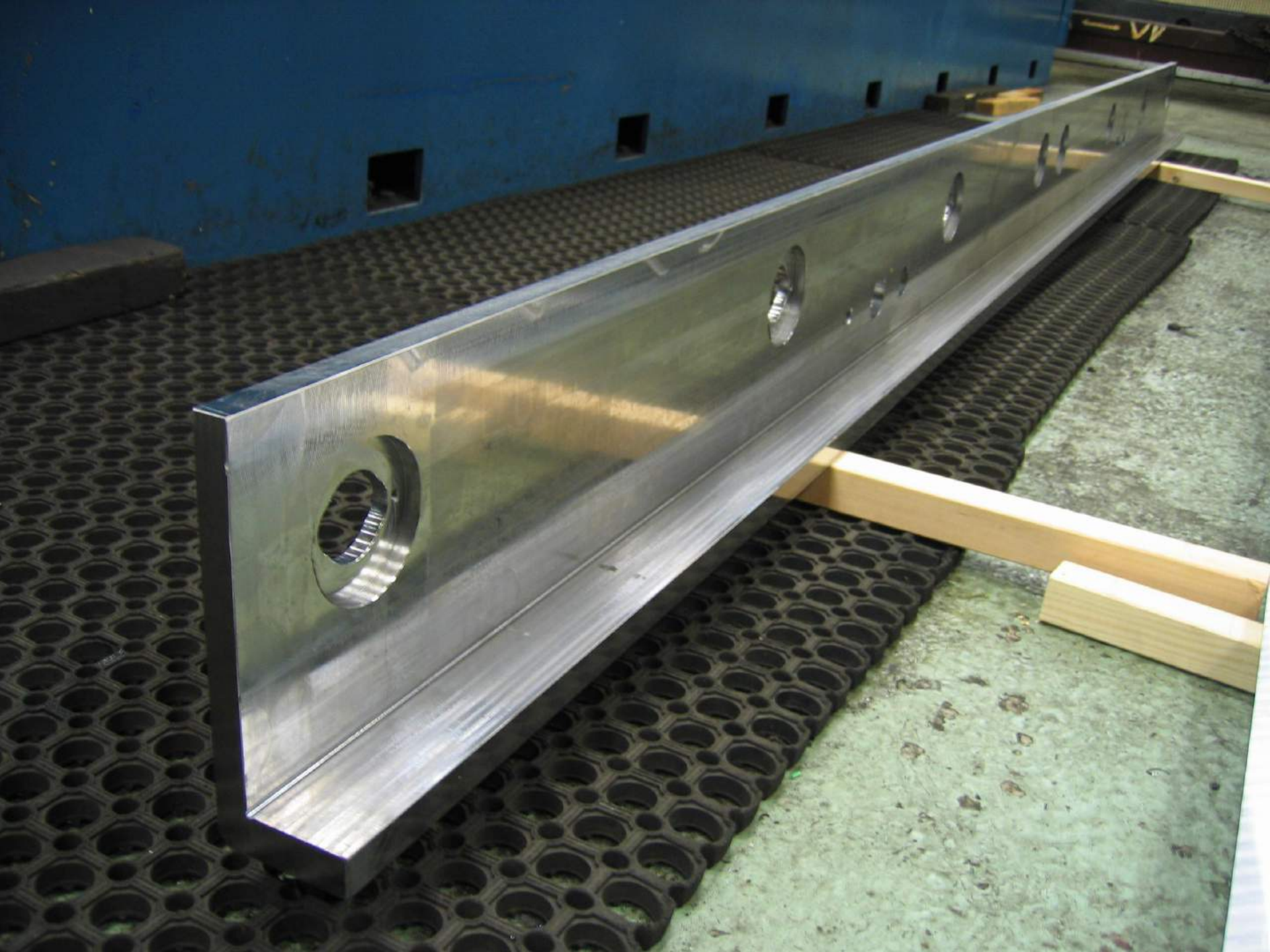
42CrMo4V.

Manufacture

Size 2614 x 210 x 66mm.

Gascut 70mm plate was machined with excellent results.

Great advantage with good dimension stability.



TOOLOX 33 in knife supports



Function

Support for the knife in a machine shearing steel plate. There are very high demands on flatness tolerance; 0.1mm on 4000mm.

Dimension

4000x230x80mm.

Previous solution

34CrNiMo6 (hardness 240-290 HB) was used. The support needed to be changed due to plastic deformation. It was changed every year during the yearly maintenance stop. Since a lot of steel was taken away from one side, previously machining was very complicated to obtain the necessary flatness. Milling had to be carried out on one side, the piece turned and milling continued on the other side.

Manufacture

The piece was gas cut at an elevated temperature of 175 C. The resulting stresses were noted during pre-milling but disappeared when the surface layer was milled away. Then milling went very well without the need to change sides as before.

Experience

The piece was put in to use summer 2006. Until April 2007, the support works very well and the responsible engineer will introduce TOOLOX as standard for the application.





LEVERANTÖR/SUPPLIER
LINKÖPINGS
TRANSPORTINDUSTRI AB
LINKÖPING — SWEDEN

TOOLOX 33 in wedges



Function

When cutting plates in the SSAB factory, a shear with two shear blades are used. The distance between the blades has to be optimised. For this reason two metal pieces are pushed in relation to each other.

Dimension

4600x170-60, thickness 69mm

Previous solution

Previously, C 45 was used. With this steel it was difficult to obtain the right tolerance in shape over the length of 4600mm.

Manufacturing

The pieces were first cut from a 84mm thick plate with waterjet cutting. The pieces are milled and drilled. Screws that are pushing the two pieces relative to each other are put into the holes. The workshop very much appreciated the tolerances after machining.

Experience

The pieces were put into use summer 2006. April 2007 they were still operating with good result. It has been noted that the stability in geometry during operation is better than before.



TOOLOX 44 in shearblade

Function

The pieces are used as blades in a machine cutting steel plates in the SSAB production. The highest strength steel grade cut has 960 MPa and is cut to thicknesses up to 35mm.

Cutting is made with the plates cooled to room temperature. Around 2000 cuts are made/week. The pieces are turned every 4 weeks. As each corner of the pieces can be used 8000 cuts, the piece can be used 32000 times before being sharpened.



Manufacture

A TOOLOX 44 piece with dimensions 3700x200x70mm was machined and then nitrided. The nitriding was made to a specification of 0.5mm depth (60 hours). The weight of the piece is 460 kg.

Important during the manufacture was that the shorter edges of the piece was ground to remove the nitriding layer. Giving the piece a selfsharpening effect since the core wears out faster than the nitrided surface on the sides.

Previous solution

W.Nr. 1.2767 hardened to a by SSAB measured hardness of average 510 HV.

Experience

The TOOLOX 44 blade has until April 2007 been sharpened several times. The result is at least as good as with the previous steel. An advantage has been that due to the nitriding layer, the blades are more resistant to small pieces entering and sticking into the surface. The blades also are more resistant to plastic deformation than the previous ones.

TOOLOX 44 Height control piece



Function

The piece is used in a rolling mill to control the height of the lower rollers.

Former solution

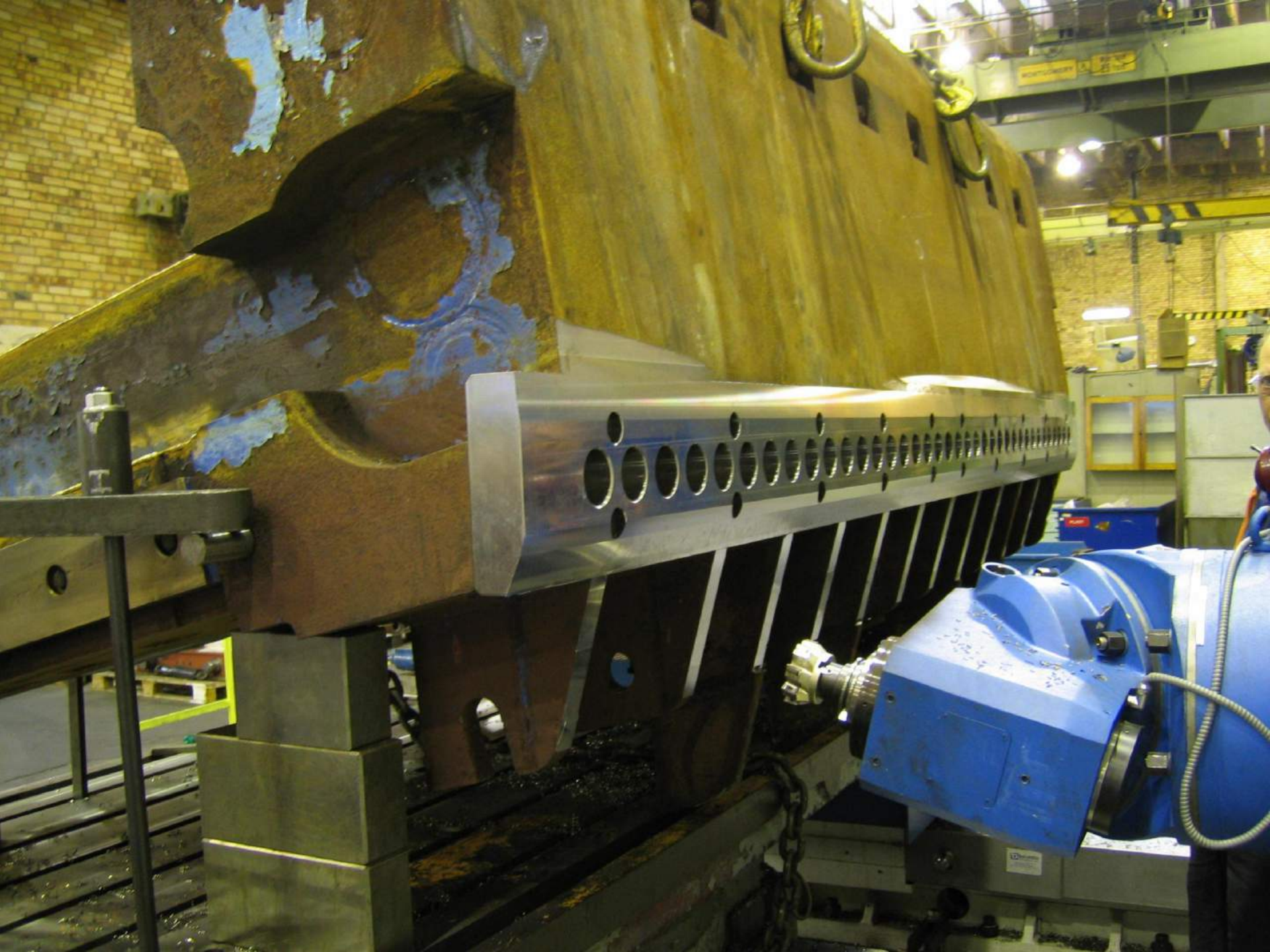
- Two different solutions have been tried;
- Induction hardened 34CrNiMo6 having to low strength
 - IMPAX HI HARD, having to low toughness giving crack problems

Manufacturing

Forged TOOLOX 44 pieces were used
A thinner piece was waterjet cut and a thicker one gas cut. After that machining was made to final dimension

Benefits TOOLOX

The pieces are subjected to very high pressures. The high strength and the toughness of TOOLOX 44 make it suitable for such conditions



TOOLOX 44 for shot blasting ramp



Function

The ramp is used when cleaning steel plates with high pressure water. The water nozzles are positioned in the holes seen of the photo. The piece is worn out from pieces removed from the plate surface.

Previous solution

The hole ramp was made in cast material.

Manufacturing

The part of the ramp with most wear was replaced with the TOOLOX 44 piece.

It is expected that changing to TOOLOX 44 will both increase flexibility as well as the life time.

It was very important with flatness after manufacture of the wear part. Something very well obtained with TOOLOX 44.

Experience

The ramp will be put into place during 2007 when maintenance is carried out next time.



TOOLOX 44 for wear protection in the rolling mill



Function

The wear pieces are used to take up sliding forces in the rolling mill. Every time the rollers are lowered towards the steel plates, a sliding movement takes place. Corresponding to more than 1 million cycles/year. The corrosive atmosphere is quite demanding with a combination of grease, scale and water.

Dimension

1285x1000x40mm.

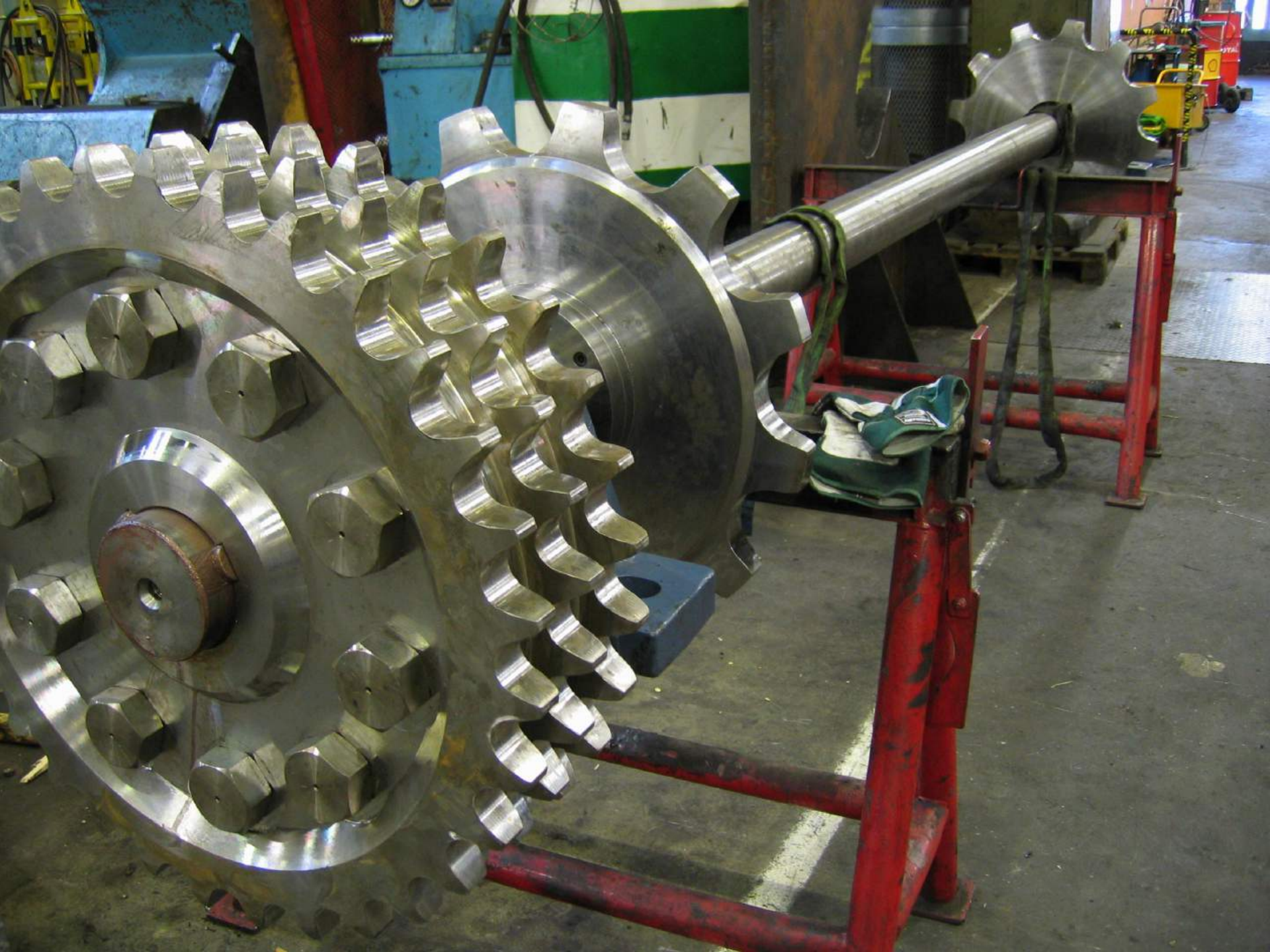
Previous solution

Previously a compound plate with a soft core and a surface of around 60 HRc was used. Resulting in cracking after 5 years and being in general an uneconomical solution.

Manufacturing

First, the pieces are cut out with gas cutting. The result after machining made it possible to obtain the high demands on flatness.

After machining the plates, they were sent for a black nitriding treatment giving a corrosion resistant and very hard surface, 64-71 HRc.



TOOLOX 33 for chain wheels



Function

Chain wheel used in a steel plate painting line.
The wheels are disgarded when the teeth are worn out.

Previous solution

A cast piece made in C45W. The delivery time of the cast piece was quite long which made TOOLOX 33 a more convenient alternative.

Manufacture

As can be seen in the photo, three 60mm thick wheels with a diameter of 680mm were screwn together. Giving a final thickness of 180mm. Since the wheels were put together it was very important with flatness after machining.

The pieces were cut out from 80mm plate using gascutting.

Experience

Manufacture went well giving a very good tolerance. The wheel was put into use summer 2006. Until April 2007, the result is fully satisfactory.



TOOLOX 33 for wheel hub



Function

Wheel hub for a large construction machine used for outdoor transport. Very high forces (the machine loads up to 40 ton) are working on the hub.

Dimesion

Diameter 773mm, thickness 317mm.



Previous solution

The previous wheel hub made in cast material cracked. Delivery time of a new cast piece was around 3 months. To save time it was decided to make the hub in TOOLOX 33.



Manufacture

The thickness of the hub is 317mm. Since this thickness was not available in TOOLOX 33, the hub was built up from three 130mm pieces. The following procedure was carried out;

- Preheating
- Gas cutting
- Stress annealing
- Turning
- Preheating
- Welding with stainless material 6745
- Stress annealing
- Turning
- Drilling

Experience

The hub was installed January 2005. Thus far it is working without any problems. The hub wheel was taken apart beginning 2006 and inspected. No problems of for example welding cracks were seen. April 2007 the hub is still running without any reported problems.

A further advantage with the TOOLOX hub is that if in the future repairs have to be made, it will be much easier than with the cast part.



TOOLOX 44 for chain wheel



Function

The setup is used in a conveyor carrying steel plates into a heating oven.

Dimension

Diameter 368mm, thickness 174mm.

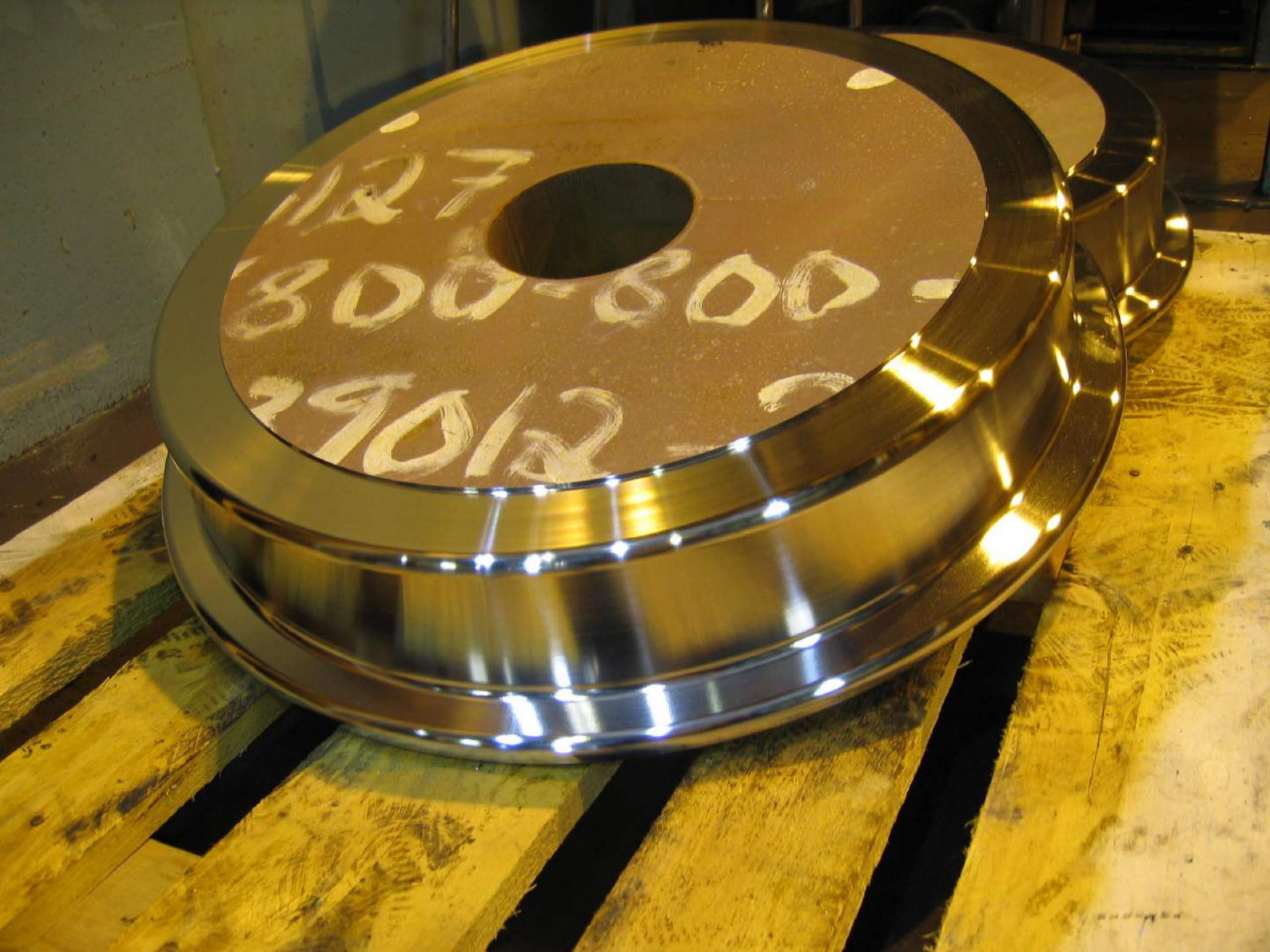
Previous solution

Previously the pinion and the chain wheel was manufactured from W.Nr. 1.2718 having a hardness of 200-260 HB. The setup was made in one piece from a round section of diameter 380mm. The material cost was around 700 euro.

The solution was uneconomical since 80% of the steel bought ended up being machined away. When the wheel teeth became worn down, the whole piece had to be changed.

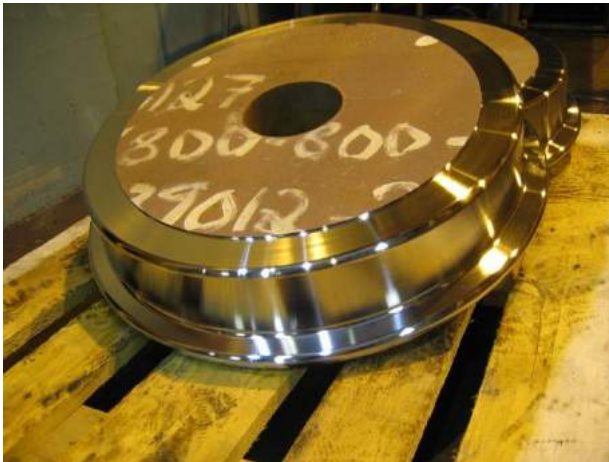
Manufacture

Insted of one piece, the design was changed. The pinion, that never changed, was made in low strength steel. The teeth that are subject to wear were made in TOOLOX 44. This represents a better solution since now only the TOOLOX 44 part has to be changed.



127
800-800
29012

TOOLOX 44 in crane wheel



Function

The pieces are used as crane wheels in a steel plate rolling mill. The wheels are normally changed every 3-5 years.

Dimension

Diameter 610mm, thickness 125mm.

Previous solution

Previously machine steel 35CrNiMo14(similar to W.Nr. 1.6582) was used. Induction hardened to a depth of 10mm.

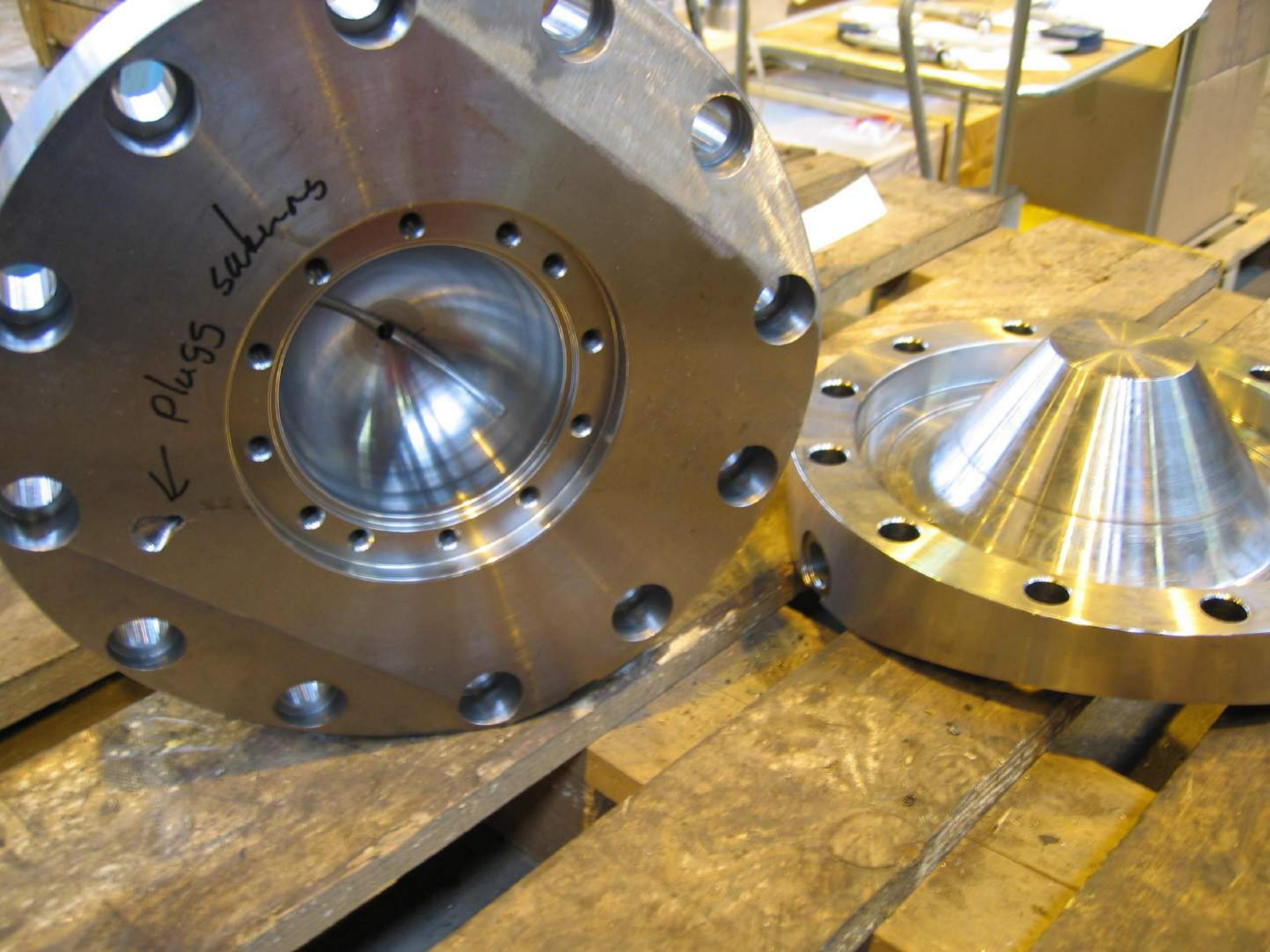
Manufacturing

A piece of TOOLOX 44 was made through water jet cutting and then turning to final dimension. No surface hardening was made.

Taking away the surface hardening lowered the manufacture time. TOOLOX 44 is also considered a safer solution since the risk of a incorrect heat treatment is taken away.

Experience

The piece was put into use May 2006. Until April 2009 it works very well.



TOOLOX 33 for hydraulic cylinder support



Function

The piece are details for a hydraulic cylinder.

Dimension

Diameter 292mm, thickness 99mm.

Previous solution

Previously machine steel W.Nr. 1.6582 was used. Bought in round shape.

Manufacture

The piece was gas cut from a 104mm TOOLOX 33 plate. After gascutting, the piece were annealed to take away stresses. Finally the dimension was obtained through turning and milling.

The homogeneity and stability during machining of TOOLOX was considered a big advantage for the application being a hydraulic component.

Experience

The piece was put into use during 2006. Thus far it works well.



TOOLOX 44 as steering wheel



Function

The piece is a steering wheel used in a large crane.

Previous solution

Previously 34CrNiMo6 was used. Bought in round shape with 255mm diameter. The wheel was made through;

- Turning
- Threading
- hardening
- machining once again.

Manufacturing

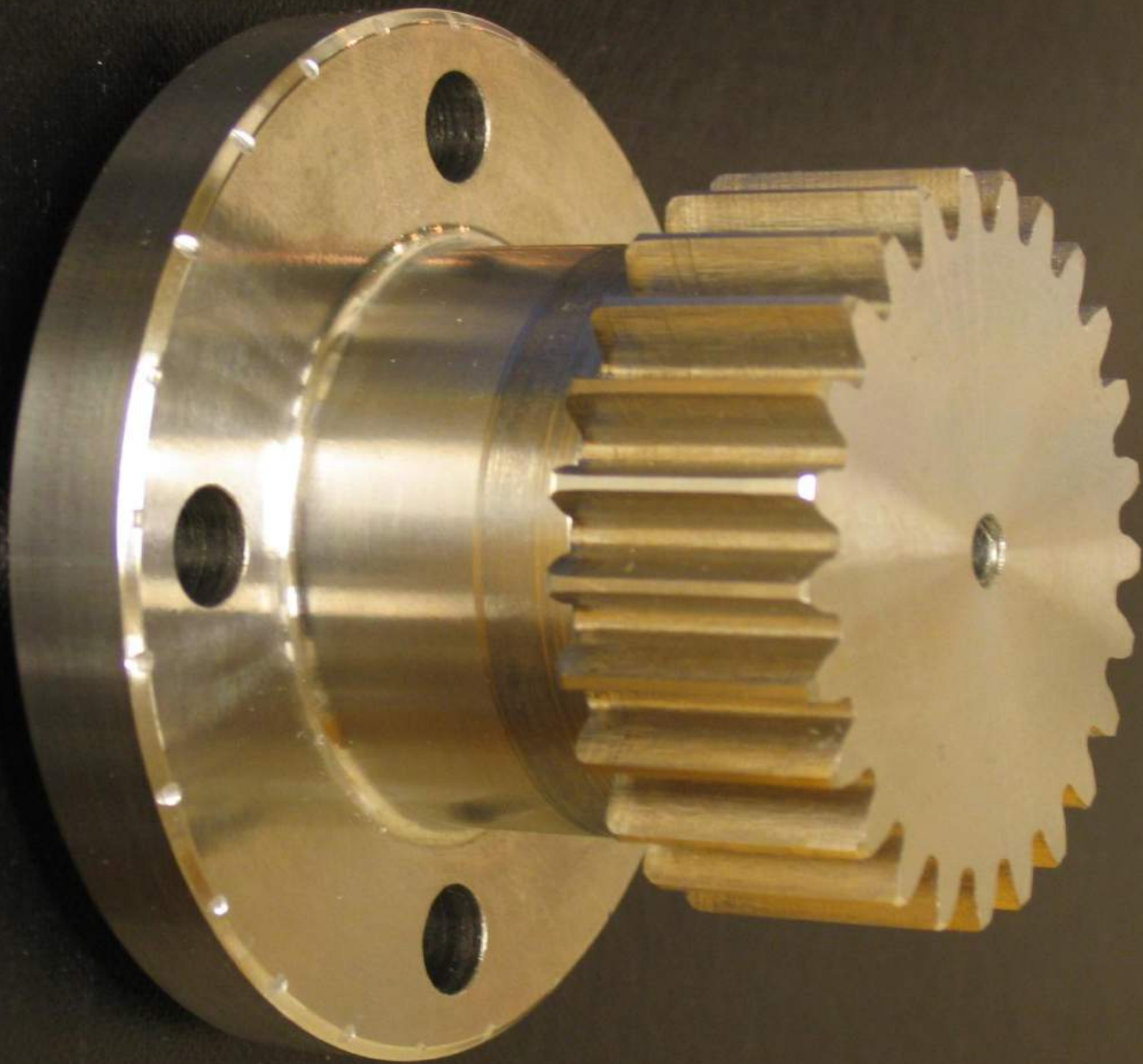
The TOOLOX 44 piece with diameter 250mm and thickness 86mm was made through;

- gascutting
- turning
- threading

Since heat treatment could be taken away, the time to manufacture could be much lowered. Also, the risk with incorrect heat treatment was avoided.

Experience

The piece was put in use during 2006. Thus far it works very well.



TOOLOX 33 as pinion



Function

The pinion is driving a cutting machine through running against a gear rack.

Dimension

Diameter 80mm, thickness 61mm.

Previous solution

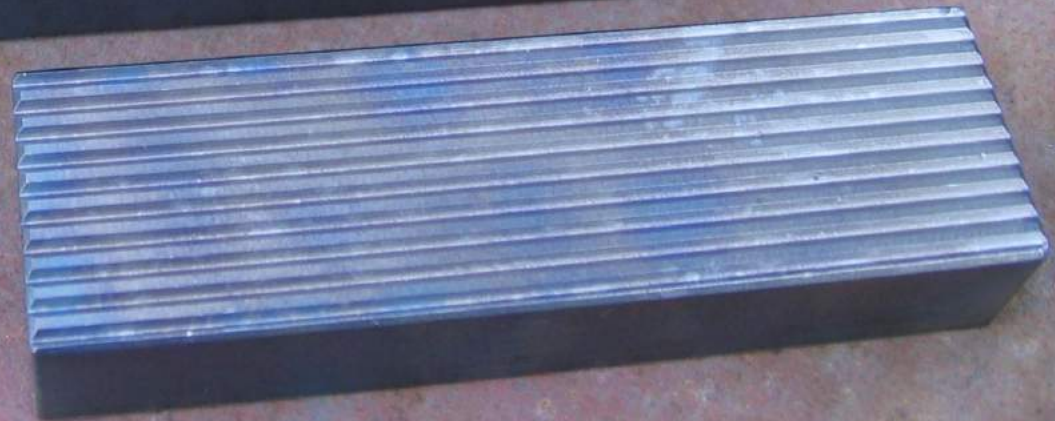
Previously 34CrNiMo6 was used. Bought in round shape. Nitriding was carried out to increase the wear resistance.

Manufacture

Round pieces of TOOLOX 33 was made through gascutting a 70mm plate. After machining, the pieces were nitrited.

Experience

The piece is in use since 2006. Thus far it is considered to be performing better than previous solution.



TOOLOX 44 for fixture



Function

Fixture used to clamp the workpiece in a circular saw.

Dimension

100x30x17.3mm

Previous solution

Nitrided W.Nr. 1.2311 has been used as well as wear resistant steel HARDOX 500.

Manufacture

Gascut TOOLOX pieces were sawed, machining and finally nitrited.

Experience

Is in usage since 2006 and thus far it is considered to be working better than previous solution.



TOOLOX 44 for fixture



Function

Fixture used when preparing samples

Previous solution

(New product).

Manufacturing

Gas cut TOOLOX 44 is machined and nitrided

Benefit of TOOLOX

TOOLOX 33/44 is very suitable for components that are nitrided



TOOLOX 44 as cutting blade



Function

Cutting blade

Manufacturing

Gas cut TOOLOX 44 is machined and nitrided.

Size of finished blade:
300x48x16mm.

Benefit TOOLOX

Low manufacturing cost



TOOLOX 44 as support



Function

Support used during sawing

Previous solution

Former material had short lifetime and gave bad result vid cutting to small tolerance

Manufacturing

43 mm plate was gas cut. Then machining was carried out to final dimension. Finally, nitriding was carried out. Final dimension 710x100x40mm.

Benefits TOOLOX

The nitrided surface prolongs the life time very much and gives a higher safety to failures during production



TOOLOX 33 Tool for machining

Specially made tool for large hole drilling
(up to 1000 mm)

