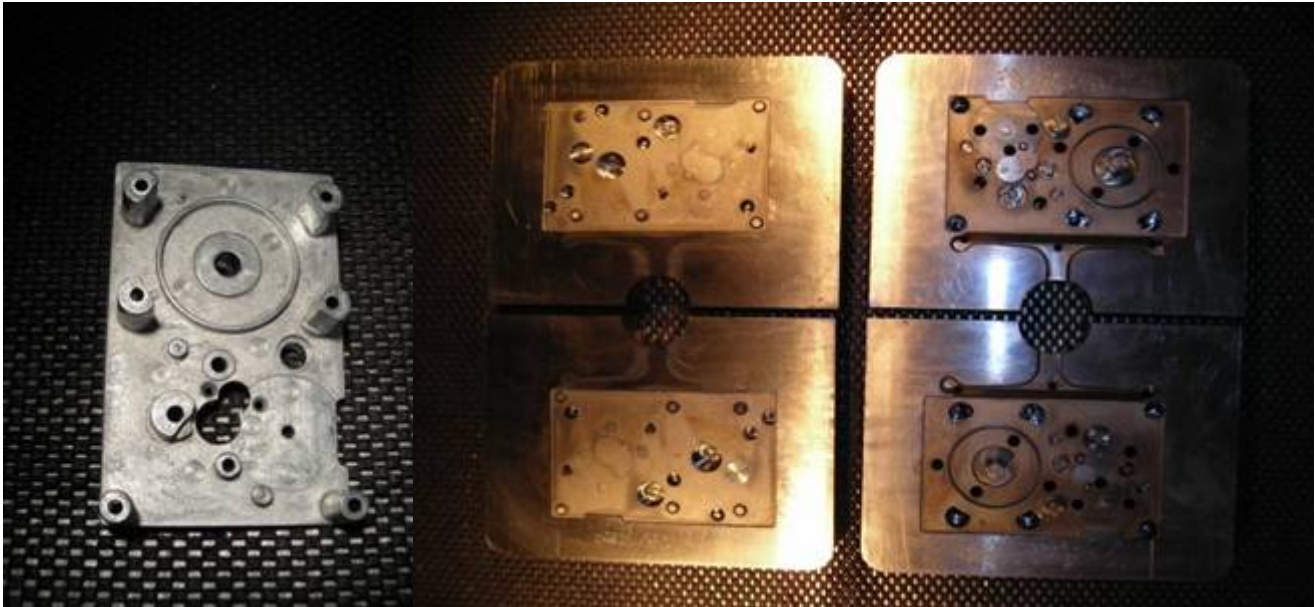


# Die-casting

## TOOLOX 44 in Zamak die casting



### Function

Die casting of components in Zamak. The parts are mechanical components in electronic valve actuators. TOOLOX 44 is used for the inserts in the die casting mould.

### Previous steel solution

The mould is a new design. For similar previous moulds, W.Nr. 1.2344 heat treated to 44 - 47 HRC has been used. Probably ESR-quality.

### Manufacturing

The moulds are made by the Barcelona based company GARME. They say that after initial work in finding the right tooling, they don't experience such a difference in the machining as compared to working with non heat-treated W.Nr 1.2344.

They see large economical benefits with TOOLOX. Besides, giving a lower purchase cost they also see large benefits in manufacturing time. The normal time to manufacture the mould in W.Nr 1.2344 is 300 hours. Using TOOLOX 44 a reduction by 50-100 hours was achieved due to elimination of heat treatment.

### Experience

The customer is a manufacturer of electronic equipment. The inserts were made in the end of 2005. Until January 2007 around 15,000 pieces have been made. The result has been at least as good as when using W.Nr 1.2344. The final series will probably be 200,000 details.

### Contact person

Håkan Engström, SSAB Plate Division.

## TOOLOX 44 in Zamak die casting



### **Function**

Mould for manufacturing of Zamak pieces used for a coffin decoration. For aesthetic reasons, the must to have a very good surface quality.

### **Previous steel solution**

W.Nr 1.2343 hardened and tempered.

### **Manufacturing**

Machining went well. The necessary surface quality was obtained without any reported complications. Significant cost and time savings were obtained due to the elimination of heat treatment in mould manufacturing.

### **Experience**

The die has been in use since the end of 2005. So far with good result.

### **Contact person**

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 in brass die casting



### **Function**

Mould for die casting of brass components.

### **Material**

Brass.

### **Previous steel solution**

QRO 90 heat treated to around 48 HRC. Technically a well working, but expensive, solution.

### **Manufacturing**

It was possible to reach better surface on TOOLOX 44 after polishing than with the previous steel. This was considered important by the customer. Machining of the mould went well.

### **Experience**

TOOLOX 44 was used in a parallel test to QRO 90. In the mould as well as in the cores. In the cores, TOOLOX 44 was worn out faster than QRO 90. The mould itself was run to the full series of 45,000 pieces. Almost no difference could be seen between the TOOLOX 44 and the QRO 90 moulds. The only difference was slightly better surfaces on the QRO 90 part. The customer has decided to introduce TOOLOX 44 as standard for the application and also initiate a test with larger moulds.

### **Contact person**

Tomas Berglund, SSAB Plate Division.

## TOOLOX 44 in aluminium die casting of automotive engine cover



### Function

Aluminium die casting mould to manufacture covers used in car engines. The moulds are made in a series of 80. To make covers in different diameters up to around 300 mm. Each mould makes two covers in one shot.

### Previous solution

W.Nr 1.2343 heat treated to 46 - 48 HRC.

### Manufacturing

No major complications reported during manufacturing. Significant savings in time and cost due to that heat treatment was eliminated when using TOOLOX 44.

### Experience

Initially, the customer made two moulds in TOOLOX 44 (= making four details at the time). These moulds were made in early 2005. Since then, the moulds have been in production, parallel with the moulds made in the previous steel. Two years later, the TOOLOX moulds still work well. The customer has decided to use only TOOLOX 44 for a new series of 80 moulds they plan to make, thereby leaving the previous solution. The change will represent a significant increase in the productivity at the customer.

### Contact person

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 for aluminium die casting



### **Function**

Piston for a Piaggio Vespa scooter.

### **Previous solution**

W.Nr 1.2343 ESR-quality heat treated to 46 - 48 HRC. Technically, the solution worked well at the customer.

### **Manufacturing**

The piston is made in ten different sizes. Therefore a series of ten moulds were made. TOOLOX 44 blanks with 130 mm thickness were used in the manufacturing. Usually, a mould like this is manufactured in four weeks. Using TOOLOX 44, one week manufacturing time can be saved due to heat treatment can be eliminated. No surface engineering was made.

### **Experience**

The mould went into production early 2006. So far it works fully satisfactorily.

The customer has also used TOOLOX 44 in a significant number of other projects.

### **Contact person**

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 in aluminium die casting



### Function

The piece is used for locking moveable ladders systems.

### Previous steel solution

W.Nr. 1.2343 ESR-quality heat treated to 46 - 48 HRC. Heat-checking typically appears after 6,000 cycles. Stress relieving after each 10,000 cycle interval was normally always carried out.

### Manufacturing

With TOOLOX 44 no heat treatment had to be carried out and the mould manufacturing time could be halved. The total cost of the tool was reduced by 20 % as compared with the previous solution.

### Experience

The die went into service in March 2005. Since then at least 80,000 production cycles have been made. The mould is still running.

### Contact person

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 in aluminium die casting



### **Function**

Die casting of an aluminium fixture for furniture.

### **Previous steel solution**

W.Nr 1.2343 ESR-quality. The manufacturing time with this solution was around 30 days. Twelve days for machining, seven days for heat treatment and another eleven days for adjustments after heat treatment.

### **Manufacturing**

A TOOLOX 44 blank with dimensions of 90x250x330 mm was used. The blank was delivered on 20th of February 2006. The mould was finished on 10th of March 2006, and tested on the 11th. The total manufacturing time was 16 days, including four days waiting for the mould base to be delivered.

The time savings correspond to eliminate heat treatment and the following adjustment of the mould to its final shape. Very small deformations were reported during machining in TOOLOX 44.

### **Experience**

The mould went into production in March 2006. So far production it works well.

### **Contact person**

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 in Aluminium die casting



### **Function**

Die casting of components covering the cutting blade in a lawn mower.

### **Previous solution**

W.Nr 1.2343 hardened and tempered.

### **Manufacturing**

No major complications reported during manufacturing.

The mould is not surface engineered.

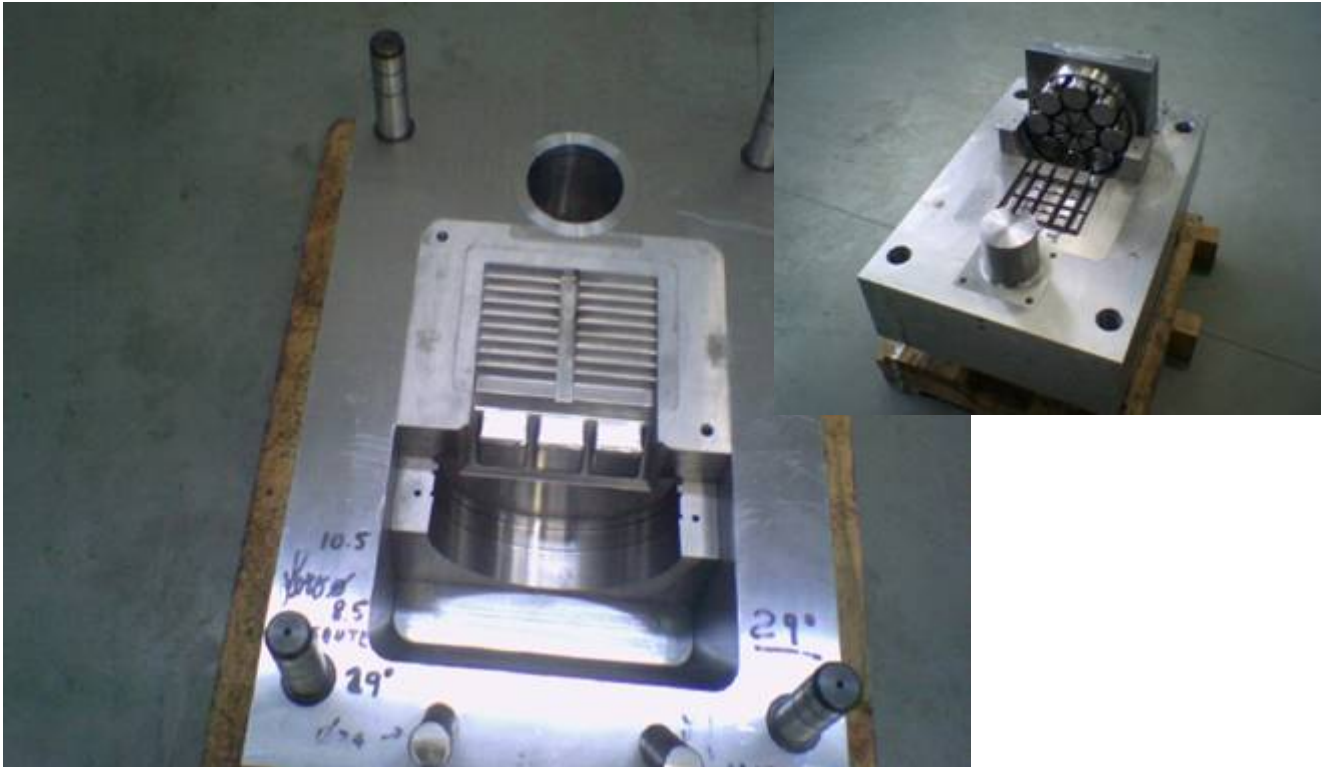
### **Experience**

The die went into production in 2006. An annual production of 100,000 components is estimated. So far running production works well.

### **Contact person**

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 in Aluminium die casting



### Function

Mould for die casting of aluminium component.

### Previous solution

W.Nr 1.2343 ESR-quality, hardened and tempered. A well working solution.

### Manufacturing

The entire mould is made in TOOLOX 44. Starting from 130 mm blanks. Each blank weight is approximately 10 kg. Besides some problems with threading, machining went well. No surface engineering was carried out.

### Experience

The mould went into use in the beginning of 2005. So far no backlashes.

### Contact person

Christer Offerman, SSAB Plate Division.

## TOOLOX 44 in Aluminium die casting



### **Function**

Mould for die casting of an aluminium component.

### **Previous solution**

W.Nr 1.2344, hardened and tempered.

### **Experience**

Due to a corrosive attack from the liquid aluminium was noticed after approx. 10,000 shots was the die PVD-coated (CrN). After the coating were another 80,000 components produced.

### **Contact person**

Christer Offerman, SSAB Plate Division.

# Extrusion

## TOOLOX 44 in an aluminium extrusion die



**Function**

Aluminium extrusion die.

**Material**

Aluminium alloy AA6083 F31.

**Previous steel solution**

Dievar.

**New steel solution**

TOOLOX 44, nitrided.  
Die diameter = 210 mm  
Die thickness = 48 mm

**Experience**

The TOOLOX 44 dies produced 40 and 129 tons of profiles resp. With the earlier die steel used an average of 70-90 tons of profiles produced is common. The aluminium billet temperature is 555°C, and the dies are water cooled during the extrusion.

**Contact person**

Tomas Berglund, SSAB Plate Division.

**Forging**

## TOOLOX 44 for Brass forging die



### **Function**

Pressing of brass door handles.

### **Previous steel solution**

Different steel grades were used for the application; W.Nr 1.2343/1.2344/1.2365.

### **Manufacturing**

The die manufacturer experienced some problems during drilling. No similar problems reported during milling. Significant reductions in mould manufacturing time as heat treatment could be eliminated.

### **Experience**

The brass handles are pressed in one stroke at 730-750°C. After each stroke the die is cooled to 150-200°C and excess material is removed.

Surprisingly, the end user has reported that the die does not oxidise was the case with the tool steels previously used. The TOOLOX 44 surface remains in the original polished shape. Due to this, the finished pieces do not stick on to the die surface. The need for maintenance is thereby reduced improving both quality and volumes of the components produced. The die manufacturer has after these initial results ordered TOOLOX 44 for a large series of dies.

### **Contact person**

Christer Offerman, SSAB Plate Division.

## Steel hot forging die in TOOLOX 44



### Function

The chain link is used in high-quality ship and offshore steel chains. One chain can have thousands of links. TOOLOX 44 is used in a hot forging die in the chain production. The chain steel is heated to around 890°C before forging. Thereby the die works continuously at an estimated temperature of 400-500°C. Sometimes as long as several months without any interruptions. The forces which act on the die are small, approximately 1-2 tons.

### Chain material

Steel grade W.Nr 1.7218

### Previous die steel solution

Before TOOLOX 44, different steels were tested. The best result was obtained using W.Nr 1.2343/1.2344. The die was manufactured in soft annealed condition, thereafter heat treated to 45 HRC. Typical die life time was around 10,000-11,000 forging strokes. The end failure was, typically, surface cracks.

### Manufacturing

Using the SSAB recommendations, there were no problems with machining of TOOLOX 44. No surface engineering was carried out.

### Experience

The first TOOLOX 44 die went into service around 2002. That die has been used in approximately 50,000 strokes and, after refurbishing, still works well. The customer makes, since then introduction of TOOLOX 44, this new grade in all their forging dies. Up till today totally 10-12 tools. Besides the enhanced life time, another advantage using TOOLOX 44 is that a worn die can easily be re-used in a die with smaller dimensions.

### Contact person

Tomas Berglund, SSAB Plate Division.