How die maker R Grifell S.A increases quality and obtains shorter delivery time at the same time

Every die maker knows how the competition steadily increases. In today's global world the companies you compete with is not as before from the same region or even country. Instead you can expect to find your customer demand you to compete with die offers from countries like China and Turkey. Having labor costs much below any Western Europe die maker

At the same time, the delivery times demanded for the dies become shorter and shorter. End customers like the car industry needs their models to reach the market faster and faster and they want to be able to modify their dies as late as possible. The number of pieces needed on a specific die also decreases as end product models change more often

These trends can be very positive for a die maker that are situated close to end customers but then all effort needs to be put in optimizing the dies to the new situation

The company Matrius I Motless R Grifell S.A situated in Barcelona, Spain has understood the need for changes and taken steps to develop their dies. R Grifell is very suited to do that since they have a 30 year history in making high performance dies for different industry sectors like automotive, electronics and house appliances. The fact they are a family company since three generations is also a big advantage since that makes Grifell flexible in their decisions. Something very crucial when improvements need to be introduced.

Grifell has spent a large effort to make sure they have right machinery (introducing 5 electro erosion machines) as well as optimizing the usage of them (making sure all work are done by CAD-CAM and connecting all machines to the network) but they also have felt they should improve the steel usage in their dies

To find out the possibilities of introducing new steel technology they contacted their steel supplier Sermetal Barcelona. Sermetal Barcelona has since many years been one of the leading Spanish suppliers of special steels for the mould and die industries. They understood early the benefits of supplying already heat treated (prehardened) steels. Something that is standard among their main type of customers which were plastic mould makers. For plastic moulds only when a higher hardness than normal has been needed heat treatments has been used. Sermetal Barcelona is since some years a distributor of the Swedish steel grade Toolox. One of the steels in the Toolox range, Toolox 44, is delivered with the hardness of 45 HRc. Higher than what has been previously available.

A comparison between the manufacture time of a plastic mould made in Toolox 44 compared to the old solution of tool steel 1.2344 plus heat treatment was made. The mould in Toolox 44 was ready to be used after less than 60 hours. The 1.2344 took more than 80 hours and that did not include the time to send the mould for heat treatment. The longer manufacture time of the mould in 1.2344 was

due to that all processes as programming, CNC machining and EDM needed to done twice. Before sending the mould for heat treatment and once more when it comes back

R. Grifell recognized and understands the potential benefit of avoiding heat treatments to obtain these kind of benefits. They are as other die makers already using already heat treated steels for many parts of their dies. But with a high hardness steel like Toolox 44 they can start taking away heat treatments for even more pieces.

Today, for the parts of the dies where the highest wear and forces are active, typically a steel of the type 1.2379 is used. Having very high contents of carbon and alloy elements like Chromium to give a hardness of 60-65 HRc. These kind of steels has other disadvantages than the cost and time for heat treatment. They are very crack sensitive which provokes fatigue crack problems when the dies are used. The very high carbon and alloy content also makes the welding done at the die users during maintenance very complicated and risky

Using a steel such as Toolox 44 improves also these aspects considerably. As can be seen in Table 1, the crack resistance (toughness) of Toolox 44 can be expected to be typically 6 times higher than heat treated 1.2379. Actually, the toughness of 1.2379 cannot be known since it depends on the heat treatment made but it can be expected to be quite often even lower. The suitability for welding is quite often measured in the so called carbon equivalent. The higher the value the higher the risk for cracks due to welding. The extremely high value of 1.2379 explains why welding during maintenance of dies is such a sensitive and complicated process. The much lower value for Toolox 44 shows a further huge benefit for the end customer. A further risk with steels like 1.2379 is that today the quality control made by the steel maker is not always very strict. Quite often in practice it is for the end customer difficult to even know who is the steel maker. With a patented produce like Toolox only made by the Swedish steel maker SSAB, the product quality can be expected to by high and even

Due to these benefits if a heat treated steel like Toolox 44 can be used instead of 1.2379 it will combine shorter die manufacture time with large improvements for the die user. Resulting in large potential competitive benefits for a die maker

The key decision for R Grifell was how and where to start introducing Toolox 44. After consulting with Jordi Esteban, Sales Manager at Sermetal Barcelona it was decided to start with the dies for the least sensitive applications. R Grifell is making dies for deforming a lot of different metals (besides carbon steels also bronce, stainless steel and aluminium) so they had the possibility to make a step by step introduction

Several dies with Toolox 44 steels in parts of them is today working since up to 6 months. In the attached photos one exemple can be seen. A progressive die has been designed for producing 300,000 - 500,000 pieces as of a part of the electronic system of a new car model. The steel that will be deformed is a 0.8 mm low strength galvanized stee lgrade. Guaranteeing not too high forces or wear and thus making the 45 HRc of Toolox more than enough.

Ramon Grifell Roig, one of the owners of R Grifell is thus far very satisfaid with his decision to start using Toolox 44 in his dies and plan to continue to do that more and more. R Grifell is planning to further increase their number of workshop machines and also move to a larger 1000 square meter site. Thus far they have been mainly supplying the regional market with their dies but with the improved product performance they should be very competitive also in a larger geographical area. All guaranteeing that also the third generation of the Grifell family will continue to make the company succesful

	Toolox 44	1.2379 heat treated to 65 HRc
Toughness (J)	**30**	**5**
Carbon equivalent	**0.97**	**4.25**

Table 1 Comparison of heat treated 1.2379 and Toolox 44

Fig 1. Third generation Grifell around progressive Toolox die

Fig 2. Progressive cold forming die with Toolox 44 parts.

Fig. 3 Piece for electronic car system made in a Progressive die containing Toolox 44 parts