

CHALLENGE:

New Entry into Die Forging Business for More Flexibility and Cost Reduction

SOLUTION:

Process Simulation and External Development Services

PRODUCTS USED:

Simufact.forming

CUSTOMER:

Uponor GmbH



Quadruple Forging Blank after Readjusting the Process

Process optimization through forming simulation

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Temperature Profile for the Quadruple Forging of a Brass Elbow

One of the most important factors for efficient manufacturing was considered to be the experience of the blacksmith. This includes the knowledge of and the feeling for the temperatures in the blank as well as the right selection of the workpiece sizes and the correct angle for putting them into the die. Entering the forging business seems to be quite difficult for a company because it has to gain the required experiences to realize an efficient forging process.

Uponor shows exemplarily that another way of developing an efficient forming method is

possible in a short span of time with the right technology.

The company

Uponor GmbH, located in Haßfurt, Germany, is a supplier of modern plastic pipe systems and is organized in different branches: panel heating and cooling, water, gas and compressed-air installations as well as piping for building services. Concepts for underground construction and municipal infrastructure complete the company's international profile. The company group was founded in 1965 in Finland and is one of the largest and most successful manu-

facturers in their sector today, with a distribution network in more than 100 countries worldwide.

The challenge

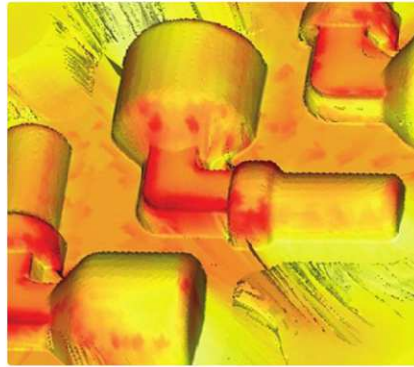
In 1996, it was decided in Haßfurt that the metal fittings, which have been purchased from an external manufacturer, should be produced in-house from now on. The reason for this was to react better and more flexible to the demand for these components. At first, the simulation that was needed for the development of the forming process was completed with support of the Fraunhofer Institute in Chemnitz (IWU). Afterwards, Uponor tested the components and produced them.

After a relatively short period of time it became obvious that it is more beneficial to perform the simulation directly at Uponor. The in-house simulation has a lot of advantages for the development process in terms of flexibility and time involved. Besides, the process costs were significantly reduced in the long term. Today, 12 years after entering the forging business, the forging processes are simulated and optimized beforehand at Uponor and thus prove to be robust and very efficient in reality. Uponor uses Simufact.forming for the simulation of forming processes, a simulation environment from Simufact Engineering GmbH, Hamburg, developed for the practical application in the metal forming industry. With the help of this software, forming processes and dies can be evaluated and optimized before the first blow or pressing even took place.

Mr. Oppelt, Manager Production Technology, is responsible for the optimization of plants and tools, the improvement of production process-

"Originally, we thought about manufacturing as many parts as possible with one pass. It is theoretically possible to insert a blank with a length of 300 mm, for example. The simulation made it clear that there would be problems with the temperature profile at the ends of blanks with this length and thus the blank cannot be forged anymore."

Gerald Oppelt,
Manager Production Technology, Uponor



"We were able to significantly improve the process with the help of the simulation. Not only were we able to further increase the robustness and the quality of our products, but we were also successful in economic terms by increasing the productivity and saving material. Today, we analyze and evaluate all new dies the same way. To us, forming simulation stands for progress, improvement and cost reduction."

Gerald Oppelt,
Manager Production Technology, Uponor

es and the selection of the right machines at Uponor in Haßfurt. With his daily coordination tasks, he systematically pushes the improvement of processes and idea management forward.

Area stress and die stresses were analysed for the improvement of the forming process. It was tried to save material and to make optimal use of the required forming force. Only with this, the fiber flow of the product can be designed perfectly and defects can be avoided.

The application

A current application shows that great need for optimization also exists for established processes. Production output could be increased by 50% and material savings for this component reduced the cost by 102.000 euros per year. How was that possible?

Several forming processes were evaluated with the help of the forming simulation. The conclusion was the adjustment of an existing process from double component manufacturing to quadruple component manufacturing and thus increasing the machine output from 800 pieces to 1.000 pieces per hour. In addition, around 35 tons of material could be saved by this, which, at a price of 3 euros per kilogram, resulted in a significant cost reduction.

Outlook

At the moment, Uponor is evaluating a way to further improve the existing process by using preformed blanks. Currently, round rods are used as blanks. Because preformed blanks require less material, this production method is analyzed with the simulation. The cost for blanks is also considered.

In addition, Uponor is working on a new layout of the forming process with a new press. This new machine would permit hollow extrusion and thus the preforming of inner contours. The additional savings in material would be substantial. The forming energy would be received by the lower die in this case, diverted



Single Manufacturing of a Brass T-Piece

and brought in from the side with a bolt into the workpiece, which would lead to an additional hardening in this area.

The company closely cooperates with Simufact Engineering for the simulation of this method. Not only does Simufact provide the software, but it is also available as a consulting firm, helping its customers as an engineering partner with the advanced development beyond the day-to-day business.

Conclusion

The decision of Uponor GmbH to enter the forging business in 1996 and to compensate the lack of experience with the precise use of innovative simulation technology clearly proved to be successful. The close chaining of plants as well as the complete temperature monitoring and recording support the staff members on site. Although it was an exception

in 1996, today this is usual in many companies. The close cooperation with Simufact and the smooth introduction and short training and orientation periods for the software made the implementation of manufacturing processes that outperform the efficiency of competitors in this field significantly possible after a very short time.

Uponor is planning to extend the use of the forming simulation consequently and to simulate and develop new methods in cooperation with Simufact.

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