

# Press report

Mikron application, Rottweil, Germany

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A clamping solution with a hydro-expansion clamping chuck from Röhm ensures short cycle times

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## Stretching before the competition

For the economical production of different workpieces, Mikron supplies a modular machining system with hydro-expansion clamping chucks from Röhm to Asia.

**(Rottweil/Sontheim) Mikron GmbH in Rottweil, with its modular machining system Mikron Multistep XT-200, offers an extendable machine and tool technology, which can be adapted to the life cycle of a product in its production capacity. Because a customer wanted to additionally produce different variants of a workpiece, a special clamping solution was desired. The specialists at Röhm have developed a hydro-expansion clamping chuck for this, which securely clamps cast-iron and aluminium workpieces of different dimensions and allows machining on 5 1/2 sides. At first, the solution seemed to be too expensive and unsuitable for raw parts.**

"During the search for the clamping solution, it quickly became clear that a classical three-jawed chuck would not be able to solve the problem," remembers Alexander Amann, Multistep Project Manager at Mikron GmbH in Rottweil. The solution would have been too big and too heavy. In addition, such a chuck would not have been able to clamp the cylindrical workpieces without the risk of deforming them. "Based on the technical investigation, it quickly became clear that the clamping problem can only be solved with a hydro-expansion chuck. The precondition, however, was that the clamping diameter have a corresponding tolerance class," reports Frank Stier, a professional consultant at Röhm.

## Three-jawed chuck too big, too heavy, too rough

Mikron GmbH in Rottweil has delivered a modular machining system, Multistep XT-200, to an Asian company for the production of parts which are later used in the manufacture of radial piston pumps for the hydraulic drive in heavy building machinery. The system consists of three linked modules, a loader module and two production modules, including a transfer mechanism, which ensures a short chip-to-chip time. Since Mikron always stands for solutions made up of machine and tool, the clamping technology also had to be solved for the workpieces. That is a bigger challenge, however.

Two workpieces at a time, made of aluminium and GGG 60 spheroidal cast iron with 144 / 134 mm diameter, respectively, and weighing up to 10 kg, should be guided through the system securely with one clamping fixture and a single set-up. The two production modules, linked to one another with two spindles each, each with 18 tools and five axes, should be able to machine the workpieces on 5 1/2 sides. In order to put nine

holes in the workpiece, the machining steps pre-drilling, finish drilling, circular milling, reaming and honing are necessary from one side. On the opposite side, the nine elongated holes – some inclined – are produced and deburred. To do this, the heavy raw parts must be taken up securely, clamped and transferred from module to module.

### **Machining on 5 1/2 sides required**

The clamping solution provided by RöhM with a hydro-expansion chuck has turned out to be an inexpensive solution which meets all desired requirements in an optimal way. The chucks have an opening angle of only one to two tenths of a millimetre. The workpieces are securely held at a pressure of 160 bar. Since the chuck encloses the cylindrical parts all around them, there is no risk of deformation. Clamping and unclamping are done with hydraulics, which are disconnected again after these operations. This gives the tools the necessary freedom of movement for 5 1/2-side machining and also allows for the automated transfer from module to module with transfer axes. In addition, collisions are ruled out this way. A pressure accumulator keeps the workpieces securely fixed during machining.

The production processes to be carried out can then be done with a single set-up, which allows for high precision. In the loading module, a gripper inserts the workpieces in the clamping chuck. An Erowa zero-point clamping system, known for its precision in eroding technology, serves as an interface. In order to rule out any imprecision, the chuck is freed of any chips beforehand, by having a blowing mechanism remove foreign particles with 6 bars of compressed air. So that these cannot fly uncontrollably through the machine area, a Plexiglas bell is placed over the chuck beforehand automatically. After clamping, a pin moves to a contact switch and checks whether the clamping pressure has built up. Afterwards, a wireless sensor determines the positions of the middle axis, the top edge and – for the chamfer thickness – the position of the rear side. The entire periphery is aligned to the workpieces with the two different dimensions. And converting to the other workpieces only takes a few minutes and a few easy steps. After eight screws have been loosened and three parts of the inner clamping ring have been exchanged, the chuck is converted for the other respective dimension.

### **Standard solution, the use of which at first seemed impossible**

The highlight of the clamping problem solution here was, however, no special fabrication, but the use of standard elements/constructions. That kept costs down. The fact that the hydro-expansion chuck would provide the solution, though... no one could believe that at first. Cast-iron parts, such as the delivered workpieces made of GGG 60 spheroidal cast iron and aluminium with a high silicon content, have, due to the production process, an outer surface with a surface quality much too imprecise for this kind of clamping technique and with no repetition accuracy. This makes exact clamping with regard to position and repetition impossible. There is no casting process which would meet the surface requirements. Even for Stier, this seemed to be a knock-out criterion: "That actually ruled out the

use of the hydro-expansion chuck from the very beginning." After Mikron talked about the problem with the customer and the customer with his supplier, the right preconditions could ultimately be established. "The supplier now provides the cast-iron parts with a surface quality of H7 after another machining step," Amann said, stressing the good and solution-oriented cooperation. With raw parts machined this way, it was possible to ensure the precision and repeatability of the clamping operation.

The three hydro-expansion chucks, which were delivered along with the machining system, are now also responsible for a short cycle time of under five minutes and confirm Mikron's one-of-a-kind know-how in the development of production solutions, together with the right cutting tools. The international presence with an on-site service option in Asia worked in favour of the Röhm people, who only became involved six months beforehand.

*888 words, 6842 characters*

Röhm image directory, MIKRON application



Image no. 15-01 RM\_MIK-XT200.jpg  
Modular machining system Multistep XT-200  
from Mikron GmbH in Rottweil.



Image no. 15-02 RM\_MIK-Teile.jpg  
In one set-up, completely machined parts for  
the hydraulic drive in heavy building machinery.



Image no. 15-03 RM\_MIK-Teile2.jpg  
Workpieces made of aluminium and GGG 60  
spheroidal cast iron are guided through the  
system securely with a single set-up.

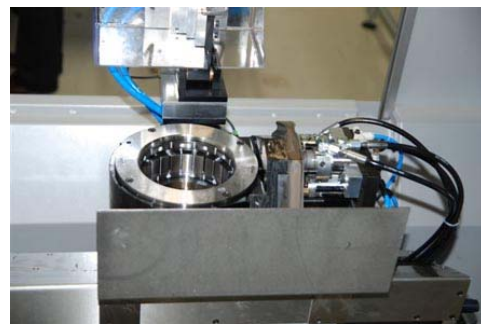


Image no. 15-04 RM\_MIK-Lader.jpg  
In the loading module, a gripper inserts the  
workpieces in the hydro-expansion chuck,  
which has an opening angle of 0.2 mm.

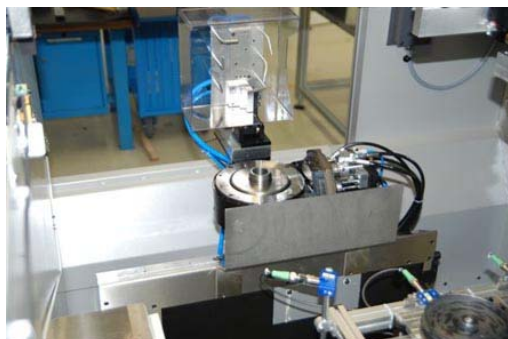


Image no. 15-05 RM\_MIK-Lader2.jpg  
After clamping, a pin moves to a contact  
switch and checks whether the clamping  
pressure has built up.

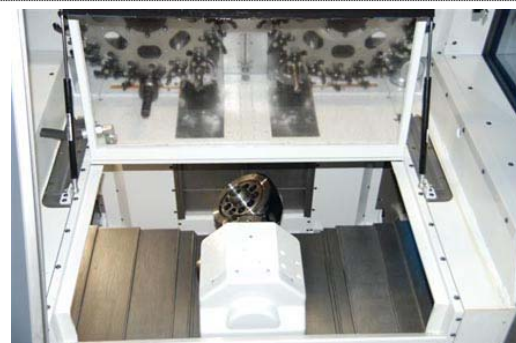


Image no. 15-06 RM\_MK-MIK-Bearb.jpg  
The two production modules linked to one  
another with two spindles each, each with 18  
tools and five axes, machine the workpieces  
on 5 1/2 sides.



Image no. 15-07 RM\_MK-MIK-People.jpg  
Project Manager Alexander Amann (Mikron, right): "When searching for the clamping solution, it soon became clear that a classical three-jawed chuck would not be able to solve the problem." The international presence with an on-site service option in Asia also worked in Röhm's favour (Röhm professional consultant, Frank Stier, left).

#### **((Company info - Röhm GmbH))**

##### **Specialist with great innovative power**

Röhm was founded in 1909 and is considered to be one of the most significant clamping tool manufacturers in the world, with an extensive product range and their own high-performance special production. Around 1600 employees produce and sell clamping tools worldwide, from the smallest drill chuck to efficient tool clamping systems and gripping technology to high-tech power clamping mechanisms. Furthermore, customized products for nearly every clamping situation and handling task are developed and produced. The company has long been a global player, whose activities have been further developed, particularly in Latin America, Eastern Europe and Asia. An expert and capable field service, supported by several product managers as well as more than 40 subsidiaries worldwide, supplement this development. Around 50 percent of the products are exported to more than 60 countries. New production facilities in Slovakia and India, as well as a joint venture in China, strengthen the international orientation of the company. In 2008, after 99 years, the company management was handed over to an external Managing Director, Dr. Michael Fried. With this, the Röhm family implemented a shareholder resolution to pull out of the operative business and to help shape the fate of the traditional company in the future as shareholders and members of the advisory board.

#### **((Company info - MIKRON GmbH))**

##### **Support for market leaders**

Mikron Machining is the leading provider of highly productive production solutions for manufacturing complex, highly precise metal components. The company provides the best production solutions worldwide for specific, highly precise high-volume applications and allows users to set new standards in their production processes. The majority of Mikron customers are in the pharmaceutical, medical and automobile supplier industries, as well as the writing instrument and electric/electronic industry. Many of them are market leaders or are on their way there. The Mikron Group employs more than 900 people worldwide, mainly at the two main locations in Agno (Switzerland) and Boudry (Switzerland). Other production facilities are located in Rottweil (Germany), Denver (USA) and Singapore and Shanghai (P.R. China).