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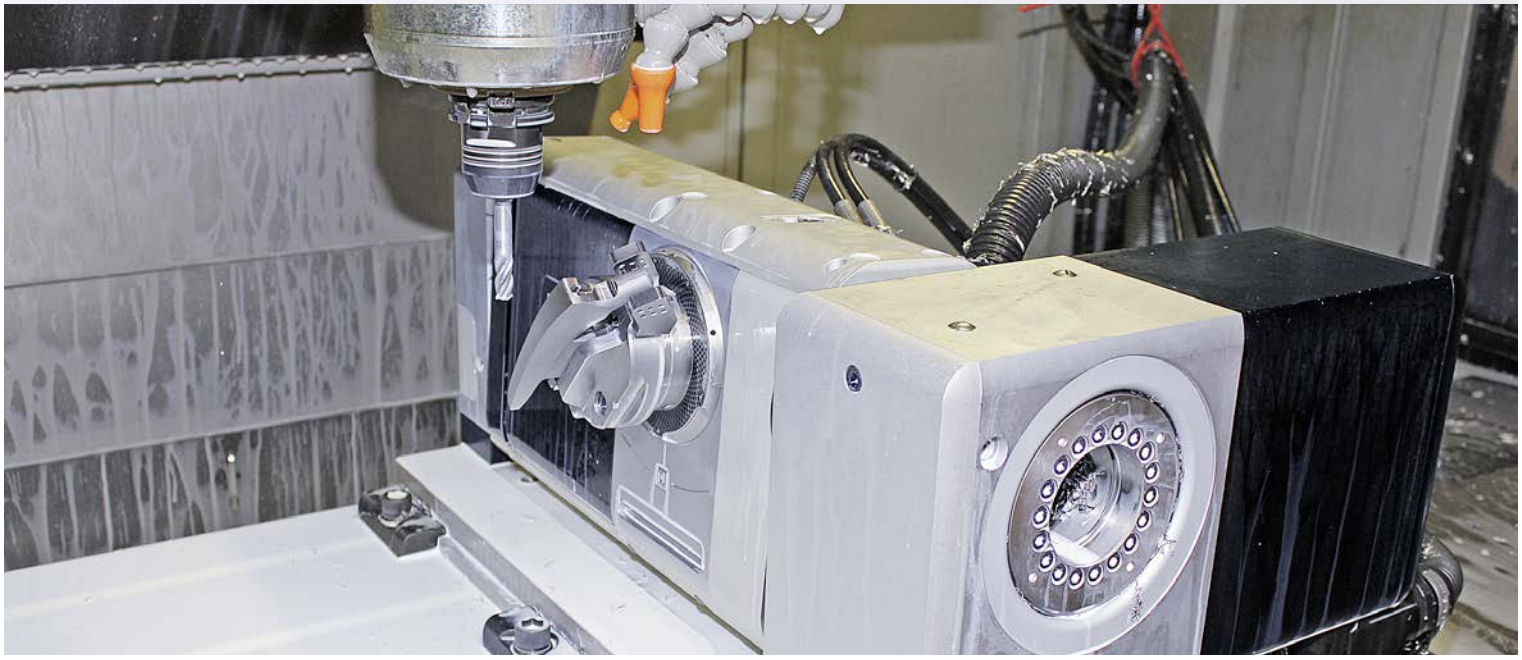
Swiss Rotary Table Technology

NEWSLETTER

For hip prostheses from the best material

T1-510520 fixX on Toyoda FV 1165 vertical machining center



3+2-axis machining center guarantees precise, flexible and economical machining

MBN Präzisionstechnik GmbH prefers to machine titanium hip prostheses on the stable Toyoda FV1165 machining centers that are equipped with an additional two-axis CNC rotary table from pL LEHMANN. This allows the parts to be machined in a single processing step and maintain tight form and position tolerances even for short production runs.

As Thomas Müllner established MBN Präzisionstechnik GmbH in 2001, the trained precision machinist and master craftsman already had extensive experience in precision machining and as a plant manager. With courage – and two colleagues – he started to manufacture in a rented hall as a supplier of demanding, precision mechanical components.

T1-510520 fixX rotary table from pL LEHMANN. Images: pL LEHMANN

Today – 15 years later – MBN has 22 employees that produce primarily medical device components in their own building in Pottendorf, Lower Austria. About 70 percent of the order volume comes from this sector; the rest is distributed over a variety of industrial segments that need high-quality parts and components. «Our strength lies in machining complex parts from titanium-based materials, stainless steels and other difficult-to-machine materials», states Thomas Müllner regarding his field of activity. «However, we do not function solely as as a supplier of machined parts, but rather as a supplier of complete solutions. This means that we offer an extensive spectrum of services from development assistance through production and measurement to sterile packaging.»

This is surely associated with the requirements for medical devices. High quality and precision, measured and documented, is mandatory for implants and surgical instruments. To ensure economical production, MBN relies on modern technology, as general manager Müllner explains: «We update our machinery continually, making sure that every investment meets our needs, that is, not oversized and definitely not undersized.»

As we considered the purchase of a new machining center in 2011 on which primarily hip prostheses would be machined, it was clear: The machine must have the ideal size for parts with dimensions of about 200 mm and cover the entire edge length range from 10 mm to a maximum of 300 mm. Furthermore, a very stable structure was required in order to ensure the ability to machine titanium alloy forgings with the necessary precision and surface quality. From the standpoint of economics, MBN placed great value on complete five-side machining capability and future automation.

Ultimately the Toyoda FV1165 vertical machining center was selected. According to Thomas Müllner, with its large, hardened precision flat guides and extensive options package, this stable machine was superior to the other competitors under consideration in terms of the price/performance ratio.

The Toyoda FV1165 machining center was automated with a URC articulated-arm robot by MBN. Result: 20 percent greater productivity.

The pL LEHMANN T1-510520.LL fixX CNC rotary table converts the vertical, three-axis Toyoda milling machine into a five-axis machining center for complete machining of complex parts.

3+2 is more than 5

To achieve complete machining capability for complex parts, it had to be equipped with a two-axis CNC rotary table. A combination with which Thomas Müllner already had good experience in the past: «Such a 3+2-axis machining center provides distinct advantages over a strictly 5-axis machine where the fourth and fifth axes usually lie in the table. That creates some significant interfering edges – with small parts in particular – requiring a raised fixture for the workpiece or at least long tools. Both of these reduce stability, promote vibrations and ultimately reduce precision and machine performance.»

Moreover, a 3+2-axis solution is generally more cost-effective in terms of purchase price and offers greater flexibility. After all, the rotating/tilting table leaves enough room to accommodate another vice on the machine table, thus providing further clamping capability for simpler workpieces. Furthermore, if the machine is needed in between for parts measuring 1000 mm, the rotary table can simply be removed and the machine will be back in use again within 20 minutes.

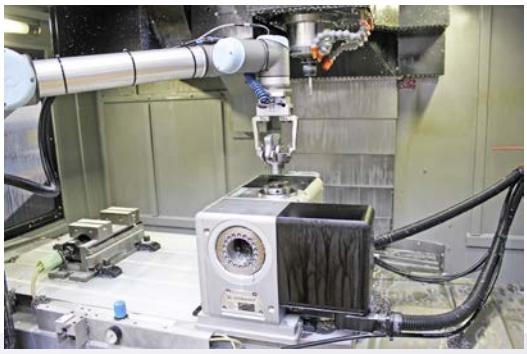
High holding torques elate the precision machinist

This applies at least to the CNC rotary table Thomas Müllner selected from the Swiss company pL LEHMANN, Bärau. The head of MBN emphasizes: «As was already the case when selecting the machine, quality was the primary concern. I have been familiar with Lehmann products for over 20 years and am convinced of their capabilities. In the past, he also gained experience with rotary tables from other manufacturers and can justify his assessment «that the performance data and above all the holding torques of the Lehmann rotary tables are noticeably higher.»

MBN does not machine only medical device parts on the five-axis Toyoda FV1165 machining center with pL LEHMANN T1-510520.LL fixX rotary table. The technical capabilities of this combination are ideal for a wide variety of workpieces.

Based on this, MBN had the machining center equipped with a pL LEHMANN T1-510520.LL fixX CNC rotary table. This is a two-axis, single-spindle tilting rotary table (4th and 5th axes) with clamped counter bearing. It is ideal for small to medium-sized workpieces up to a cube of about 250 mm. Some of the most important technical data: the maximum clamping torque of the 4th axis is 800 Nm, while that of the 5th axis is 2600 Nm. The maximum spindle load is 133 kg (0°…-30°) or 89 kg (-30°…-90°), respectively. pL LEHMANN lists the indexing accuracy of the standard version at 17 and 16 arc sec (4th and 5th axis). If necessary, increased accuracy of 10 and 12 arc sec can be supplied.

«In our opinion, with its high holding torques and rigidity, this rotating/tilting table matches the stable machining center ideally – and our parts», states Thomas Müllner, «which is why we purchased a second, identically equipped machine in 2013.» His experience with both production systems has been quite positive. Their operation is stable so that – in contrast to previous 3+2-axis solutions – there is absolutely no vibration. «We can utilize the full capabilities of the machining center and rotary table, and maintain not only the tight form and position tolerances required for hip prostheses, but also achieve the necessary surface quality», reports Müllner.



Here, the robot loads the pL LEHMANN T1-510520.LL fixX CNC rotary table with titanium blanks for hip prostheses.

Process reliability is an important factor in success

In addition, the high stability has a beneficial effect on tool wear – especially when machining titanium. This is not only a direct cost factor, but also an important element for high process reliability, which in turn is decisive for successful automation.

MBN looked into this about one year ago. On their own, Thomas Müllner and his employees installed a pallet rack on the first machine from which a URC articulated-arm robot from Universal Robots (10 kg transfer weight) load the pL LEHMANN table. «Since the URC robot does not need an enclosure, the greatest challenge was to program the interface to the machine with door opening, etc. Ultimately, we also succeeded here, although we are not automation specialists», emphasizes Müllner, with no small amount of pride, and explains that it was worthwhile. In this case, the automation generates about 20 percent more output – from unmodified machining centers. As a result, automation of the second machine is already being planned.

The ripas pallets loaded with the part are clamped by the HSK-A63.

Thomas Müllner does not neglect to mention one important basic prerequisite for automation: «It must be possible to automate the clamping mechanisms.» MBN had the CNC rotary table already equipped with the ripas zero point clamping system when purchased. This pL LEHMANN system is based on standardized HSK clamping, with the driver cams precision-ground

All manner of clamping devices can be mounted on the ripas palletizing system from pL LEHMANN.

to high accuracy and axially giving. The counterpart (HSK-ripas adapter) has a very precise groove as well as a positioning bore for the guide pin. The ripas system, which is fully integrated into the spindle, can also be operated with commercially available standard adapters and HSK clamping sets. According to the pL LEHMANN catalog, retrofitting on rotary tables in the 500 Product Line (Edition 2 and higher) is also possible.

Müllner adds, «To keep all options open, we configured not only the pL LEHMANN rotary table with the ripas system for automation, but also selected pneumatic clamping for the vice that is also installed on the machine table. In this way, it can also be loaded with parts by the robot. This gives us maximum flexibility when it comes to automated machine utilization.»

Precision technology from Lower Austria

MBN Präzisionstechnik GmbH, Pottendorf, was established in 2001 by Thomas Müllner and two partners. Today, the company has 22 employees and annual sales of about 4 million euros. The core competence lies in production of precision mechanical components and assemblies in small to moderate lot sizes. Since 70 percent of all orders come from the medical device sector, MBN can present its experience in machining of titanium-based alloys, stainless steels and other difficult-to-machine materials. The spectrum of services ranges from development assistance through production and measurement to sterile packaging, for which an ISO Class 5 cleanroom is available.

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