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Swiss Rotary Table Technology

NEWSLETTER

Flexible five-axis milling

T1-520520.RR varioX
on DMG MORI
DMC 1150V

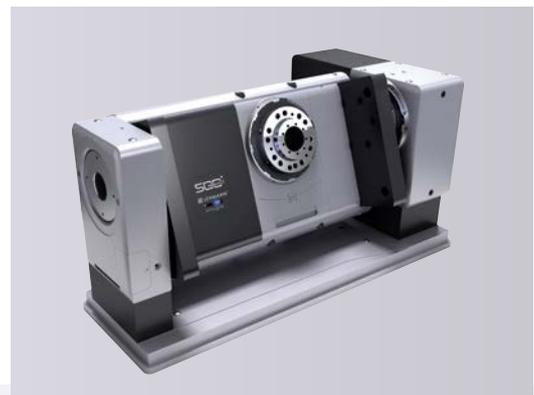


Five-axis machining is absolutely essential to produce the installation locations for interchangeable inserts in an optimal manner. For special versions of carrier tools, Jongen uses the combination of a three-axis machining center with an additional Lehmann tilting rotary table. Images: pL LEHMANN

Special tool production relies on 3-axis machining center with additional two-axis rotary table

Precision tools manufacturer Jongen is known for its high-quality milling tools. In the special tools field in particular, the medium-sized company has a reputation for high flexibility and short delivery times. Contributing to this is, among other things, the use of three-axis machining centers which – with the addition of a two-axis CNC rotary table from pL-Lehmann – can machine in five axes simultaneously.

The precision tools manufacturer Jongen, which has its main office in Willich, North Rhine-Westphalia, has been on the right track for success for many years. According to Günter Hofmann, Engineering Manager, the driving force behind the ability to grow continuously with milling and boring tools «made in Germany» in the highly competitive global market lies in the innovation ca-



T1-520520 varioX rotary table from pL LEHMANN.



Since 2015, Jongen has been using the Lehmann T1-520520.RR varioX rotary table, which offers convincing precision, speed and high holding forces.

pability, flexibility and customer focus of his company: «With our approximately 350 employees, we are not among the «big boys» of the tools sector, but are very close to customers in Germany and the important European countries. This is because our field personnel is technically qualified and knows how tool solutions need to look to ensure high productivity in machining. On the one hand, you can select from our wide range of milling and boring tools in the standard program. At the same time, however, we offer special tools perfectly designed for a specific application.»



Such a complicated special carrier tool requires extensive know-how in development and production – in addition to a suitable machine solution.

At Jongen, everything that cannot be purchased as a standard product is called special. This begins with simple tools that are not stocked in special diameters or lengths. The greatest technical challenge, however, is presented by complex form cutters and bore grinding tools as well as multi-step carrier tools fitted with hardmetal interchangeable inserts. «With special tools, we are able to give the customer an ideal tool for increasing productivity», explained Günter Hofmann, who is also a member of Jongen's management. «In this way, we form a close bond with the customer, which is especially important for our company.»

He attributes the success with special tools primarily to their functionality and quality as well as a short delivery time. And naturally his fellow employees, who are highly qualified – in terms of both tool development and production. To provide optimal conditions, there is a specific department for special tools, separated from series tools. In the case of carrier tools, the separation

occurred more than 25 years ago; in the case of all-hardmetal tools, about ten years ago.

Since then, special manufacturing also has its own group of machines. «We focus here on great flexibility and enough free capacity so that – depending on the requirement – we can deliver many tools within only two, three weeks», states the Engineering Manager.

3+2 – the formula for flexible five-axis milling

André Goossens, Department Manager for Prototypes and Special Tools, is convinced that interchangeable-insert carrier tools absolutely require 5-axis machining: «We machine stepped tools, multi-tooth cutters and solid drill bits using five axes – almost always simultaneously. Otherwise it is not possible to machine the installation positions for the interchangeable inserts and reliefs in an optimal manner.» For prototype and short-run production, which is the usual situation in the special tools area, three-axis boring/milling centers – with the addition of a two-axis CNC rotary table – have proven to be ideal for over 20 years. Jongen has procured these additional fourth and fifth axes from the Swiss manufacturer pL LEHMANN almost from the very beginning. «After we were dissatisfied with a different brand when first starting, we equipped the next machine generation with the Lehmann models from the Series 400. They were more reliable and clearly superior to the competitor's product in terms of accuracy, clamping forces, etc.», notes Günter Hofmann.

Increasing demand, growing number of machines

In recent years, the volume of special tools produced has grown considerably, and Jongen has increased the number of machines in operation almost yearly – in 2015 with two DMG MORI DMC1150 machining centers equipped with two-axis, single-spindle CNC- pL LEHMANN rotary tables. André Goossens points out: «This combination gives us greater flexibility than five-axis machining centers alone.»



In 2015, Jongen added two DMG MORI DMC 1150V machines, which together with the additional T1-520520.RR varioX tilting rotary table from pL LEHMANN can machine in five axes.

An additional benefit of the 3+2 solution can be found in the moving masses. While a 5-axis machine must accelerate and decelerate the entire machine table including workpiece, with an add-on one- or two-axis system, only the rotary axes with the workpiece move, considerably smaller masses. In addition, there is better accessibility to the workpiece: When the workpiece is clamped in the add-on rotary table, there are noticeably lower interfering edges, which allows use of short tools less prone to vibration.

There was no question for Goossens and his team that the additional axes would again be provided by pL LEHMANN: «What is important is the quality, and that is what we have with the Lehmann axes, with the initial ones and the current ones. When it comes to precision, stability and repeat accuracy, they are unbeatable in our eyes.»

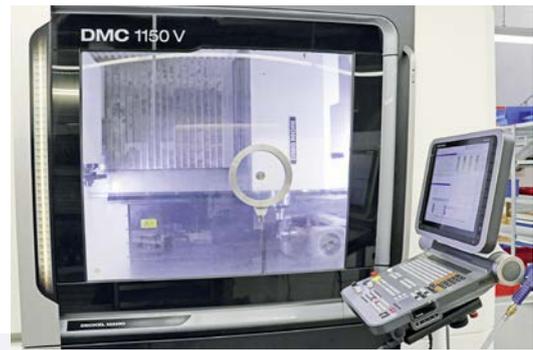
Based on technical consulting by pL LEHMANN and the German sales agency IVO Oesterle, the managers decided on a Lehmann-T1-520520.RR varioX edition 2 rotary table. With its high load-bearing capacity and the center height of 300 mm, it is ideal for tool diameters up to 350 mm. «We can accommodate a wide spectrum with this machine, which is important for us. Even for small tools with a diameter of only 10 mm», adds Department Manager Goossens. He is pleased that the dividing axis on this CNC rotary table is variable regarding height.

The most important technical data of the counterbearing-equipped T1-520520.RR varioX: weight 187 kg, max. spindle load 200 kg (0°...-30°) and 133 kg (-30°...-90°), max. clamping torque 4th and 5th axis 2000/4000 Nm. The indexing accuracy Pa is +/- 12 arc sec in the dividing axis and, thanks to the integrated angular position measuring system, +/- 5" arc sec in the tilting axis. The spindles rotate at up to max. 50/40 rpm (4th/5th axis).

An ideal combination

The machining spectrum and the space needed for the rotary table made it necessary to select a relatively large machine as the basis – the DMG MORI DMC 1150V mentioned. The vertical machining center, which can accommodate a load of up to 1'500 kg, offers a large Y-traverse stroke of up to 700 mm. In the X-axis, the maximum travel is 1'150 mm and in the Z-axis 550 mm. As a result, there is still sufficient space for an additional clamping fixture on the machine table beside the rotary axes. André Goossens explains: «Many tool blanks still require certain rough machining before they are clamped on the Lehmann axis. In this way, we can produce clamping surfaces, slots or central holes all on the same machine.»

When it comes to quality, the machining center satisfies all requirements. This is ensured by the stable construction with rigid table and X-slide above as well as direct position measuring systems and cooling of the ways and ball nuts. «Even coordi-



The DMG MORI DMC 1150V vertical machining center offers enough space to use an additional clamping fixture beside the Lehmann rotary table.

ination with DMG MORI went smoothly regarding the additional equipment. The machine was delivered to us ready to use with the Lehmann axes» – an important argument for Günter Hofmann as purchaser.

Positive experiences

After more than two years, the experience of André Goossens with the new Series 500 rotary tables is completely positive: «The new technology incorporated into the Lehmann products is impressive. Compared to earlier models, the Series 500 rotary tables provide considerably higher clamping torques, together with noticeably higher speeds and repeat accuracy. That gives us economical and quality benefits in machining. The design has been improved as well: Everything has become rounder, which is a definite benefit in terms of fewer interfering edges and soiling.»

Goossens also considers the integrated Blackbox a real aid. During operation, it automatically acquires and collects important data that provide information on the condition of the rotary table. When requested, the customer receives a status report with recommendations for preventive maintenance. «Should a problem occur, we can send the appropriate directly to Lehmann. There we receive fast and uncomplicated help.» At Jongen they are very satisfied with the service from pL LEHMANN. When a minor problem arose once with one of the new Lehmann rotary table, pL LEHMANN was quickly on-site and within 48 hours the machine was back in use as usual.



Compared to the previous Series 400 versions, the Series 500 rotary tables provide twice the clamping torques, together with noticeably higher speeds and repeat accuracy.

Milling and boring tools for metal and plastics machining

Jongen Werkzeugtechnik GmbH was founded in 1976 by Ernst Jongen to produce interchangeable inserts and carrier tools. In 1996, Jürgen Heinzig, then General Manager, acquired the company together with several employees in a management buy-out. Starting in 2000, major investments were made and product development proceeded as a fast pace. Since 2005, Jongen owns the majority of hardmetal manufacturer Tribo Hartstoff GmbH located in Immelborn, Thuringia so that the tool manufacturer is able to control the entire process chain from hardmetal powder to finished tool, including sales. Today, Jongen offers a complete milling tool line and a growing selection of boring tools – in both carrier tool and all-hardmetal versions. In addition to the approximately 250 employees in Willich, about 80 employees are active field personnel in various European countries as well as in branches in France and Italy. The consult with customers to address their needs and offer solutions to problems.

Lehmann rotary table technology with PGD

The rotary table manufacturer pL LEHMANN has improved its 500 Series CNC rotary tables. For some time, the Swiss company has offered its 3rd edition, which is distinguished from the 2nd edition by its preloaded and backlash-free gear unit PGD (preloaded gear drive). There are many advantages: The defined preloaded PGD makes true simultaneous machining possible, even without a direct measuring system. In addition, for smaller machining tasks up to one third of the allowable feed torque can be machined unclamped thanks to the preloaded gear unit. Another advantage: The gear unit is wear-free to a large extent, which was confirmed in a comprehensive long-term test with the EA-510 rotary table, with standard load and drive data according to catalog.



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