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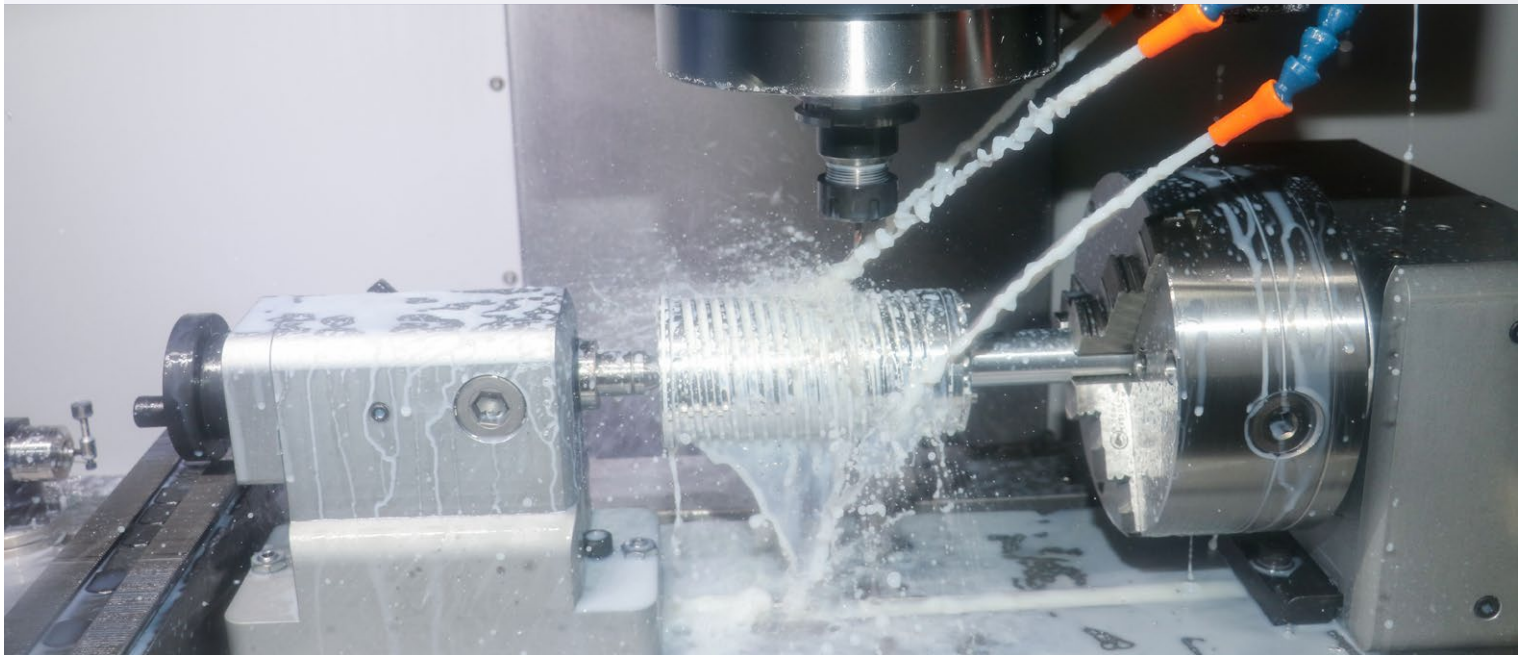
Swiss Rotary Table Technology

NEWSLETTER

Additional axis provides flexibility

EA-510



Four-axis simultaneous machining made possible on 3-axis milling machine

What does a newly established manufacturer of high-quality high-frequency motor spindles need? Good ideas, courage, enthusiasm – and flexible, high-performance machines! SPINOGY GmbH in Weiterstadt meets all the basic requirements. For the machinery, the responsible individuals invested, among other things, in a three-axis Doosan machining center, to which an additional pL LEHMANN rotary table lends four-axis capabilities.

SPINOGY, founded in July 2020, is probably the youngest manufacturer of motor spindles in Germany. Behind it are the four mechanical engineers Andreas Schleifer, Marc Schmidt-Winterstein, Dominik Eschenbach and Marcel Linke, who are also still young and are all graduates of Darmstadt Technical Univer-

EA-510 rotary table from pL LEHMANN. (Image: pL LEHMANN)

sity or Darmstadt University of Applied Sciences. Even as working students, they were involved with motor spindles, discovered their enthusiasm for these mechanical engineering components and, after graduating, gained several years of experience in this industry – until they jointly decided to give shape to their spindle ideas in their own company.

Andreas Schleifer, like his three colleagues, founder and managing director, describes the start-up situation: «In a way, we used the quiet coronavirus period to work out and implement our plans so that we can now go into full spindle production.»

Motor spindle based on a modular concept

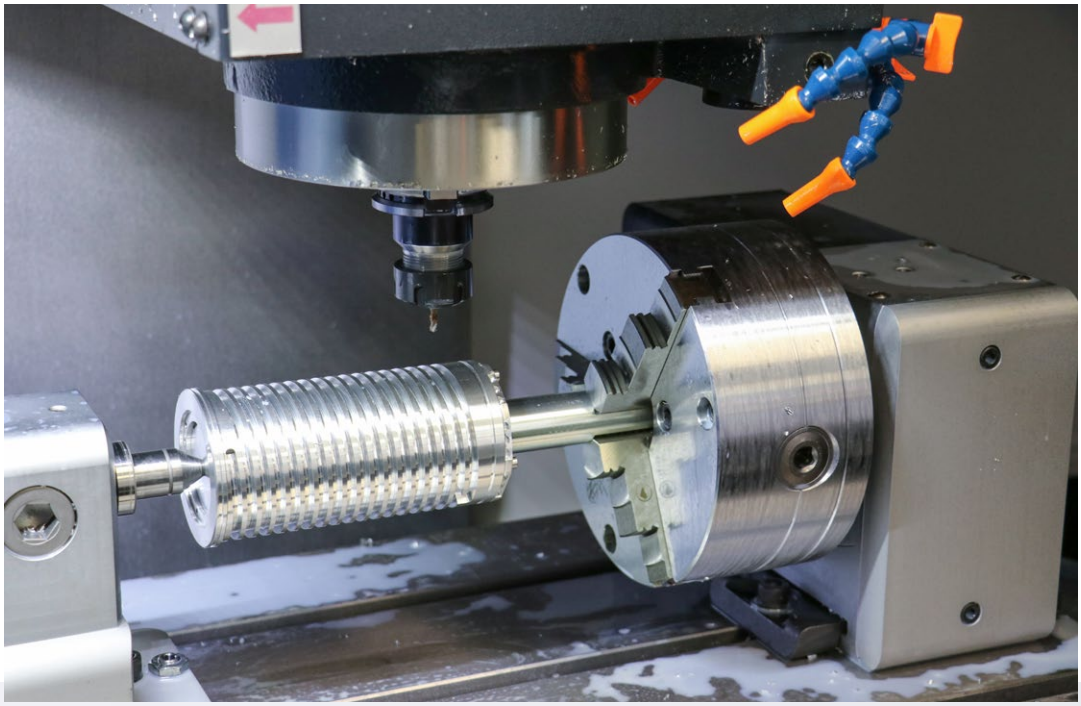
The start-up tasks included – in addition to the search for suitable premises and operating equipment – the development of the first product, a high-frequency motor spindle. Andreas Schleifer, who is responsible for development and design together with Marc Schmidt-Winterstein, explains: «We wanted to launch a motor spindle on the market that can be configured according to customer requirements – compact, powerful and 100 percent Made-in-Germany. For this purpose, we have examined the complete structure of such a spindle for possible improvements, even questioning proven methods and rethinking them.»

The result: the SPINOGY X22. This motor spindle (market launch November 2021) is modular throughout. It is available in both air-cooled and liquid-cooled versions, with up to 7.5 kW peak power and speeds up to 50,000 rpm. The modular system allows a large number of variants and therefore appeals to a wide range of customers: Industrial companies – especially machine tool builders and plant engineers – can configure maximum performance and also have the option of adding sensor technology, etc. In addition, the hobby user who only needs a small amount of equipment for modeling purposes is also served.

Sales-promoting: The SPINOGY X22 motor spindle can be previewed on the screen and in 3-D printing. The compact, appealing product design has already received a lot of positive feedback.

Aiming for high vertical integration

All the main components of the motor spindle, such as housings and heat sinks, as well as shafts, bearing seats, etc., are already produced in the company's own production shop, and in the future the vertical range of manufacture is to be extended even further, for example by using motor elements developed in-house. «We started at a high level in terms of our product and manufacturing,» emphasizes Marc Schmidt-Winterstein. «To achieve this, it was important that our metal-cutting machine tools fit our requirements perfectly; that is, they are precise, powerful and very flexible to use.» He adds with a grin, «Basically how we see our spindles.»



The coiled heat sink of a SPINOGY X22 motor spindle can be machined with the pL LEHMANN EA-510 axis using fourth-axis interpolation. (Images: pL LEHMANN)

In order to clarify all possibilities at an early stage and to get production up and running smoothly, the SPINOGY quartet relied on the familiar: With GLM Werkzeugmaschinen from Grefrath, the four engineers consulted a machine dealer who, thanks to its broad product range and in-house application technology, was ideally suited to the tasks at hand. Ludger Köster, GLM Sales Manager, introduces his company: «We have been selling Doosan machine tools for almost 20 years and collaborative robot technology for 10 years. Our CNC application engineering, in-house service and spare parts management, and design departments can develop and install complete automation solutions.»

Michael Fading, GLM Regional Manager, was also involved in the discussions at SPINOGY to advise on the desired machines. After all, the company's founders wanted to know quickly what was needed and what was affordable. A five-axis multitasking turning/milling center was only briefly considered – too complex and not flexible enough was the collective verdict. «Especially in the early days, we have to produce many different prototypes and small series, so that the machines often have to be retooled,» states Andreas Schleifer. «This takes too long for such an all-rounder, and programming is also too time-consuming. In addition, the costs are high.»

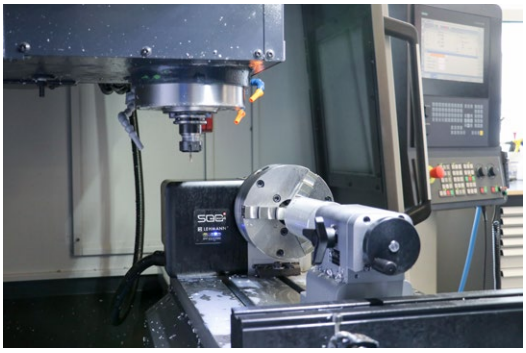
Autonomous solutions for turning and milling

The plan: Better to invest in two machines that can work in parallel as the order situation grows. As far as turning was concerned, it was quickly determined that a Doosan Lynx 2100 LSYB with Y-axis, counter spindle and driven tools would be suitable. «A machine type with which we have already gained very good experience,» notes Andreas Schleifer. «It was important for us to have a counter spindle that is suitable for series and complete production as well as automation options.»

The milling center, on the other hand, was new territory. However, there were concrete ideas here, too. Marc Schmidt-Winterstein: «We wanted a three-axis milling machine with an additional fourth axis to be placed on the work table. For some machining operations on the housing and heat sink, such a CNC rotary table is absolutely necessary.»

In addition to the entire maintenance unit, the pL LEHMANN pressure reducer and air oiler are also easily accessible on the rear of the Doosan DNM 4500 machine.

The choice fell on the Doosan DNM 4500 vertical machining center,«a high-quality machine with a rigid structure, so that high precision and the best surface qualities are guaranteed on the component,» as Michael Fading says. «It also fits the SPINOGY products exactly in terms of size.»



Thanks to the large variety of pL LEHMANN rotary tables, SPINOGY did not have to make any compromises. The EA-510 size is a perfect fit for the component and machine size.

The work table measures 1000 x 450 mm, leaving enough space for an additional CNC axis – in the case of SPINOGY, the EA-510 model from pL LEHMANN. Based on several recommendations, also from the machine supplier GLM, the SPINOGY managing directors had contacted the renowned Swiss supplier. «At the beginning, we thought these components might go beyond our budget,» says Marc Schmidt-Winterstein, citing one inhibition. «After all, Swiss products are known not only for the best quality, but also for a high price. However, we found that the pL turntables have a top price-performance ratio and are a very economical solution overall.»

Swiss quality and precision

pL LEHMANN is represented in Germany by pL SOLUTIONS Germany (operated by IVO OESTERLE NC-CNC Technik Vertriebs GmbH). SPINOGY received detailed advice from the specially trained experts on which CNC rotary table was best suited

in terms of size and performance parameters such as speed, clamping force and workpiece loads. «Thanks to the wide range of possible configurations, we didn't have to make any compromises,» Andreas Schleifer is pleased to say. «The EA-510 is exactly the right choice for our purposes.»

The installation was still a bit of a challenge, as the SPINOGY engineers took care of it themselves and wanted to gain an understanding of the equipment first-hand. With appropriate support from pL and GLM, the rotary table was installed nevertheless relatively quickly and can now be controlled easily via the machine's CNC. Programming takes place via CAM software and a post-processor created for the rotary table.

The special feature of the SPINOGY motor spindles is the modular system. Many variants can be produced with very few different components (in the picture, housing parts and heat sinks).

CNC rotary table as added and interpolating axis

On the Doosan DNM 4500 with pL rotary table, SPINOGY machines, among other things, the rectangular housing parts with their typical chamfered edges. «We not only attach great importance to top performance and practical benefits, but also want to combine these in a new and appealing product design,» explains Marc Schmidt-Winterstein. «Thus, our housing has the practical advantage that the holder for the spindle can be integrated and no covering is required for visual reasons.»

The specially designed aluminum heat sinks are also machined on the Doosan DNM 4500. Of particular interest is the coiled liquid cooler, which requires interpolating movements of the fourth axis. «This is where the pL LEHMANN axis has deci-

Because of their design, the housing parts require four-axis machining (right, the subsequently anodized housing).

A strong team: the Doosan DNM 4500 three-axis machining center and the pL LEHMANN EA-510 rotary table

sive advantages,», says Andreas Schleifer. «Like all current pL axes, the EA-510 CNC rotary table contains the permanently backlash-free preloaded PGD gear unit, which also enables high-performance simultaneous machining.»

After the prototyping phase, SPINOGY started the first small series production. The founders see the strengths of their combination of Doosan machining center and pL rotary table confirmed: «This solution is a perfect fit for our components, all of which come off the machine with optimum precision and surface quality. We are truly very satisfied.» With demand expected to increase, they continue to plan with Doosan or GLM and pL LEHMANN. The next thing to do is to automate the machines, and when the spindles of the next size have been developed, a similar machine-rotary table combination, if necessary.

Spindle technology «Made in Germany»

SPINOGY GmbH is the developer and manufacturer of high-quality motor spindles. The company, headquartered in Weiterstadt near Darmstadt, develops its products according to a well thought-out modular principle that meets many customer requirements. The optionally air- or liquid-cooled motor spindles convince with their exceptionally high quality, sophisticated functions and modern design. As a system supplier, SPINOGY offers all components required to operate the spindle as well as common accessories. The services promise the highest quality and durability.

CNC rotary tables with Swiss quality

Founded in 1960 strictly as a contract manufacturer, pL LEHMANN has been developing and producing CNC rotary tables for over 40 years. With innovations and Swiss quality, the family-owned company in the Swiss town of Bärau (Emmental) succeeded in opening up new opportunities for its customers and developing lean machining solutions characterized by high productivity through use of additional NC axes. One of the highlights of the company's history is the powerful and flexible Series 500 – developed in 2009 – which is ideal for the most demanding tasks thanks to its modular design. With the backlash-free, preloaded PGD gear unit – developed in 2014 – pL LEHMANN reached another milestone. In 2017, the company introduced, among other things, the new pL iBox generation, making their rotary tables ready for Industry 4.0 and digital production. This was followed in 2019 by introduction of the Series 900 DD (Direct Drive) rotary tables with speeds of up to 5,450 rpm. As an additional new product, the AM-LOCK system, a special zero-point clamping system for 3-D printing, including preprocessing and postprocessing, was presented for the first time in 2019.

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