

Innovative ideas turned into innovative machines

Loesch T-P-L in Darmstadt, Germany is a source of ideas as well as a supplier to major machinery manufacturers. At its in-house production facility, complex parts which require a high level of know-how are machined with ultimate accuracy. Here, a Mazak VCN 530C vertical machining centre stands out for its particularly high efficiency. Thanks to the addition of a 2-axis CNC rotary table from pL LEHMANN, the setup can machine parts on five sides using five axes.

Michael Loesch, managing director of Loesch T-P-L, says: "We are more than just a metal-cutting service provider. We are best described as an innovative partner of various renowned enterprises, primarily supplying ideas, developments and our own products."

He emphasises that his relatively small company, with a staff of ten, relies on almost 70 years of experience in the development and manufacturing of high-precision mechanical parts and components and that a lot of time and effort is also invested into innovation. The company has been participating in several research projects conducted by universities and major partners from the industry, implementing the insight gained from the projects into market-ready products.

Its product range covers three main areas: testing equipment for the automotive industry; in particular specific components for engine and brake system test benches; handling devices and components for plasma powder and laser cladding; measuring and testing equipment for the pharmaceutical, cosmetics and chemical industry. "Our know-how in these areas is extensive and we not only apply it to the manufacture of parts, but also to their mechatronical requirements," continues Michael Loesch. He adds: "Of course, metal cutting is an essential core competence because all complex, important parts are manufactured in-house."

Mazak dominates production

The company's ground floor houses six CNC machines, all made by Mazak. Michael Loesch explains: "We've had close ties with this Japanese tool machine manufacturer since 1979. Back then, my father, the founder of our company, ordered the first Mazak lathe. Further lathes and machining



centres were added over the years and we have always happily relied on Mazak's technical advice, delivery and customer care."

Naturally, the latest addition to the machine pool, a vertical 3-axis machining centre of type VCN 530C, was procured from Mazak as well. However, this unit was then extended by a CNC rotary table combination from pL LEHMANN to facilitate machining along five axes. Loesch T-P-L decided for this setup for reasons of production efficiency, something that must always be kept in mind even though corporate structures are very flat and efficient. Using 5-axis milling and drilling technology, Michael Loesch has realised the benefits for many workpieces from across the entire range of customers. In general, all parts can be manufactured on a 3-axis machine as well. However, this requires special clamping fixtures for angled surfaces and bores and multi-sided machining always requires the re-clamping of parts in different positions. This costs time and is detrimental to accuracy. From a technical and economic point of view, 5-axis machining is without alternative.

However, a machine originally designed with five axes was not an option for Michael Loesch: "Rocker-mounted rotary tables are usually rather small, or we would have had to spend a lot of money for a correspondingly larger machining centre. Such a solution also entails interfering edges which require 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 less expensive while offering a greater flexibility. For us, the Mazak VCN extended by the Lehmann rotary/tilting table is the perfect solution. It even leaves enough room to accommodate two more vices on the machine table, thus providing further clamping options for simpler workpieces or the sixth side."

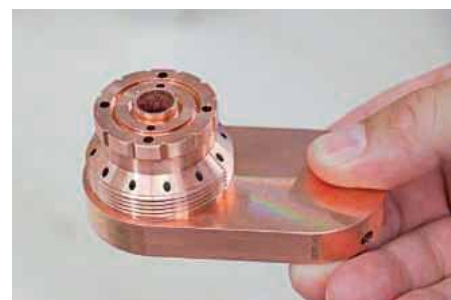
With the Mazak VCN 530C, Michael Loesch and his team of metal-cutting experts are convinced to have found the vertical machining centre, of its range, with the highest productivity. Cycle times are very short thanks to the high federate, 42 m/min, excellent acceleration/deceleration and quick tool changes, 2.8 seconds. Durable linear roller guides ensure consistent machining accuracy along all axes. The machine was specified with a 40 x tool magazine, a 18,000 min⁻¹ high-speed spindle and a Knoll 70 bar high-pressure system, reducing machining times for deep-hole drilling by up to 90 percent.

To the Loesch team, the 1,300 x 550 mm table was of particular importance as it can fit the CNC rotary table from pL LEHMANN and still provide enough space for two vices of size 125. Supported by the rotary table specialists from Switzerland and German sales and service partner IVO Oesterle, the

team selected the 2-axis model T1-510520.RR TOP2. Michael Loesch says: "The Swiss quality won us over at the first presentation. With regard to performance and suitability for digitalisation and Industry 4.0, we did not consider any of the alternatives." 3D-CAD data of the CNC rotary table were submitted to the team beforehand, so a matching workspace concept could be worked out in the in-house CAD system.

The 2-axis LEHMANN rotary table T1-510520.RR TOP2 is 711 mm long, 301 mm wide and 250 mm high. It clamps workpieces of up to 340 mm in diameter. "That's more than enough because we mainly process small to medium-sized workpieces up cube edge dimensions of about 150 mm," explains Michael Loesch. A torsionally rigid overall system was a key requirement, so the decision was made for a clamped counterbearing. He continues: "Besides copper, brass, aluminum and bearing metals, we often process stainless steels which cannot be roughed without this option." To this effect, clamping torques of max. 800 Nm in the 4th axis and up to 4,000 Nm in the 5th axis were a convincing feature."

Also, precision is a core value at Loesch. The indexing accuracy Pa specified by pL LEHMANN of +/- 17 arc sec and +/- 21 arc sec, 4th and 5th axis, as well as the average repeat accuracy Ps of +/- 2 arc sec, correspondingly, was verified by the metal-cutting experts on site using a calibration cube. The result even exceeded the specifications.



In practice, the high positioning speed of the rotary/tilting table is another great benefit. Michael Loesch adds: "If feasible, we use one single tool, e.g. a chamfer milling cutter, to execute all operations in sequence, rather turning and tilting the workpiece than repeatedly changing the tool."

To Michael Loesch, programming with the Mazatrol SmoothG is another highlight: "In the past, 3+2 machines could only be programmed for 5-axis operation using G-Code, a tedious procedure if workpieces are complex. Now, we can use the Mazatrol programming system which I think is very user-friendly." This needed some intensive up-front cooperation between pL LEHMANN and the Mazak control system developers, but the result was well worth the effort. Michael Loesch continues: "I can now program our VCN 530C with its 2-axis rotary table just like a 5-axis Mazak Variaxis. This reduces the programming effort to a fraction of the time." Productivity gains immensely, particularly for single and small-series parts, production lots at Loesch usually range between 20 and 200 pieces.

Michael Loesch is very satisfied with his investment: "Thanks to the Mazak VCN

530C and the 2-axis rotary table from pL LEHMANN and the other options we specified, we have achieved significant time savings and reduced the effort required for re-clamping, thereby freeing up our machine operators to take care of other tasks."

With his next plans, the innovation-minded entrepreneur targets automation. In the future, the VCN shall be fed by a handling automat. The machine is already prepared accordingly. The pL LEHMANN rotary table offers media channels to facilitate the remote control of automatic clamping systems.

Michael Loesch concludes: "The force clamp on the rotary table is already pneumatically controlled and the two vices on the machine table will then be converted from manual to hydro-pneumatic operation. This will allow us to fully machine all six sides without any manual intervention." He is sure that such a machine concept is the future.

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