Modular clamping systems

Set up more quickly, manufacture more economically

Flexibility is the most important thing when the contract manufacturer Bärtle in Albstadt gets to work on processing its machining orders. The technology which makes Bärtle as flexible as possible includes a modular clamping system from Triag for small to large workpieces of all kinds.

1 One of the characteristics which Bärtle appreciates in the clamping technology of Triag is the capacity to create special solutions from standard modules. A fixture consisting of elements of the PowerClamp modular clamping system for holding thin-walled light metal components firmly with low stress is shown here

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BEAT BAUMGARTNER

→ «The universal clamping systems from Triag handle everything from the economic multiple clamping of small aluminium workpieces to the firm clamping of large castings», explains Mathias Bärtle. Together with his two brothers, he runs the contract and to-order manufacturer, Bärtle CNC Metallbearbeitung in Albstadt, Swabia in the third generation as owner and general manager. Within the scope of make-and-hold orders, Bärtle produces between 20 and 50 components at short notice, usually within one to two weeks. The contract manufacturer has highly trained technical personnel as well as high-end, well-proven technology at its disposal, in order to ensure the requisite flexibility and reliability.

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The technology must as flexible be as the business organization

«We hold our own against the competition with the high quality and precision of the prepared workpieces, maximum reliability and – first and foremost – our high flexibility», says Bärtle. In particular, customers increasingly attach importance to the flexibility of the contract manufacturers. »

2 Clamping unit consisting of a clamping module with clamping claws for the base rail and a centric-clamping device with V-grooved jaws for clamping long cylindrical components

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The order quantities to be provided can vary considerably in the space of a few days. Since a large number of variants frequently have to be manufactured, it is usually unrealistic to produce for stock. Bärtle has therefore optimized its production for a lean, quick throughput. This can be organizationally implemented in a medium-sized company with currently just under 50 employees without any problems. «However, we also require appropriately designed technology», Bärtle points out.

The company processes cubic components on several horizontal machining centres from Matsuura. The operators can prepare their pallet storage systems with four to six stations with pallets during primary processing time. The automatic change in the working area minimizes the unproductive downtimes of the machines.

«However, we have to succeed in quickly preparing the pallets with the entire spectrum of components to be machined; only then can we really exploit the advantages of flexible machining in our machines», explains General Manager Bärtle.

As his father before him more than 20 years ago, Mathias Bärtle firmly believes that universal workpiece clamping systems designed for maximum flexibility contribute to this. They should minimize the set-up/change-over times. Moreover, they should allow the quick clamping of a variety of components in a chaotic mix. »The optimum for us is to produce a variety of components on one machine more or less in parallel, in order to minimize the time until the completion of individual order batches», says the managing director.

Almost all of the clamping system elements can be combined with each other

For this reason, the contract manufacturers in Albstadt invested in clamping systems of the Swiss manufacturer, Triag International AG, as early as the 1990s. «A persuasive argument was and still is the extraordinary variety of components combined with the end-to-end modular design», states Bärtle.

Roland Frühsorger, the regional Triag sales partner, adds: «The system stands out with its end-to-end modular concept. Almost all of the components are compatible with each other and can be freely combined.» Nowadays Bärtle uses the complete range of clamping components from Triag. These include mineral tombstones, grid chucks of cast iron and mineral concrete, the Opp-System zero-point clamping system and the PowerClamp universal modular clamping system. In addition to this, the men from Albstadt still work with the CompactClamp clamping system procured more than 20 years ago. With small design differences, it offers advantages which are almost comparable with the current PowerClamp system. This universal equipment enables the contract manufacturers in Albstadt to handle any clamping situation with a minimum of effort.

The technical experts arranged one to four base rails of the PowerClamp clamping system on base plates and the four or six sides of mineral tombstones. With precision teeth serrations in a 2mm spacing at the top, any number of clamping modules can be placed on them and also mounted on top at right angles to the longitudinal axis of the base rails. Only one easily accessible screw on the side is needed to securely fix the clamping modules with a high clamping force. Just a few clamping modules are needed to clamp arge, heavy workpieces. They generate such high holding forces that they e.g. also securely hold castings for heavy-duty machining.

The machine operators use direct stamping jaws, in order to clamp workpieces tightly. They implement a multiple or a 5-axis clamping system within a very short time with end modules. They create an exceptionally high packing density on the available clamping surface with clamping modules which are executed with an end jaw or with a clamping jaw. If the clamped components have to be easily accessible for lateral machining at the

3 For difficult clamping situations: the PowerClamp modular workpiece clamping system with base rails, elevation modules and linear clamping modules (© Mücke)

side, elevation modules provide the requisite distance from the tombstone or clamping table. These modules can also be placed at any desired position of the base rails.

The clamping principle with clamping claws which are only clamped with one laterally accessible screw is always the same. Mathias Bärtle confirms the high flexibility.

He shows a selection of clamping modules and interchangeable jaws of the PowerClamp clamping system. «We are prepared for any situation with these standard elements from the modular system of Triag», says Bärtle with confidence. «They enable us to handle almost any conceivable clamping task.»

Quick operator instruction instead of prolonged equipment planning

Special equipment planning is not necessary as a result of the standardization and the compatible, identical end-to-end design of the clamping modules. After a short period of training, the machine operators select the right clamping elements for the setup. The contract manufacturer Bärtle works up to 30 percent more productively especially on account of the multiple clamping of small components. This clamping concept increases the productive operating time of the machining centres.

As a consequence, it reduces the unit costs by machining a large number of components in one swift uninterrupted operation.

Clamping modules which clamp linearly or by pulling down are available for clamping blanks of varying geometry and a variety of soft or hard materials. Triag offers a broad spectrum of quickly exchangeable clamping jaws, in order to be able to correctly clamp blanks consisting of varying materials. These include direct stamping jaws. They have the advantage of being able to hold blanks securely with an oversize of just under 3 mm without further preparation. Moreover, smooth, grooved, serrated or stepped clamping jaws and V-grooved jaws and pendulum jaws are available as an option. These are hardened, in order to provide long-term resistance to wear.

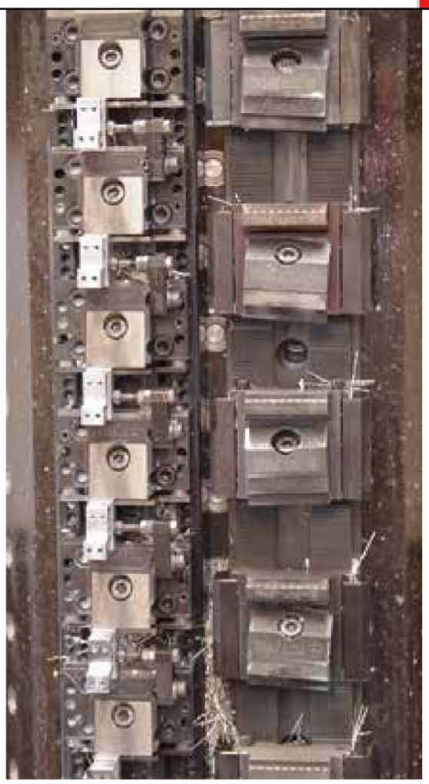
Assembly of special fixtures from standard modules

The user can process soft jaw blanks for blanks with complex geometry in accordance with this geometry. In addition to this, PowerClamp also includes 5-axis modules with centric-clamping devices, which are usually combined with elevation modules, so that the workpieces are easily accessible on five sides. As Bärtle confirms, almost all of the workpieces to be machined can be securely clamped within a very short time with this large number of clamping modules and clamping jaws.

However, a suitable solution is not combinable for some clamping situations, even in the standard clamping system of Triag. Nevertheless, this is also not a problem in Albstadt. Mathias Bärtle:

«Together with the specialists from Triag, we have pre-equipped some pallets in our machining centres with universal grid chucks. These base plates are executed with a number of centering holes with various spacings. As a result, we can also clamp specially designed fixtures quickly and easily.» Needless to say, the contract manufacturers again put their faith in universal clamping modules from Triag for the special fixtures. Apart from the standard variants, they can use clamping modules with vertical clamping levers, floating clamping jaws, magnetic or vacuum clamping chucks or three-jaw chucks.

As an additional advantage, the standard grid plates provide the flexibility to be able to use fixtures prepared with blanks on several machines alternately. This temporarily creates a higher capacity, as a number of blanks are clamped on several fixtures and processed in parallel on two or three machines. On the other hand, it can guarantee short-term delivery capability if e.g. a machine is at a standstill. The components can be processed on an alternative machine with uniform accuracy and quality. Bärtle also realizes similar advantages with the Opp-System zero-point clamping system if pallets and fixture plates are equipped with this. The high repetitive accuracy of the clamping systems also contributes to flexibility, because all the clamping modules can be positioned on different base rails with high precision. The Opp-System zero-point clamping system guarantees an even higher



4 Reduce set-up times, optimize productivity: multiple clamping of small workpieces with high packing density with the modules of the PowerClamp and CompactClamp clamping systems (© Mücke)

5 Impressed by the advantages of the Opp-System zero-point clamping system (in the background): Mathias Bärtle, general manager of Bärtle, as well as Roland Frühsorger and Dashmir Ramadani of the Swiss tool partner Triag International (from. l. to r.) (© Mücke)

repetitive accuracy, as pre-equipped pallets and fixtures can be alternately used on different machining centres. Furthermore, the tombstones consist of the cast mineral material Tripoxy and are very rigid and dampen exceptionally well.

As a result, all the clamped parts are machined with consistent precision at an unchanged cutting and feed speed- irrespective of their position at the base or the head of the tombstone. «The universal clamping systems of Triag make a significant contribution to our being able to manufacture high-precision components in small and medium series flexibly and reliably and therefore competitively at a cost-intensive location», says Mathias Bärtle, summing up the advantages.

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Bärtle in Albstadt manufactures turned and milled parts in small and medium series for aerospace, rehabilitation technology, general engineering and the automation sector. This concerns different drive components such as (pinion) shafts, wheels, axes, pistons and bolts. The spectrum of components also includes bearing shields, articulated levers and mounting plates as well as housings for electric motors and transmissions and for valves and control units. Furthermore, heavy metals and light metals, cast iron, various alloy steels and occasionally also plastics are processed in Albstadt.

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