



Date: 01.08.2018

External reamer ensures high-precision cylindricity

The contract manufacturer Karl Völlm turns, mills and grinds all common workpieces with state-of-the-art CNC machines. To ensure the exact production of several spigots on planetary carriers, the machining specialists from Krefeld are also using external reamers from MAPAL for the first time.

The company founded by Karl Völlm in October 1945 was familiar with the subject of machining from the very beginning. Starting with special piston manufacturing, the specialists based in Krefeld constantly developed their technology further. This strategy is also successfully continued in the third generation under the leadership of Ralf Baur. Nowadays Völlm covers all areas of modern machining technology.

As a contract manufacturer, Völlm produces a wide variety of parts. The range includes axle housings, pistons, hub carriers and crankshafts. The portfolio currently includes around 13,500 different items. "With all our products, we note that the requirements for accuracy, especially with regard to shape and position tolerances, are constantly increasing," says Managing Director Ralf Baur.

Völlm has been working with MAPAL for over 50 years. Völlm primarily uses reamers from the company for fine machining – one of the core competences of the precision tool manufacturer – for the manufacturer of valve guides, for example. Finely adjustable high-feed reamers from MAPAL are also used in other areas. In a current project involving the manufacturing of planetary carriers used for planetary gears, Völlm is using an external reamer from the precision tool manufacturer for the first time. The contract manufacturer has been producing these planetary carriers since 2017.

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High accuracy of cylindricity required

The biggest “sticking point” for the machining of planetary carriers made of heat-treated steel was the high accuracy required for the cylindricity of the spigots on the planetary carrier. With a diameter of 75 mm, they have a tolerance of 18 µm and with a diameter of 80 mm the tolerance is 25 µm – but the maximum deviation of the cylindricity is only 5 µm. In order to find the most suitable tool for this demanding machining step, Völlm evaluated various suppliers. “We decided in favour of MAPAL, among other criteria, because the tool concept convinced us and everything that the tool manufacturer had promised us before has always worked,” explains Managing Director Ralf Baur.

This is also true for the manufacturing of planetary carriers. MAPAL designed an external reamer that is precisely matched to Völlm’s requirements. External reaming tools can be used to machine outer diameters and shafts efficiently with µm precision. Hans-Adolf Thelen, Technical Advisor at MAPAL, explains: “The principle of our external reamers is based on optimally absorbing and dispersing the cutting forces using guide pads so that no displacement forces and bending moments are exerted on the workpiece.” The external reamer used by Völlm has an internal diameter of 75 mm and is equipped with MAPAL’s own EasyAdjust-System. It requires a very low setting effort as it completely eliminates the need for time-consuming setting of the back taper.

An HSK alignment adapter and MAPAL’s own module connection are used to ensure high-precision machining. In combination with the external reamer, the cylindricity of the spigots themselves and the accuracy of the spigots relative to each other are reliably achieved.

The tool is equipped with a PVD coated TEC indexable insert with four cutting edges for maximum cost-effectiveness. This ensures maximum tool lives – 470 spigots are machined with one cutting edge. The indexable insert only needs to be changed after 1,880 spigots. Production takes place on a machining centre with a cutting speed of 120 m/min and a feed rate of 60 mm/min.

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Meeting technological challenges together

“What is particularly positive about working with MAPAL is that all technical requirements are always reliably met,” appreciates Ralf Baur. “As a contract manufacturer, we are constantly getting new parts on the table, which present us with new challenges. As a result, our cooperation with MAPAL continues to develop.”

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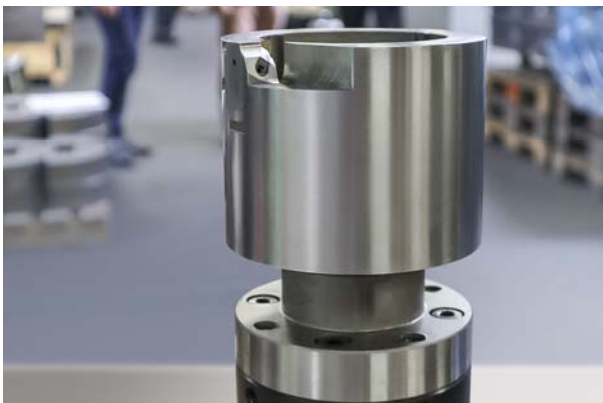
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MAPAL's EasyAdjust-System

A drastic reduction in the setting effort for tools with guide pad technology was the goal of the development of the EasyAdjust -System. The heart of the system is an innovative cassette that stably holds the indexable inserts with six or four cutting edges without any play. The back taper of the minor cutting edge is already integrated in this cassette, thus eliminating the need for this setting effort. Due to the exact guidance of the cassette on a precision guide pin, the back taper remains unchanged even during diameter settings.

Captions:



Since the introduction of the external reamer with EasyAdjust system, measuring loops are no longer necessary.

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With the external reamer, a cylindrical form deviation of less than 5 μm is reliably achieved.



Ralf Baur, Managing Director of Karl Völm GmbH, application engineer Frank Pfeiler and Hans-Adolf Thelen, technical consultant, both from MAPAL.

PRESS RELEASE



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All common workpieces are turned, milled and ground with state-of-the-art CNC machines.

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