



The Hainbuch mandrel on the Liebherr machine.

Hainbuch »geared-up« at Wittmann, and during the process discovered clamping solutions for complex components

Urgent – a geared component is needed. This is not a problem for the company Wittmann located in the Baden-Württemberg town of Uhingen. Wittmann really enjoys solving the gear cutting challenges of its customers. The 65-man contracting company tries to fulfill every customer request for involute-geared components from all areas of the machine tool industry. Gear-cutting sizes from module 1 to module 36 for gears with a diameter of up to one meter can be realized. The quantities are usually between 10 and 100 pieces. However, Wittmann also produces component parts, prototypes and series far more than 1000 pieces. With a lot of manpower in the manufacturing and with lean administration, this works very well. Nevertheless, flexible clamping devices are needed for this, which in addition are cost-effective for automatic clamping on gear grinding machines. What clamping devices satisfy all the prerequisites and score with outstanding concentricity and short clamping intervals? The Mando T211 mandrels from Hainbuch. For such a solution the clamping device manufacturer headquartered in Marbach Germany has the answer in its standard modular system product range.

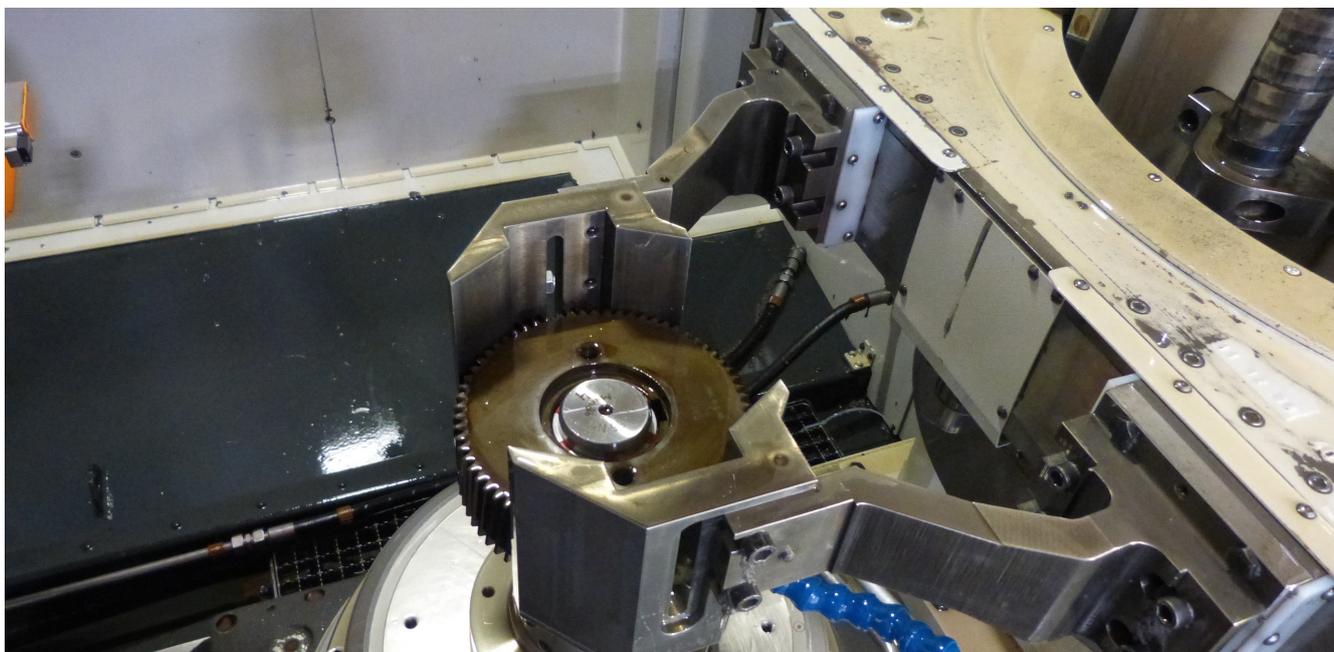
Persistence pays off for both

After multiple visits at the Wittmann's facilities in 2012, Renee Reuter, responsible Outside Salesman at Hainbuch, got the chance to put the capability of the Hainbuch system to the test for the first time. Meanwhile Dr. Oliver Mager, Authorized Officer at Wittmann, is quite happy about this. At that time the task at hand was to find an improved clamping system for an

existing component on a Burri BZ 362 gear grinding machine. And because the employee at Wittmann who was commissioned with this task had prior experience with Hainbuch, an attempt was started with the Torok manual chuck, size 100, and a mandrel adaptation. Result: The tests were consistently positive, and today the parts are still running on the hand-actuated clamping concept from Hainbuch.



Great teamwork – Renee Reuter from Hainbuch and Dr. Oliver Mager acting in concert in the projects.



The automatic change-over of components to the Mando T211 mandrel is outstanding.

Mager recalls: »These were relatively thin, disk-shaped parts that started to vibrate if they were not properly clamped. To avoid this, we needed a special clamping and installation geometry that ensured smooth running and stabilized the parts. Moreover, we wanted to clamp parts quickly and reproducibly, without having to take the complete clamping set-up off of the machine each time. Rigid clamping is the prerequisite for a good grinding result.«

Cornerstone laid for the second project

Two years later, when the new Liebherr LCS 700 gear and profile grinding machine was ordered, Liebherr recommended the special mandrel Mando T213 from Hainbuch as the clamping system. Mager reports: »Our task was to manufacture parts in accordance with the customer's drawing and plan ahead. Basically, even today we do not know what part the customer will come to us with tomorrow.« Thus, flexibility was the focus for the new automated clamping concept. »We took a look at Liebherr's clamping recommendation, and the various components that we had already manufactured in house. And we considered how we could adapt

the clamping concept to our own ideas, so that in the long term we would have an effective and modular clamping system. We did not take Liebherr's original suggestion, but rather went with standard components from Hainbuch. It was quite clear to stay with the standard Hainbuch components if the technical requirements allowed for it. This decision offered two crucial advantages for Wittmann: The delivery times were short and the costs were reasonable. The standard segmented mandrels and the standard segmented clamping bushings both could be used. »We built the interface adaptations ourselves and now a Mando mandrel from Hainbuch in the appropriate size sits on top. Our goal was to cover a certain diameter range in a flexible manner.

No other choice than Hainbuch

For this machine Mager specifically chose on the Hainbuch concept. Basically for the bored parts there were three possibilities to choose from. The mandrels from Hainbuch, a manual chuck, or a hydraulic chuck. The Liebherr machine has automated handling for workpiece change-over. It is equipped with a ring loader, and a pallet conveyor is connected. If this process should



The automated Liebherr LCS 700 with the workpieces on the pallet conveyor.

Quote

»Because Hainbuch guaranteed us an appropriate reproducibility, and the clamping devices were in the accuracy range of a few μm , we ordered, and we are very happy.«
*Oliver Mager,
 Wittmann*

run without an operator, then it needs an automated clamping device. If it is necessary to work with manual clamping here, the component must be clamped classically on a mandrel between two centers. Or you clamp with jaws; however, in this case you must align every component individually. Using an automated clamping process with the Hainbuch mandrels, this is no longer necessary. Hydraulic mandrels also have their justification and purpose. But Mager explains why they were not selected in this case. »A hydraulic mandrel has a clamping interval that is in the range of few hundredths of a millimeter.

The Hainbuch system is in the range of several tenths of a millimeter. Therefore this is also the advantage for the automation. The component may be more easily fitted onto the mandrel and replaced and changed. Particularly for the large and heavy parts that are pivoted in and pushed onto the mandrel, it is advantageous if there is space of a few ten millimeters between clamping bushing and component. For hydraulic mandrels, it is necessary to work with chamfers. There is danger that the component will be damaged if there are soft bores and precentering does not fit absolutely perfectly. Moreover, in many cases several different components that differ in the bore dimension by several tenths can be covered with one clamping bushing. If there are two components, one has a 95 bore and the other has a 95.1 bore, then under some circumstances one 95 clamping bushing can still cover the situation. With the Hainbuch system the 95 and 96 bores only the bushing needs to be changed and not the entire mandrel. Therefore the price advantage is also evident. However, ultimately for us the clamping interval was the decisive factor for our choice of the Hainbuch system.«

The final quality of the tothing is generated on the hard gear finishing machines. With the Burri, gears can be ground up to a size of 362 mm, and with the Liebherr gears up to a size of 700 mm. When grinding the gears, the quality of a gear is defined by the required concentricity and pitch accuracy of the workpieces. This accuracy must be significantly better than 1/100th of a millimeter. This must also be provided by the clamping device. Mager explains: »Because Hainbuch guaranteed us an appropriate reproducibility, and the clamping devices were in the accuracy range of a few μm , we ordered, and we are very happy.« Wittmann's employees also profit from this decision. The modular operating concept is consistent, the mandrels and bushings are very easy to change. Change-over from one workpiece to another or from one mandrel size to another is fast and easy.

Future plans

Currently a series production project with a new Liebherr and an existing Burri is being planned. Again this involves tooth grinding with automated workpiece clamping. However, in this case the parts are very small with a

relatively low wall thickness. Mager states for the record: »Relatively large worm grinding wheels are used, and firm clamping is a strict requirement. In addition, the clamping device sits very close to the machining position.« Due to the interference contour the set-up must be slim and occur in a specific machine position. For Mager the overall concept is the important thing: »In this case as well we strive to integrate our clamping concept in the existing modular system. We do not want special clamping fixtures for each component, but rather swapping the modules between different machines. Hainbuch provided this modular system.« According to Mager, the cooperation between Hainbuch, Liebherr and Wittmann went really well. We will use these companies again for further projects that will give us a good result.

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