

KÖNIGSDORN® - CENTRIFUGAL FORCE DAMPING

Based on the good experiences that a long-term customer had gained in the field of machining with König-mtm, he contacted the company with a new inquiry in 2022. The request was for a suitable clamping device for high-precision workpiece clamping, for the internal machining of thin-walled workpieces to be machined in the future on his turning machine from the machine manufacturer Felsomat.

During an on-site appointment with the König-mtm application engineer responsible for the area, the customer's task was discussed in more detail and an effective solution for the high-precision clamping of the component was sought. Due to the limited pre-machining, as well as the thin-walled and long design of the workpiece, it quickly became clear that special attention had to be paid to avoiding vibrations in the machining process.

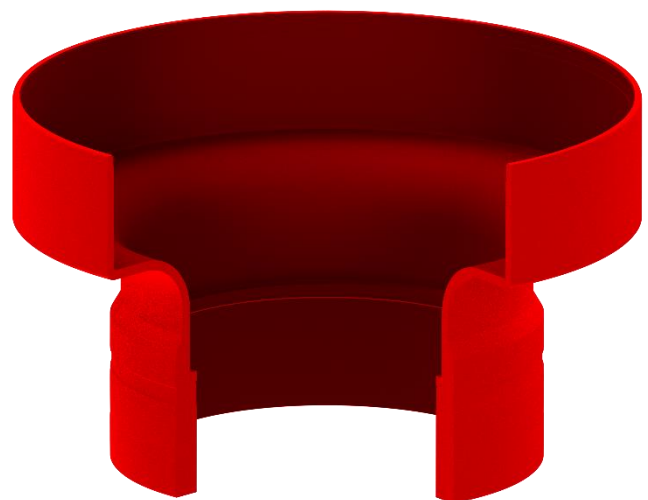


Illustration 1: Workpiece

Challenge

During the turning process, the customer wants to machine the inner contour of the part. Since the outer contour has not been pre-machined, the only possible clamping diameter is the later bearing diameter at the bottom of the workpiece. This diameter is well suited for hydraulic clamping because its tolerance is rather small and the wall thickness - compared to the rest of the workpiece - is thick. The challenge, in this case, is that the area to be machined is far away from the clamping diameter. This favors vibrations.

Workpiece support

For the workpiece support, the adjacent surface of the component, which was qualified to the clamping diameter, was well suited. In order to be able to guarantee an automated machining process, the changeable support ring was equipped with an air system control.

Damping of the vibrations

A common way to contain the occurring vibrations is to additionally support the workpiece in the vicinity of the thin-walled area by using a spring-loaded damping unit in addition to the fixed workpiece support. This system damps the axially acting forces, but in this case, it was still necessary to look for a further solution to contain the radially acting forces. For this task, the centrifugal force damping system implemented by König-mtm appeared to be perfectly suited.

Centrifugal force damping

After consulting with the customer, the centrifugal dampers were attached to the damping unit of the hydraulic Königsdorn® in an even pitch and designed with changeable jaws. During the turning operation, the centrifugal forces pull the rear, heavier part of the lever outward and pressing the front jaws against the workpiece by the flip

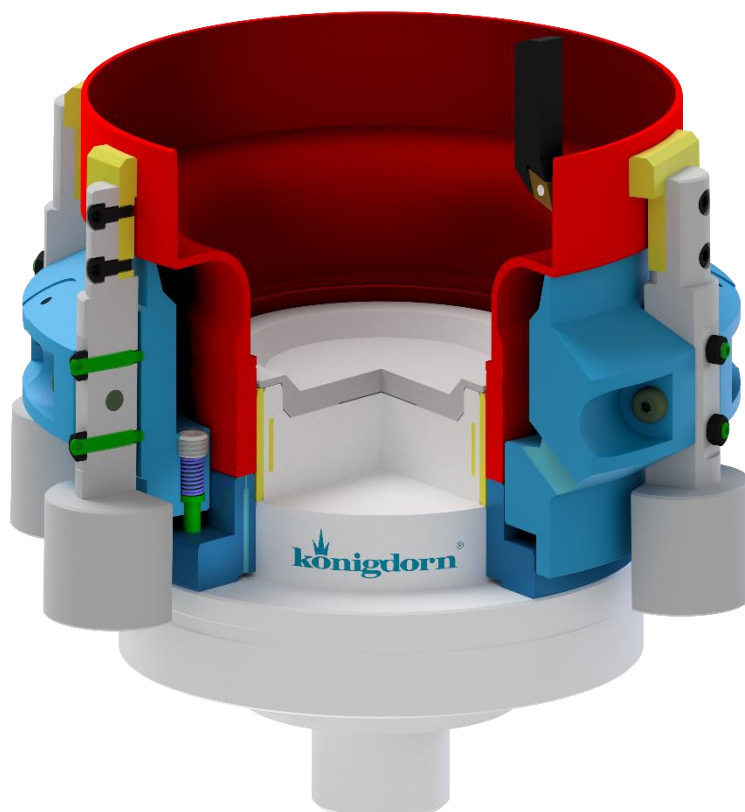


Illustration 2: Clamping solution in $\frac{3}{4}$ cut

effect. In this way the pressing of the jaws damps the direct radial vibrations on the thin-walled machining diameter.

The clamping device was designed to be as modular as possible, not only for the centrifugal damping, also for the complete clamping device. Due to the changeability of the collet, support ring, clamping unit and the jaws, it is possible to react quickly to a change in the workpiece and the customer does not have to rely on an external reworking or a completely new clamping device.

Due to the funnel shape of the workpiece, further attention had to be paid to the removal of the chips and cooling fluid. For this purpose, drainage holes were drilled on the plane surface of the clamping mandrel to facilitate the discharge of the chips.

König-mtm guarantees a repeat accuracy of less than or equal to 0,005 mm for high consistent quality even with this demanding clamping principle and size. This type of clamping system is transferable to further applications.

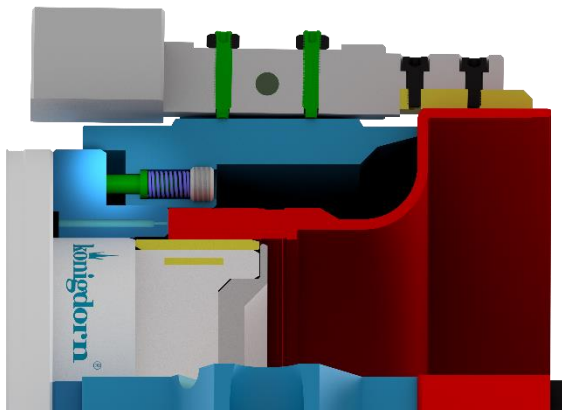


Illustration 3: Detail view of centrifugal force damping (gray)

Our application engineers are available for you and will be happy to advise you.



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