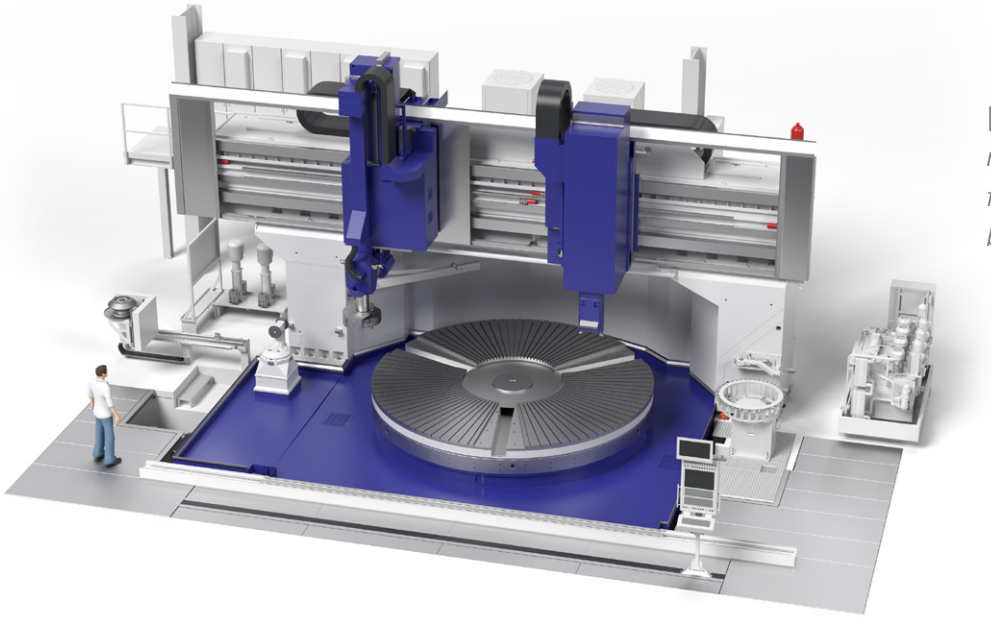
Grinding, turning and drilling machine for the complete machining of large parts

„The final touch“ - Contouring on a grand scale

The decisive operations always come at the end. Even with large parts, grinding is often the method of choice. However, because other processes are also required, ELHA has designed the VTG, a customizable vertical machining centre for complete machining tasks.



[1] *The vertical large machining centre VTG from ELHA for finishing large-format workpieces by grinding, turning and drilling*

Even with large-format workpieces, grinding is the first choice for reliably producing the required quality in a final, all-determining operation. If you choose the wrong machine now, you risk immense damage towards the end of the value-added chain - after all, grinding is supposed to refine the workpiece and give it the final and above all valuable quality. But grinding alone is not enough in many cases: High-precision features for the ground surfaces must be milled, drilled and turned in the same clamping for economic reasons. A combination of metal-cutting machining processes in one machine is the most effective solution.

Prioritization is important

However: What is the main task in this context and what are the secondary requirements? Only those who know the main task, i.e. who know what leads to a significant increase in the value of the end product and what has to be done „for better or worse“, will be able to achieve an economical and effective compromise in the resulting machine design. The answer to this question always has a direct impact on

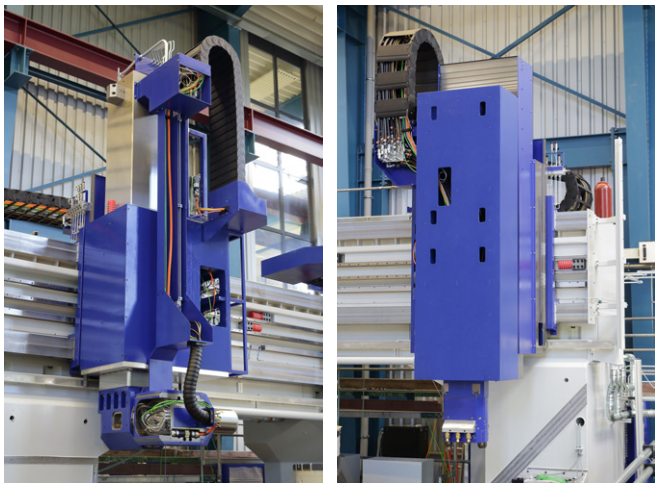
- Characteristics of the frame components (cast, welded or polymer concrete design, passive/active sag compensation)
- Type of main spindle (tool holder, automatic balancing, chip-in-spindle detection)
- Type of guide elements (linear roller bearing guided or hydrostatic)
- Characteristics of the drive (indirectly via pinion and rack and pinion/toothed wheel or directly via direct drives (ELHA SDD)

- Type of measuring systems used
- Coolant supply inside and outside as well as on pressure and quantity, temperature control and its preparation
- Tool change methodology, with number of the tools, their monitoring and additional equipment such as dressers

Geometrically defined and indefinite in tailor-made combination

ELHA-MASCHINENBAU has taken up the challenge of combining several machining processes - after prioritization by the customer - in one vertical machining centre. The maximum benefit in terms of achievable quality, required productivity and flexibility can only be achieved for the customer with a solution tailored to the tasks at hand.

In the present case, ring-shaped workpieces with a diameter between 2500 mm and 6000 mm are machined on the ELHA VTG. On the one hand, machining with a geometrically defined cutting edge is carried out by turning and drilling on the right-hand work unit, while on the other hand the left-hand work unit is used to machine the workpiece with a geometrically undefined cutting edge by grinding. As an additional function, it is also possible to carry out turning operations with the grinding unit.



[2] *Even in its basic version, the VTG carries two working units - one for geometrically undefined grinding work (supplemented by turning functionality if required) and one for geometrically defined work using turning and drilling*

[3] *The ELHA-SSD (Segment Direct Drive) table drive concept developed in-house, based on the principle of a magnetic levitation train, is proving to be a secret weapon in the context of high-precision finishing of expensive large components*

Secret weapon in the table

However, the focus of the ELHA VTG is clearly on the grinding of round bodies. As a „secret weapon“ for high-precision grinding of rings, ELHA uses the table drive concept „SDD“ - Segment Direct Drive - developed in-house. This drive works similar to the principle of the magnetic levitation train, in that permanent magnets mounted on the table follow a magnetic field rotating around it. The result is an absolutely symmetrical, uniform and above all shock-free force input into the rotary table. With a positioning accuracy of ±1 arc second, high acceleration, high torque and high control stiffness, this table can nevertheless be used for highly accurate and dynamic positioning and interpolation processes. These features of the table drive have an extremely positive effect on both drilling and grinding processes. In this case, a magnetic chuck is used as the chuck, which, together with the ELHA-SDD, represents the perfect solution for clamping and machining with regard to grinding.

In addition to the innovative table drive concept, the frequency response analyzed machine architecture - consisting of a combination of polymer concrete and adjustable welded steel constructions - as well as the use of hydrostatic guides in all axes, ELHA-MASCHINENBAU guarantees the user to find the perfect machine for his task.