

PC-based control for modular finishing gantry

Automated finishing down to lot size 1



Many metalworking shops still hand-finish stainless steel, regular steel and aluminum parts. Automated machines such as the modular finishing gantry made by Peitzmeier deliver significantly higher quality and make production processes more efficient while easing the workload of employees. To achieve its full potential, however, such a system must be able to handle the widest possible range of parts. The PC-based control technology from Beckhoff makes this flexibility possible.

Peitzmeier Maschinenbau GmbH based in Gütersloh, Germany, develops, designs, and builds machines for finishing stainless steel, regular steel, and aluminum parts. The company's product portfolio ranges from machines for standard applications to process-oriented custom solutions. The parts include kitchen exhaust hoods and sinks, as well as cladding panels for food processing and packaging machines, which are usually ground and polished as one of the last steps in their production process. This improves their appearance and makes them easier to clean. Especially in the food and pharmaceutical industries, more finely ground surface patterns mean less dirt and increased resistance to aggressive acids and alkaline liquids.

The quality requirements for such applications are very high, because most parts have already gone through the manufacturing process and are therefore highly valuable. On the other hand, finishing by hand is exhausting and demanding work which creates considerable amounts of breathable dust. Accordingly, it

only makes sense to automate the belt sanding process to the extent that it produces consistent quality – efficiently and economically – ideally, for lot sizes as small as a single unit.

Highly automated finishing gantry

To implement Peitzmeier's modular machine concept, company founder and CEO, Ulrich Peitzmeier selected automation technology from Beckhoff from the start: "By selecting a controller manufacturer with extensive engineering expertise, we were able to cooperate closely in designing the software. In addition, the Beckhoff control philosophy, with its focus on modularity and flexibility, meshes very well with our own machine design concepts." Equipped with the appropriate belt sanders, Peitzmeier's gantries deliver easier, safer, more efficient finishing processes. The modular machines make it possible to precision-finish each part with consistent quality, thus avoiding scrap or the need for rework.



In its most advanced version, the modular Omni-Grind gantry features a fully automated finishing process.



Automation expert Marian Gutzeit and CEO Ulrich Peitzmeier of Peitzmeier Maschinenbau together with Beckhoff Sales Engineer Michael Nienkemper (right to left).

"The new Omni-Grind gantry is a modular finishing system with the most advanced degree of automation," explains Ulrich Peitzmeier. "In its simplest setup, the system works with a manually operated handling system and pneumatic axes. In the next stage, drives take over the handling, and in the most advanced version, the axes are moved automatically through the control program. The programming has been designed to be as practice-oriented as possible. For example, to measure a part you need only have to trace its contours via a handwheel, 'teach' the start and end points, and enter the desired feed rate."

Two guided pneumatic cylinders press the contact roller against the abrasive belt to control how much material is removed. The pressure of these cylinders is controlled via a servo-proportional valve. For the reversal points with their inherently longer contact time, the fast Beckhoff controller defines the ramps for the contact roller's pressure in order to prevent unwanted hatching patterns on the surface.

Consistent control system from I/O terminals to software

The heart of the control system for the Omni-Grind gantry is a CX2020 Embedded PC in combination with the CP3915 15-inch Control Panel, both from Beckhoff. The fanless design of the Embedded PC ensures failsafe operation despite its proximity to the finishing process with its super-fine dust particles. The automation software used is TwinCAT NC PTP. Ulrich Peitzmeier: "The Beckhoff control technology is a great match for our machine, because it is equally flexible and modular, while reflecting our philosophy perfectly. Another important factor is the speed with which it responds. With belt speeds of 30 meters per second, the tool moves forward at a speed of 40 meters per minute. Even when the geometry of the part changes, the ratio of table speed and the speed with which the part moves must be constant at all times. This is the only way to achieve an even finishing pattern."

Especially important, according to Peitzmeier, is having motion control with a wide adjustment range and highly dynamic controls for multiple linear axes, the table and tool drives, and the three pivot axes of the clamping device – depending on the respective gantry model. Together with its system of I/O terminals, EtherCAT delivers the speed and flexibility necessary to support his company's powerful and modular machine concept, notes the CEO. With TwinSAFE, the required safety functions can be implemented as an integral part of the control solution. If someone hits the emergency-OFF button or the belt breaks, the drive is stopped as quickly as possible via a ramp-down function before the main drive motor is switched to operate with no torque. Light sensors protect the setup mode, during which TwinSAFE reduces the feed rate to 2 meters per minute.

Ulrich Peitzmeier summarizes his experience as follows: "The modularity and ability to retrofit the Beckhoff components were core requirements for us. Other important points were the speed in processing varying shapes and the flexibility of the Beckhoff system, which is in line with that of our own equipment. Also critical is the fact that as a small equipment maker, we depend on our customers' ability to get parts for the control system anywhere in the world. We also decided to take further advantage of the Beckhoff system consistency in the future by making use of the company's servo drive technology. Further, Beckhoff One Cable Technology (OCT) and the compact EL72xx servo terminals deliver huge benefits."

Further information:

www.peitzmeier-maschinenbau.de/english

www.beckhoff.com/TwinCAT

www.beckhoff.com/TwinSAFE