Automated surface finishing



The surface quality of rotation-symmetrical workpieces has always played a crucial role for the function of a wide range of machines. No matter whether the surface finish of combustion engines are the issue or mirror-like surfaces in video and audio transfer heads – the production of smooth surfaces is a real challenge.

Machine control very close: Only those connection modules that are actually required are provided via top hat rail mounting.



A special machining technique for achieving very fine surfaces is belt finishing. It is a kind of belt grinding process, whereby the abrasive is placed on a belt that is unwound continuously and process-dependent from a so-called belt finishing device and pushed onto the wet workpiece with controlled contact pressure. Filter trolleys and associated capture devices separate and dispose of the grinding residue. This process creates accurate and reproducible surfaces with the required characteristics – from highly polished to structured. The Swiss company ProTech AG, based in Matzingen, is one of the players in this market segment with interesting growth potential.

Finishmaster with high-tech automation

The Z600 and Z600-E Finishmaster machines are innovations from ProTech AG. For Mr. Egloff, general manager of ProTech, the reasons for the very high degree of automation of the machines are customer expectations in terms of productivity, operator convenience and integration capability: "In order to be able to reduce production costs, our customers expect us to combine advanced mechanical engineering, state-of-the-art control technology and special technology know-how." The finishing cells with their continuously open processing areas, accessible from two sides, are therefore designed to be suitable for almost any rotation-symmetrical part. They can process up to six bearing points or sealing surfaces. The Z600 finishing machine is particularly suitable for polishing and structuring of shaft and piston surfaces. Using the advanced belt finish technology, all materials can be finished quickly and safely to achieve the required surface roughness after the grinding or hard turning process. A further advantage is the uniform and homogeneous surface structure of the finished parts.

The Finishmaster Z600 is a PC-controlled finishing machine, originally designed as a separate add-on machine, but can also be supplied as a fully automated in-line machine. The Z600-E is a finishing machine for automatic plunge-cut machining. It is also available as a stand-alone add-on machine and may be expanded into a fully automatic high-performance robotic cell.

IPC technology forms the backbone

The Finishmaster is controlled by a CX1000, DIN rail mounted, modular Industrial PC from Beckhoff. In principle, a CX1000 can be operated "headless", i.e. without display and keyboard; in this case, no associated interface is required. While the resulting control system requires no visualization, it does have communications capability via the ubiquitous Ethernet and RS232 interfaces, independent of the standard PC interfaces, which are also available.





Built-in Control Panel CP6829

Compact and successful: Mr. Egloff, general manager of ProTech, in front of the control centre of the finishing machine.

However, for the ProTech finishing machines, a CP6829 Beckhoff Control Panel is used. Mr. Egloff, general manager of ProTech, said: "With a variable range of parts and freely programmable machining zones, convenient and nevertheless simple programming by the machine operator is an absolute must." The machine manufacturers have therefore equipped their machines with a state-of-the-art modular software and hardware concept that enables a wide range of configuration and expansion options to be implemented.

With TwinCAT PLC, the runtime system is also based on proven Beckhoff technology. The customary IEC 61131-3-compliant TwinCAT tools are used for programming. The CX1001-0111 PC control is equipped with a Windows XP CE operating system. The Qvis visualization system from Kinz is used for operating the system.

User-friendly operating and programming

For starting the machine, the main switch has to be turned. During start-up, a colored menu will appear on the operating panel. Machine operation is organized very simply, e.g. via fixed operator control elements integrated in the panel (START Program, STOP Program, Reset Program, EMERGENCY OFF) and via stored functions that are called up from the operating panel via soft keys.

Programming of the machine requires two fundamental steps: The devices have to be parameterized (device settings), and the part-specific processing paths have to be entered.

Further function keys are available for part programming, e.g. for switching to the "Setup" screen, determining the loading position or switching to the "Zone 1" screen. The spindle speed and the number of cycles are also specified via function keys. Whenever additional parameters or numerical values have to be entered, a small input mask appears where the new values can be entered via the keyboard and confirmed with the Enter key.



Flexibility down to the last detail

The modular Finishmaster machines can be adjusted to a wide range of customer requirements and offers a very good price/performance ratio. For the Finishmaster Z600, the maximum workpiece length between the tips should be 600 mm, and maximum diameter should be 100 mm. The ideal dimensions are between 50 and 400 mm length and 4 to 50 mm diameter. The maximum device lift is 30 mm. The machine itself is 2.0 m long, 1.2 m wide and 1.8 m high; the weight is approximately 800 kg. The connected electrical load is 3 \sim 400 V AC, 50/60 Hz, 16 A. Compressed air (6 bar) is required.

The filter trolley and the SLBF30-50 or BF50-100 belt finishing devices used in the Finishmaster can also be used individually on turning or grinding machines. They can significantly increase the consistency of the quality during production and at the same time reduce costs.