Old machines refurbished

Protecting investment by retrofitting machine tools

Everyone who operates machines takes care to optimize the return on his investment by using his equipment as long as possible. Certainly mechanical and electrical components of a machine tool are in most cases operative or can at least be repaired and maintained at acceptable costs after a service life of approx. 10 years. However, this is often not true for drives and CNC technology. Therefore targeted modernization of the drive, control and operational components contributes in an economically sensible way to investment protection for machine tools. But even in the case of new acquisitions such retrofit models provide a solution with an optimized price-performance ratio.

Apart from the pure performance data, the productivity of a machine is, above all, determined by the service life and the failure safety. For mere technical reasons, large machine tools such as grinding machines with a high investment volume of several hundred thousand euros have to be designed such that their mechanical construction and their heavy-current components are sufficiently strong to work reliably after 10 years of operation and to be maintained at low costs and with little expenditure of time. The situation is very different in the case of integrated CNC technology: due to the rapid progress in control and PC technology, technical standards change in much shorter intervals so that service and maintenance can already cause problems after 10 years of operation. Spare parts may no longer be produced and therefore cannot be supplied at all or their prices rise drastically because of high storage costs. Expenses for maintenance increase excessively and, even worse, the limited maintenance capability poses the threat of an unexpected machine down-time.

Thus, apart from a favourable price-performance ratio, machine retrofitting offers obvious advantages such as enhanced machine

availability due to unproblematic services and guaranteed spare part supply.

Comprehensive consulting service for modernizing control systems

In this situation, targeted modernization of the control components and, if necessary, of the drive components is the first choice. Therefore CNC-Technik Weiß GmbH, Neckartenzlingen, Germany, has specialized in this service in close cooperation with John CNC-Service GmbH, Wiesbaden, Germany.

With a used machine or, if desired, a replacement machine or an additionally purchased base machine as a staring point, Bernd Weiß provides his customers with complete retrofit solutions, including special works for circular grinding. His service starts with dismantling all assemblies and subsequent inventory and evaluation of the components that can be used.

The machine bed is abrasive blasted and newly painted. The guides are renewed completely. All assemblies such as the workpiece spindle head, the tailstock and the grinding spindle head are equipped with new spindles, bearings and packings. All assemblies are fitted to each other geometrically and for each an acceptance certificate conforming DIN for circular grinding machines is issued.

Fig.1: A base machine before modernization

Old standard parts are replaced with new, currently available ones. The entire power supply and the axle drives are redesigned and replaced with modern technology. A new control cabinet with CE mark is the basis for the installation of the new CNC controller, where Weiß relies on the proven technology of ECKELMANN AG, Wiesbaden, Germany. A dedicated trough system, which is attached to the machine bed, in conjunction with full enclosure guarding provides optimal temperatures for circular grinding in the machine and absolute cleanness at the workstation.

Fig.2: The original machine is being dismantled

The retrofit program of CNC-Technik Weiß GmbH is complemented by variable-speed workpiece and grinding spindles, Crash-GAP Control, electrical balancing, electrical handwheel for tool setting, the latest measuring instrument technology, CNC-controlled cylinder correction, customized grinding-technological solutions and special software.

As far as electronics services and, in particular, CNC retrofitting are concerned, Bernd Weiß is supported by Gerhard John, whose consulting service first of all consists in developing a suitable service strategy. For complete retrofitting of the CNC controller is not necessary in all cases. John is very familiar with the machine tool and controller markets. He knows the terms of delivery of the manufacturer of the control system, but he also knows which spare parts are available as replacement components from old machines. However, given the falling prices of CNC controllers, a strategy which is economically effective in the long run often consists in retrofitting with new or current models.

Fig 3.: A retrofit machine of CNC-Technik Weiß cannot be distinguished from a new circular grinding machine

The customers of the two firms are not only small and medium sized businesses. Even renowned companies such as Bosch Rexroth, Federal Mogul, Daimler Chyrsler, SKF, SEW Eurodrive have already ordered

complete retrofit circular grinding machines. These are used in 3-shift production and can boast an availability of up to 100 %.

Performance leaps in CNC hardware and software

Optimized maintenance capability of their machines is not the only benefit customers of Weiß and John get from the CNC modernization measures. They also enjoy improved performance and enhanced operating convenience of the new CNC components. A substantial step in the modernization is the use of modern processors. Operators can, for example, rely on high-performance 32 bit processors after a retrofit with the current ECKELMANN CNC controllers.

Moreover the upgraded controllers lead to an appreciable gain in performance and convenience through the provision of modern interfaces for axle connection and HMI. Apart from axle interfaces with conventional +/-10V setpoint interface and bearing feedback via incremental or absolute path measuring systems, the new models offer digital drive bus interfaces such as SERCOS and CANopen according to DSP-402. Networking and PC-HMI connections are made via TCP/IP. For the connection of other machine components, for example identsystems, additional RS232 interfaces are available.

Thanks to the integration of CNC controllers with standard industrial PCs, the operator can make use of all conveniences of modern PCs, from CD-ROM drives and large hard disk space through mouse and external keyboard up to remote data transmission options.

Fig.: ECKELMANN E•PNC55

The benefits of the new ECKELMANN user interfaces make themselves felt immediately in daily work under Windows 9x, NT, 2000 or XP. Their clear and ergonomic design facilitates data input and control during machine operation. Additional software packages for axle optimization, CAD data conversion, remote diagnostics etc. enhance the quality, effectivity and convenience of the modernized machines.

Substantial time saving is provided by the modernized operating software due to the possibility of preparing the next work step by reading new CAD data while the machining process is running.

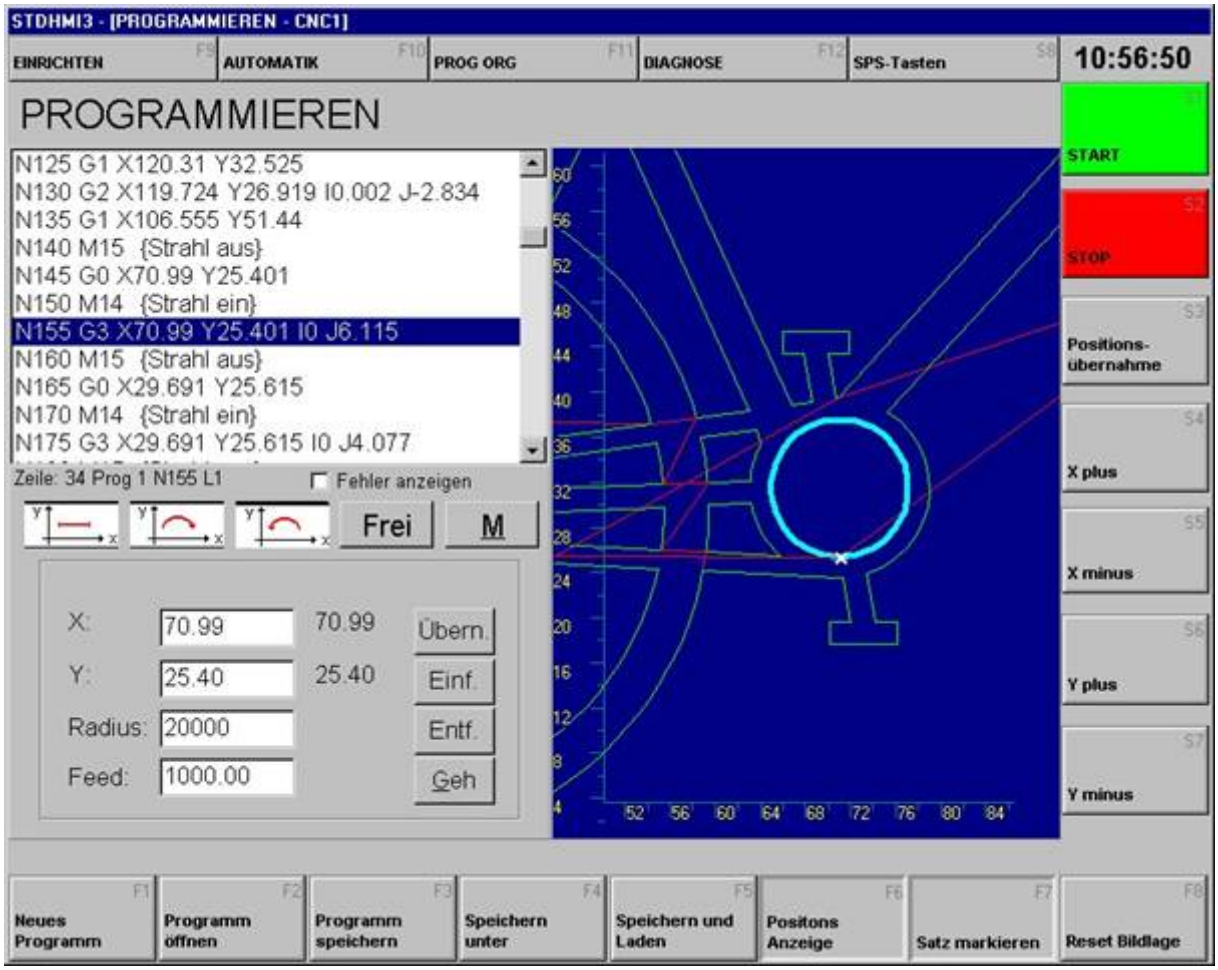

Fig.: ECKELMANN user interface

Tailored control solutions for machine operators

Good machine control systems are not ready-made products. CNC technology for machine construction has to be customized optimally to the customer's needs with regard to cost as well as technological and ergonomic design. This is even truer for the modernization of the control components of machine tools.

A modernization strategy that is to be successful technologically and economically has to be coordinated in careful agreement with the owner, the maintainer, the operator and the production management of a firm. This is just what John CNC-Service GmbH provides as a partner of ECKELMANN AG on the basis of comprehensive know-how and experience in the field of CNC technology. This work is a good example of customer-oriented cooperation of machine producers, control partners and negotiating service providers.