Bringing New Life to Old Grinders

Sauer-Danfoss, Inc., of Freeport, IL, a supplier of mobile hydraulic and electronic solutions, has two Tschudin center grinders on Team 3. The grinders had been purchased new in 1985 and are used primarily for grinding diameters on their smaller pump and motor shafts. The machines were becoming unreliable due to their aging electronic controls. Larry Jogerst, Process Engineer for Sauer-Danfoss, set out to bring new life to these tired machines. The machines were mechanically sound but the aging Marposs E14 control had become unreliable and replacement parts were no longer available.

One of the two Tschudin center grinders is shown below. The original control is also shown in the second picture.

Tschudin Center Grinder

Sauer-Danfoss established the following criteria for their investigation for a CNC system for these grinders:

- Open PC-based, so they could access the machine configuration.
- A proven industrial environment friendly enclosure.
- A proven axes drive control system, instead of a one of a kind configured system.
- The ability to re-configure and upgrade their current Marposs gauging system when that need is determined.

They searched magazines and the Internet for possible solutions. They intensively researched five different controller solutions.

Original Marposs E14 control

Sauer-Danfoss selected the MachineMate® CNC systems for these retrofits. MachineMate, Inc. (of Fond du Lac, WI) is a manufacturer of PC Based CNC systems. The MachineMate control has an Open PC-based architecture so Sauer-Danfoss could access and change the machine's configuration if needed. The CNC comes in a CE rated stainless steel industrial enclosure with a sealed IP65 flat panel color TFT display. Sauer-Danfoss elected to replace the existing motors and drives with a new MachineMate digital SERCOS drive system connected to the MachineMate CNC via fiber optics. According to Larry, "The MachineMate has the look and feel of a real machine controller. This was more familiar to our people than a Desktop PC running controller software."

Wayne Gordon (of Gordon Electronics, Tolland, CT) was the integrator that brought new life to these grinders. Wayne was recommended to Sauer-Danfoss because of his in-depth knowledge of grinders. Wayne has done in excess of one hundred grinder retrofits from simple surface grinders to double headed 6 axes radial grinders.

One of the challenges facing Wayne was to assure that the CNC system could provide the very high resolution required for the finish grinding of precision shafts. With the MachineMate CNC and its digital servo axes, resolution to 0.1 micron (4 millionth of an inch) was achieved. Wayne utilized the MachineMate probing and custom macro feature with the Marposs probe to properly locate the part, typically to the journal shoulder. The Marposs probe was interfaced to the control via high-speed skip signals. The journal OD was ground using a stepped cycle. The CNC responded to the gauge, course, medium, fine and spark-out cycles. At the end of the spark-out the shaft diameter was updated to the gauge via the CNC. This allows other journals on the same shaft to be ground to within a couple of ten thousands of an inch. The shafts are run using live centers.

MachineMate also provided the tools to create canned cycles for the various grinding routines needed for this particular machine. Wayne has developed a library of grinder routines for the MachineMate.

Both machines are back in production. The new control system has renewed the life of these old grinders. Larry adds, “The open PC-based MachineMate has already allowed us to make improvements to our system. For example, we were able to define and add our own machine control buttons to the operator panel. Also we renamed the Function Keys of the MachineMate software so they are the same as our other controllers in the shop. This made the training and familiarity for the MachineMate very easy.” Being an open architecture PC system, standard Ethernet cards were added to each MachineMate to allow the machines to become part of the plant network. Production data will be available to the process engineers over a simple link to the CNC.

The MachineMate control was mounted in the existing cabinet with the other grinder electronics. This cabinet is shown below.

MachineMate CNC and Machine Tool Builders Panel retrofit into old cabinet

Larry goes on to say, “I feel the MachineMate is a very good value and an excellent controller for any retrofit. Gordon Electronics (our retrofitter) and the staff at MachineMate were great to work with.” Sauer-Danfoss is planning on attending future training classes on the MachineMate CNC to allow them to retrofit other machines on their plant floor.

Sauer-Danfoss (http://www.sauer-danfoss.com/) is a comprehensive supplier of mobile hydraulic and electronic solutions. The company supplies markets throughout the world with their hydrostatic transmissions, steering components, motors, valves, open-circuit products and electro hydraulic controls as either components or integrated systems. Many specialty applications rely on their components and integrated systems solutions such as fork lift trucks, telehandlers, cranes, aerial and man lifts, forestry harvesters and sweepers.

Wayne Gordon founded Gordon Electronics in 1969. The initial primary focus was service on NC machines. The business expanded in the 70's to CNC retrofits and in the 80's & 90's to grinder retrofits. Gordon Electronics developed custom controls for grinders, as standard CNC controls are not always easily adapted to customized grinder operations like the MachineMate CNC control. Besides grinder retrofits Wayne has also applied CNC's to machining centers and automatic turret lathes.

MACHINEMATE, INC. (http://www.machinemate.com/) supplies a family of premier PC-based CNC products. The MachineMate CNC family is the recognized leader in PC-based CNC technology. The use of Windows NT, a standard Pentium motherboard, standard PC components, an IEC-1131-3 conformant integrated soft PLC, support for either analog or SERCOS drives and the capability of Ethernet and standard field bus systems give this system the utmost flexibility and openness available today.

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