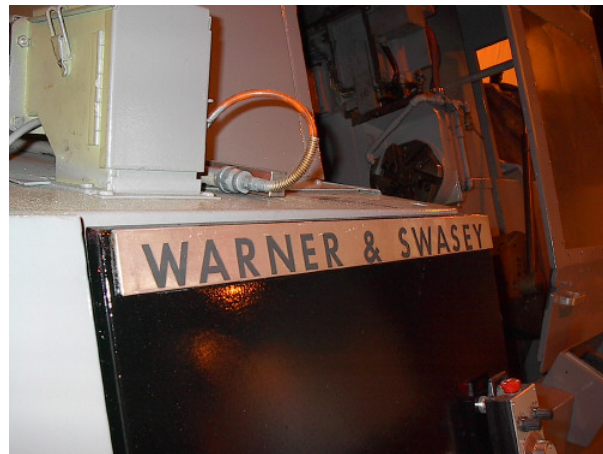


New Face and Heart for a Tired Workhorse Retrofit of a Warner & Swasey Lathe

Though the Warner & Swasey Company no longer exists as an independent entity (having been part of several corporate mergers in recent decades), many of its machines are still in production. Older W&S machines might have lost their 'cutting capability' due to difficulties maintaining the old CNC control. Most W&S users have become very proficient in keeping their machines in good mechanical condition. However, due to the age of the old NC or CNC controls on these machines, it is becoming extremely difficult to quickly return the machine to production after a control failure. By retrofitting the machine with a new PC technology control, the machine can run as well as or probably better than when new and can be upgraded or repaired with standard PC components inexpensively.

Willenborg Associates Inc., started in 1983, is a company based in Imlay City, Michigan (north of Detroit). They provide service and support for LeBlond machines as well as specializing in retrofits of all types of machines, from 2 axis lathes to 5 axis machining centers. Mike Willenborg, the owner and manager, had obtained a Warner & Swasey SC-15 lathe that had been rebuilt mechanically, but needed a new control before a return to useful part production. Mike expected that a control retrofit would enable the machine to help with the part production needed in his company's LeBlond service work as well as providing a demonstration of a 'retrofit kit' for other Warner & Swasey lathes. Carlos Aldana, one of the engineers at Willenborg Associates, would help with the retrofit.



The SC-15 lathe has four axes with a single spindle. The two head arrangement allows the lathe to perform different processes on the part from the different tool turrets. This configuration allows for fast processing of both diameters and bores simultaneously. In this SC-15 retrofit, the two turrets are run alternately from a

single part program rather than simultaneously from different part programs so that the package also applies to the 2-axis W&S machines.

Since Willenborg Associates has been installing CNC controls for almost 20 years, they have a thorough knowledge of what to expect from many vendors systems, such as Fanuc, Allen Bradley, MDSI OpenCNC and others. Because it offered the best capabilities/cost ratio among the controls that could be used to retrofit this type of machine, Willenborg Associates decided to investigate **MACHINEMATE**'s potential using this retrofit. The **MACHINEMATE**'s standard PLC programming interface (IEC 1131) is rapidly becoming accepted; other controls often use a proprietary language. They were particularly interested in two areas: the Open Architecture (PC-based) platform and the high level functions such as Adaptive Control and High Speed Machining. They were looking for a control solution that had these functions "built-in" and was also backed by knowledgeable technical support.

The W&S lathe had solid construction. Since the machine had been rebuilt, there was little mechanical rework needed. However major electrical work was required because the retrofit attempted by the machine's previous owner was of very poor quality.

The machine had a stand-alone control cabinet (with an Allen Bradley 8200 control) that Mike and Carlos modified to accept the **MACHINEMATE** Control and the Machine Tool Builders Panel in the door. The existing spindle and axes drives and motors were used without modification.



Depending on the serviceability of a particular machine's electrical hardware, they might need to be replaced (e.g., very old machines). **MACHINEMATE** INC can provide a wide variety of drives and motors. Further additions of the Omron I/O rack allowed for a very clean and easy to troubleshoot installation. **MACHINEMATE** INC also provides its own Modular IO (for 24VDC or analog IO); several field buses are also supported by the control (Interbus-S or Profibus-DP).

"The installation and interface programming portion of the job went extremely well," said Mike. "With only three days training from a **MACHINEMATE** support

engineer, we were able to not only get the machine up and running in that period of time, but learn enough about the control to easily tune it to achieve excellent performance.”

“Based on our experience with other controls, one of the features I like the most is the on-line monitoring of the PLC code that is running the machine,” Carlos said. “It is very easy to debug code using this feature. Integration of the control, both electrical and software, is easy with this product,” he continued. Carlos felt that obtaining training from **MACHINEMATE** is well worth the time commitment. **MACHINEMATE** INC offers a week of training for integrators at its company facilities; this class is held on a regular schedule. In this case, the timing required for Willenborg’s retrofit did not align well with the schedule of classes and the personnel availability so a support engineer visited Carlos for just a few days to help with the initial configuration, near the start of the retrofit project. Carlos then did the interface programming with no further assistance.

After the retrofit activity was completed and the machine was running, the programming and automatic functions were evaluated.

“Our experience so far has been very positive,” says Mike. “The control parameters are easy to understand and set; the display screens are well laid out and the functionality is equal to the top of the line Fanuc or Allen Bradley controls we have used. I am personally very pleased with how rugged the control is. Even though it is a PC running Windows NT, it is designed to be on the shop floor. With other PC-based controls we have used, we had to go to an extra expense to make the systems ‘industrial grade’.” Carlos continues, “The purpose of the retrofit was to test the control, I/O feedback, and some error modes such as loss of feedback and E-Stop circuit loss.” Mike and Carlos are satisfied with the control in these areas. Carlos indicated that there are some areas in which they might alter the control functionality, “such as axis jog and to have the ability to customize the graphic user interface although these areas are not as crucial to us as the reliability of the control itself.”

Retrofit of Warner & Swasey Lathe with **MACHINEMATE**



Willenborg Associates has engineered a retrofit package for the Warner & Swasey line of lathes using the **MACHINEMATE** Control. The kit price is under \$20,000.00 for a complete CNC system that will “Plug & Play” on the Warner & Swasey lathes. This package includes all the necessary hardware (including the **MACHINEMATE** control with its Modular IO), software and documentation for an on-site retrofit of a 2-axis Warner & Swasey (1SC, 2SC or 3SC). The pictures below are from the kit for a 2SC retrofit.



The customer or end-user can install the kit in approximately 3 days with the help of the complete documentation that includes a video! The terminal strips to connect the new control with the old machine are shown at the right (they are clearly numbered though the photograph lacks that detail). This wiring should take just a few hours.

The package price also would include one day of start-up service on the customer's floor by one of Willenborg's technicians (only the air fare and lodging is additional). They also offer nationwide turnkey retrofit services on the end user's floor, as well as in-house way grinding capability and complete machine tool remanufacturing.



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