

Brown & Sharpe VC1000 & VC 1500 Control Retrofits

Customer: Industrial Pattern & Mfg. Co. -- Columbus, OH
System Integrator: MasterControls Inc., L.L.C. (MCI)

Our customer has three Brown & Sharpe Vertical Machining Centers. These machines are between twenty and twenty-five years old. Two of the machines had the original GE 1050 CNC control on them. The other machine had been retrofitted with an older **MACHINEMATE** CNC control some time before the customer purchased it.

As with many older machines, the GE 1050 CNC controls had become outdated and hard to maintain. Reliability was becoming a problem. Machine downtime was increasing so the customer began looking for CNC retrofits. They were happy with the **MACHINEMATE** control on their used machine. This led them back to **MACHINEMATE** when they began looking for a CNC control to retrofit.

MCI was contacted by the customer and asked to provide a complete retrofit solution to the control problem. An engineer from MCI made a site visit to the customer. During this site visit, a thorough evaluation of the project scope was performed. Machine requirements were discussed with the owner and operators. It was important to understand the expectations before the project could be quoted properly. Copies of machine manuals and schematics were collected for further study.

The goal of the retrofit was to reuse as much machine hardware as possible. With this in mind, MCI was able to keep both retrofit costs and installation time to a minimum. The customer wanted to keep the existing axis and spindle drives and motors. MCI also wanted to keep the magnetics cabinet in place to minimize any required rewiring on the machine. By doing this, MCI could build an operators pendant and CNC Control panel off-site and bring the panels to the site for a quick installation.

All of the control engineering and panel building was performed off site. When the retrofit package was complete, a time convenient for the installation was set. The retrofit package was delivered to the customer site and the installation started. Installing the control and operator pendant and doing the wiring in the magnetics cabinet took two to three days. As soon as the installation was powered up and tested, the operator started preparing a part for machining. By the end of the week, the operator was trained and comfortably running parts.

Part programming is done using a CAD/CAM system (SurfCAM). The customer uses the system to generate the programs and then copies the program onto a USB memory stick. This memory stick is then taken to the machine and the program is loaded directly into the CNC. This is another advantage of using a modern CNC. Many standard USB devices can be hooked directly to the CNC. All part programs, tool offsets and machine parameters can be stored to the CNC or saved from the CNC using the external USB device.

The customer uses these machines to produce permanent molds. They machine part patterns out of wood. After the wood pattern is complete, it is sent out and a casting is made from the pattern. The casting then comes back to the shop for finish machining. These parts have complex 3D surfaces and both open and closed pockets. With these applications in mind, MCI decided to use **MACHINEMATE** LW CNC controls for the retrofit. The new CNC controls handle these types of applications very easily.

See the following pages for photos of the installation and a quick overview of the project scope.

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Pattern Machining

Notice the complex surfaces and pockets on this pattern. The control is very fast! Block processing is amazingly fast so you never see transitions or pauses during the execution of the part program. This yields extremely accurate parts with very smooth contours and surfaces.



Casting Machining

Again, notice the complex surfaces being machined. These surfaces are being generated in the customer's CAD/CAM system. The geometry is then processed through a post processor and the part program is generated. Once the part program is generated, it is copied onto a USB memory stick and taken to the machine and loaded into the control. The operator sets the part up, loads the tools, and starts the auto cycle.



New Operator Pendant

This picture shows the new operator pendant. You can see the pendant on the machine next to this one. That machine has also been retrofitted. Looking toward the back of the shop, you can see the one remaining control that has not been retrofitted. The retrofit for that machine is scheduled and when completed, all three machines will have the same Operator Panel and control package installed.



New CNC Enclosure

This new CNC really makes for a clean and compact installation. The CNC and I/O are easily accessible for maintenance and troubleshooting.

Quick Project Overview: CNC

MCI replaced the existing CNC control with a new **MACHINEMATE** LW CNC control. The new control represents the state-of-the-art in modern CNC controls. The control has an intuitive operator interface. This intuitive interface enables the operators to perform quick set-ups and adjustments. The customer loves the ease of use. The control allows part-programs to be loaded via USB memory stick. No more looking around for a floppy drive. Part-programs execute from the customer's CAD/CAM system Post Processor unmodified.

Another important feature of the control was the ability to implement "AutoDrift Compensation". Older axis drives tend to have problems with motor drift. By setting up and enabling "AutoDrift Compensation", MCI was able to eliminate axis drift and optimize drive tuning at the same time.

Operator Panel

A new Operator Panel was installed on the machine in a new pendant. The operator panel includes a 15" touch screen, rugged keyboard and mouse.

Drives

The customer wanted to keep the original GE HI AK Drives. These drives can be replaced later if necessary. The **MACHINEMATE** CNC is equipped to control a very wide variety of Analog and SERCOS Drives.

Position Feedback

Newall Scales (1 micron) were added for feedback. Resolver feedback is not compatible with the new **MACHINEMATE** CNC control. If resolvers are used for feedback, a converter must be added in the feedback loop to convert resolver feedback to encoder feedback.

Magnetics

The magnetics cabinet remained in place and was largely unmodified. Some small wiring modifications were required by the retrofit.

Field Devices

All existing field devices were implemented in the retrofit. None of the limit switches, solenoid valves, lamps, etc. required replacement.

Tool Changer

The customer removed the tool changer. There were mechanical reliability problems with the tool changer, so it was removed. If the customer wishes to add it back in the future, the CNC has I/O available and is capable of controlling it.

Installation Time

The new controls were installed in two to three days. This time included power-up, testing and machine checkout. Once the installation was completed, part set-up began.

MCI was training the operators and running parts by the end of the week.

Integration time

Integration time included producing machine schematics, creating a Bill of Material, ordering and receiving all the hardware, building the required panels for the CNC and the operator panel, writing all the machine logic and configuring all the machine parameters. This typically takes six to eight weeks from the time an order is placed to installation.