



Torreda Wood Lathe Control Retrofit

System Integrator: MasterControls Inc., L.L.C. (MCI)

MCI was contacted by an end user in the Mill Works industry. This user manufactures handrails, balusters, posts, newels, treads, risers, and many other wood products. They owned a Torreda CNC lathe which they had purchased some years back. This lathe was used for not only turning, but also detailed fluting and routing patterns. The main PC on the machine had been destroyed by a lightning storm, and they were unable to get the system back up and running. At this point they contacted MCI for a possible retrofit solution.

Torreda had originally developed the CNC system, but was no longer supporting the software or hardware in the system leaving users with long term support issues. The system was capable of machining complex shapes, but had various limitations.

- Setup time was quite lengthy and difficult
- New operator training was quite hard
- There were a limited amount of operator controls on the system
- On-the-fly feed changes were not possible
- Part setup was limited to screen entry fields
- System used open-loop step and direction commands to the servos
- System repeatability and accuracy was not very good
- System positioning was not smooth
- Documentation was limited
- Part profile storage and backup was lost
- System networking was limited

Based on the original system limitations MCI set out to provide the customer with a solution that would address all the limitation of the original Torreda CNC system. MCI's solution consisted of a turnkey retrofit using a NUM CNC system. This retrofit allowed MCI to reuse the customer's existing Emerson servo drives and the original control cabinet. The NUM CNC system allowed MCI to provide a high end CNC solution that boasted the following enhancements:

- Short setup times
- Minimal operator training
- The addition of spindle and feed override controls
- The addition of a portable handpulse generator pendant for manual positioning and machining
- RS274 programming standard (G-Code) allowing for no limitation to programming flexibility
- Closed loop servo control with following errors of less than .0001"
- Smooth machine operation due to the closed loop servo control
- Much quieter machine operation
- Higher feedrates and rapid rates
- Full system documentation with new prints developed for system retrofit
- Unlimited program storage
- Easily networkable through PC front end. Industrial PC front end with Flash memory



All of the control engineering and sub-panel build was done 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 new subpanel, CNC Control, Operator's Panel, and doing the wiring in the magnetics cabinet took about two days. When this work was completed we began powering up the machine and checking it for functionality. We worked with customer personnel during this phase of the project so they would become familiar with the new control and become comfortable operating the machine from the new panel.

MCI develops solutions with the future in mind. We develop machine logic and machine functions in a way that can be reused on new applications. This helps us complete our projects on time. We also go to our customers with code which has been tested for reliability over and over. Our approach is what sets us apart from other system integrators. Additionally, having a vendor like NUM willing to partner with us on complex applications makes us comfortable taking on these types of projects.

Please see the following pages for photos of the installation and a quick overview of the specific project tasks performed by MCI.

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Application Pictures:**Operator Panel**

Operator Panel with 15" Screen with full membrane keyboard. Note original keyboard, mouse, and external USB port were reused to save on overall project expense.



Inside Main Enclosure- Upper half

Here is a view of the prewired CNC system panel that was installed in the original Torreda enclosure.



Inside Main Enclosure- Lower half

In the upper left can be seen the new system IO. These boards were installed where the original CNC board was mounted. Note that existing drives can be seen at the bottom of the picture. These drives were rewired and reprogrammed to allow for closed loop control of the system.



New Operator Controls

Easily accessible operator controls were installed to aid in setup and dynamic machine adjustment.



Quick Project Overview:

CNC

MCI replaced the existing CNC control with a new NUM CNC control. The new control represents the state-of-the-art in modern CNC controls allowing for standardized RS274 programming. The control has an intuitive operator interface. This intuitive interface enables the operators to perform quick set-ups and adjustments.

Programs can be written at the machine or transferred via network or USB stick. Both spindle and C axis operations are supported via switchable M-codes. Available as control options are fluting and U axis following of X master.

Operator Panel

A new Operator Panel was installed on the machine in place of the old VGA monitor. The operator panel includes a 15" LCD Monitor with full membrane keyboard. This panel allows the operator to select mode changes, offset modifications, program transfer and edit, and support functions.

Drives

The customer kept the original Emerson Drives. MCI reprogrammed the drive system to support closed loop axis control instead of open-loop step and direction. The NUM CNC is equipped to control a very wide variety of Analog and Digital Drives.

Axes

This Torreda lathe had four CNC axes. The machine was set up to have three decimal places of accuracy when running parts in the metric system and four decimal places of accuracy when running in the inch system.

X-Axis	Diameter
U-Axis	Diameter slave
Z-Axis	Traverse
C-Axis	and or spindle

Magnetics

The magnetics in the cabinet remained the same. The CNC panel and IO boards were mounted in the enclosure replacing the old CNC system.

Field Devices

Almost all existing field devices remained in place for the retrofit. Only the home switches were replaced on the machine. The I/O was connected to the new CNC through terminal strips on the NUM I/O boards.



Installation Time

Upon arrival on site, we intended to run parts with the old control to establish a base-line. However, the customer was not able to get the control powered up. Since we couldn't get the control powered up, we started removing it. We took all the old control hardware out including the CNC, VGA monitor, and original PC. We sorted out the wiring and removed all the wiring that would not be reused. We then installed the new Operator Panel and CNC sub-panel. After these were installed, all the wiring was landed to the new sub-panels and verified. When the wiring was complete, we began powering up and testing the new control. By the end of the 3rd day on site, we were running dry-cycles on the machine and ready to run parts. After we were confident that the machine was running properly, we started testing the part programs and running parts to check for quality and consistency.

Integration time

Integration time included producing machine schematics, creating a Bill of Material, ordering and receiving all the hardware, building the required sub-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.

Documentation

NUM produces complete documentation for integrators and end-users. A complete set of manuals was provided to the customer. In addition to the Operator's Manual, a full set of Electrical Schematics (AutoCAD Format) were provided to the customer. We can store a copy of all documentation on the control. Operators, set-up and maintenance personnel can have immediate access to all documentation right at the machine.