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Phase 2 Equipment Upgrade

c-Link Systems, Inc.

OHTS

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Introduction/Abstract

This document is intended to familiarize the reader with the 2nd phase of the creation and implementation of a robotic, Computer Integrated Manufacturing, Process controls course for high school level students. This phase is adjusted to the Oxford Hills Technical School (OHTS) but can be modified to fit most educational institutes.
Included within the document are links to the third party vendors.

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Primary Focus

Project Reason

The creation of a curriculum in the robotics arena with all the secondary facets is but a meager portion of the encompassing picture. The lectures, text books and imagery conveys little without supporting equipment for actual hands-on experience. The added program concept of a classroom factory equipped with machine cells and robots has energized the students.

Impediments

The OHTS project had the support of a myriad of equipment available. Being available is not the same as functioning or implemented system. As with many learning institutions the equipment was acquired years in the past and from a company "designed for educational purposes", that in actuality created a total propriety system. Issues with this concept are dependent on instructor/maintenance background, funding and the ability to upgrade. As with the case of OHTS the CNC (Computer Numerically Controlled) mills and lathes are primarily first generation. This brought a multitude of issues that actually put most equipment out of commission. Some of the issues are as follows:

1. Age of equipment and the inconsistent preventative maintenance.
2. Components of each unit large and bulky by todays standard.
3. Failed/non-repairable components.
4. Proprietary components.
5. Ineffectual documentation for repair and usage.
6. High cost of upgrade and/or yearly maintenance.

7. A need for PC interface card, proprietary
8. A PC with windows operating system (version 95/98)
9. The need for other custom software to interface between the human and the machine software.
10. Inability to interconnect via a network
11. Funding

This list could become a novella on it's own. Suffice to say that this list portrays a rather vivid image.

The Epiphany

The primary function of c-Link Systems (cLS) as an entity is the design and implementation of robots and their supporting sub products. Motor control systems abound within the cLS lab and production area. This generated the idea for total retrofit of all CNC equipment to the level surpassing what the designing vendor had in mind.

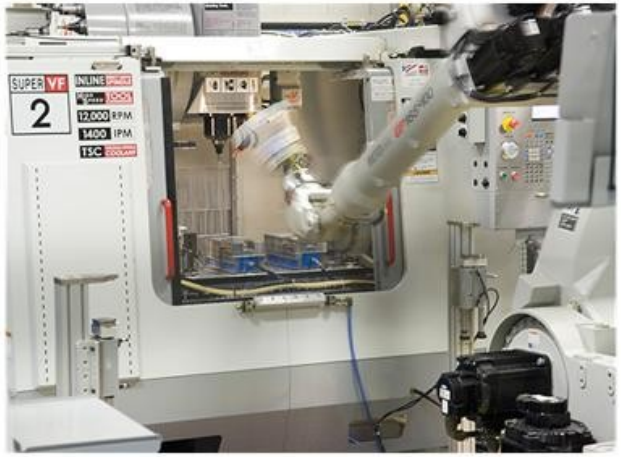
The overall requirements for driving this phase were:

1. Maximum number of units made operational.
2. Minimum budgetary impact.
3. Open Source or COTS (Commercial-off-the-shelf).
4. Low maintenance Operating System.
5. Low/No cost operating system and support software.
6. Student accessible for training.
7. Secondary function is Ethernet or other standard capable.
8. Tertiary function being the consolidation of all CNC standalone systems into one equipment rack.

The hardware selected allows for interchangeability in the case of a failure.

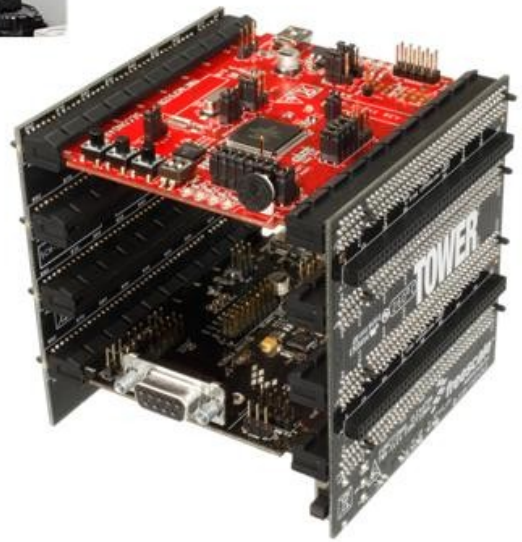
The following graphical plates depict the difference between what was the OEM configuration and the proposed configuration.

OHTS Project
Phase 2 – Equipment Update
Monday, February 06, 2012



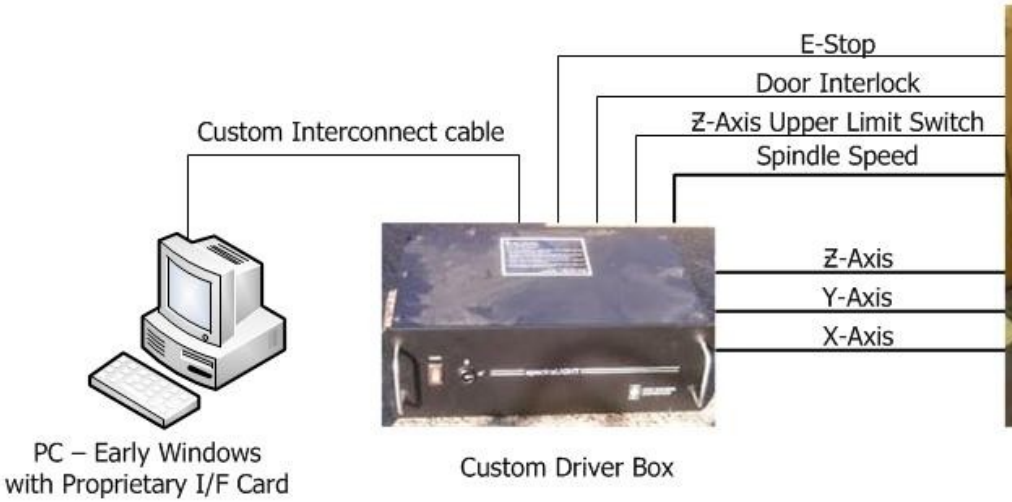
Industrial Robotic Cell

Educational Robotic Arm



Open Sourced Controller – Tower System

OHTS Project
Phase 2 – Equipment Update – CNC Mill (currently)
Monday, February 06, 2012

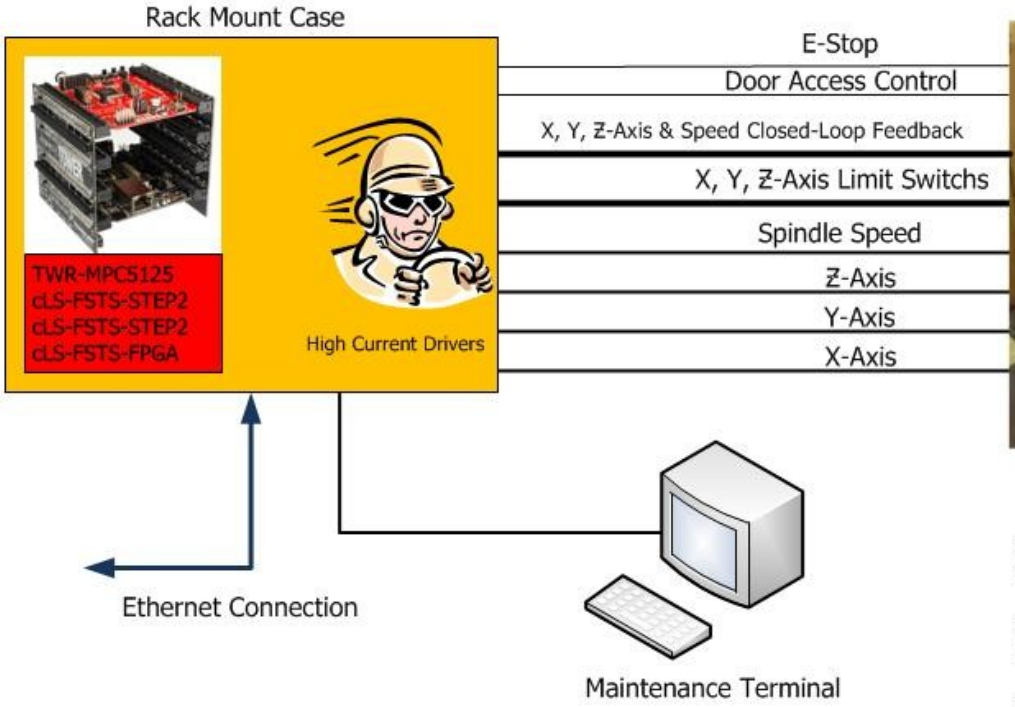


Light Machines – CNC Mill

Safety case – With flip-up front cover

Stepper drivers and feedback interface is on a proprietary circuit card set within rack mount enclosure.

Supporting PC has custom software and proprietary interface card.



Light Machines – CNC Mill

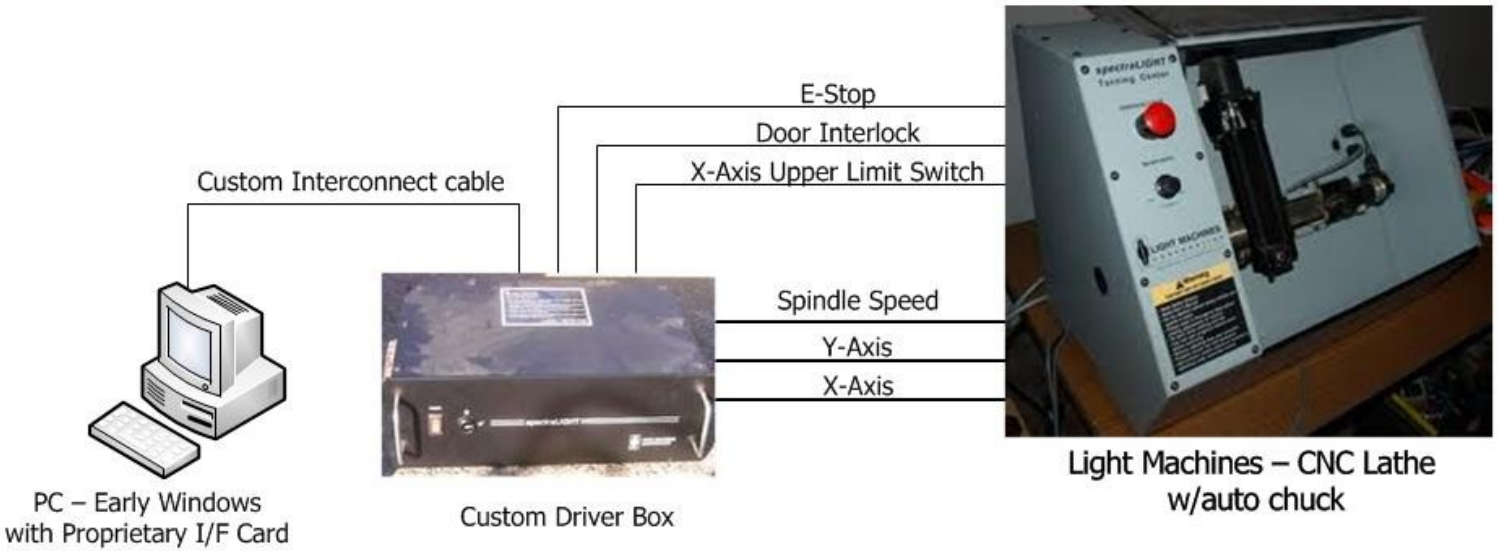
Safety case – Case redesign for full enclosure and automated opening for the robot

Stepper drivers and feedback interface is within rack mount enclosure. Open-Source designed

Supporting PC functions handled via TWR-MPC5125 and a networked PC is used for monitor/control.

Maintenance Console.
Built-in Homing Program.

OHTS Project
Phase 2 – Equipment Update – CNC Lathe 1 (currently)
Monday, February 06, 2012

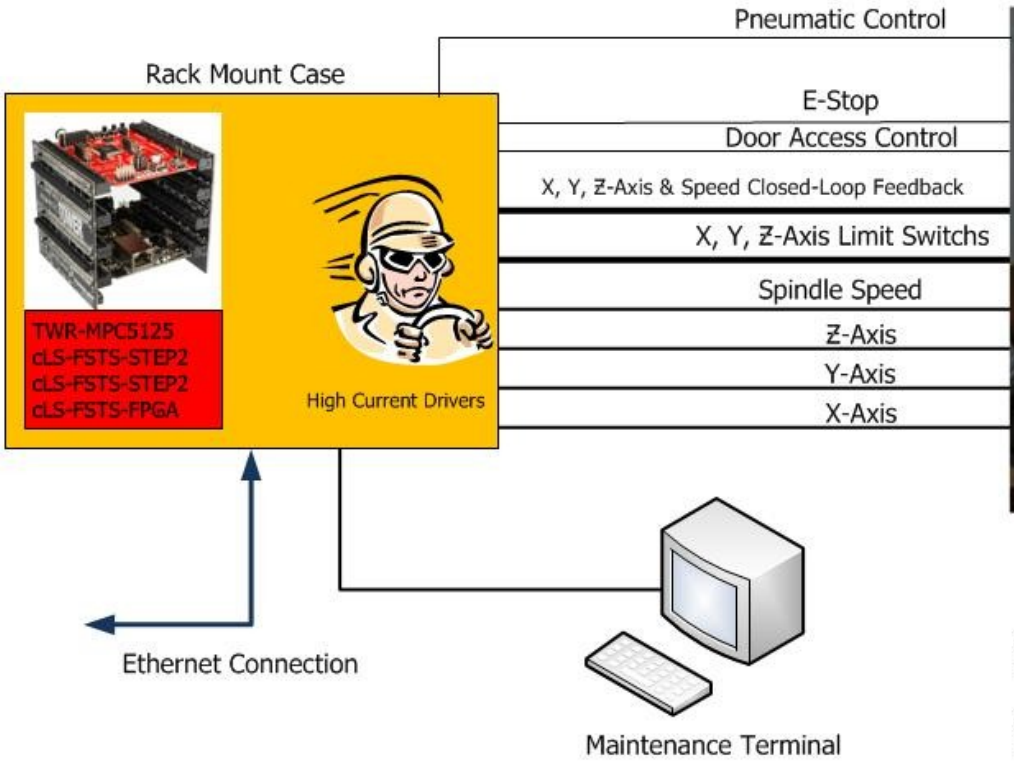


Light Machines – CNC Lathe w/auto chuck

Safety case – With flip-up front cover

Stepper drivers and feedback interface is on a proprietary circuit card set within rack mount enclosure.

Supporting PC has custom software and proprietary interface card.



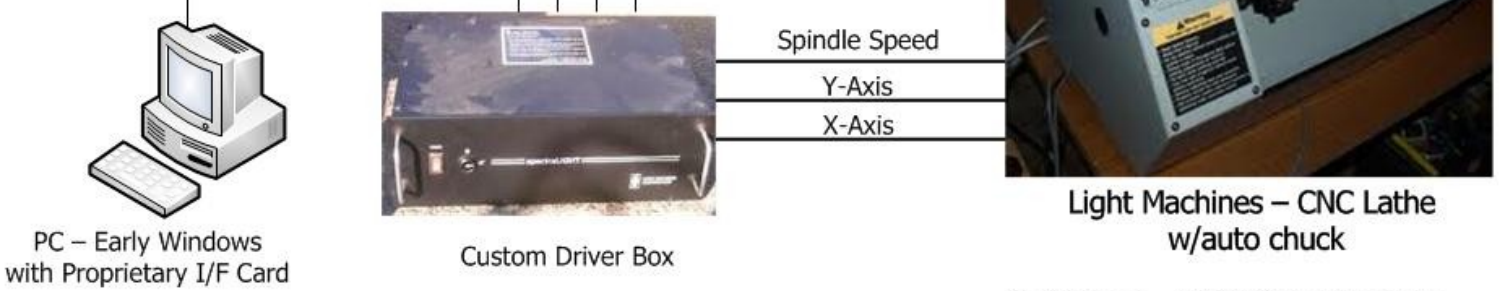
Light Machines – CNC Lathe
w/auto chuck

Safety case – Case redesign automated opening for the robot

Stepper drivers and feedback interface is within rack mount enclosure. Open-Source designed

Supporting PC functions handled via TWR-MPC5125 and a networked PC is used for monitor/control.

Maintenance Console.
Built-in Homing program.

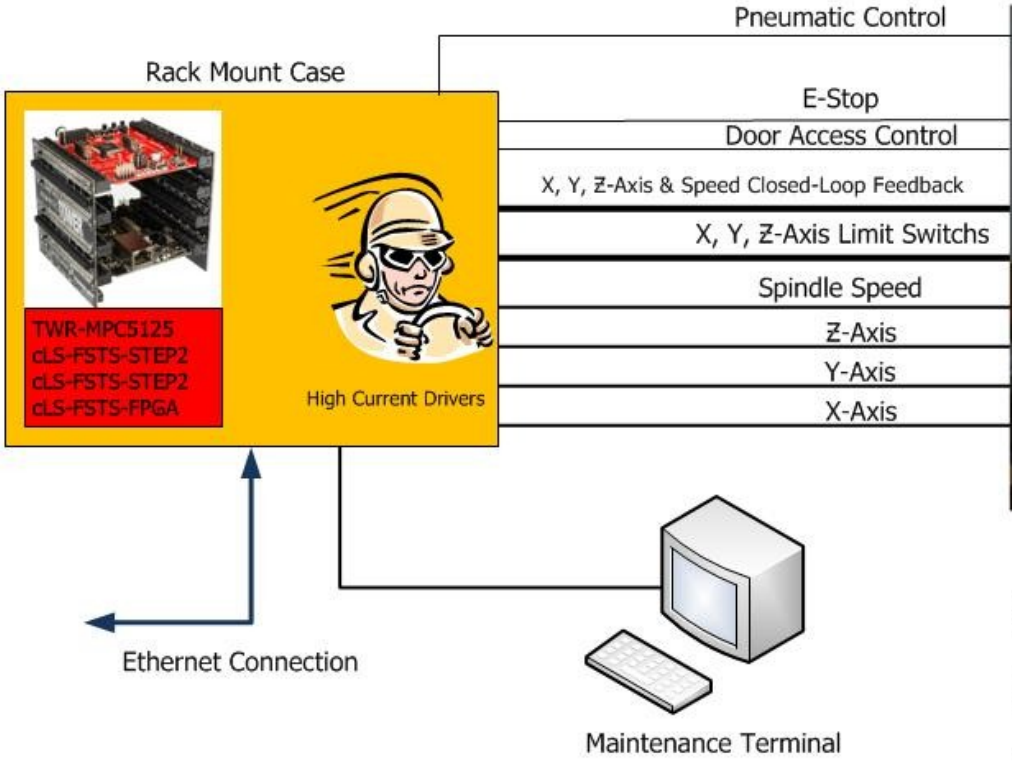


Light Machines – CNC Lathe w/auto chuck

Safety case – With flip-up front cover

BLDC drivers and feedback interface is on a proprietary circuit card set within rack mount enclosure.

Supporting PC has custom software and proprietary interface card.



Light Machines – CNC Lathe

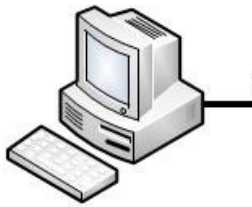
Safety case – Case redesign for automated opening for the robot

BLDC drivers and feedback interface is within rack mount enclosure. Open-Source designed

Supporting PC functions handled via TWR-MPC5125 and a networked PC is used for monitor/control.

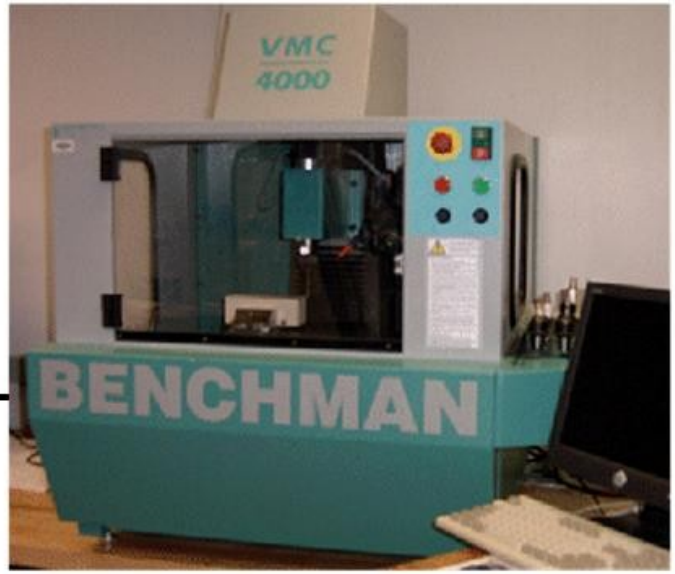
Maintenance Console
Built-in Homing program.

OHTS Project
Phase 2 – Equipment Update – Benchman (currently)
Monday, February 06, 2012



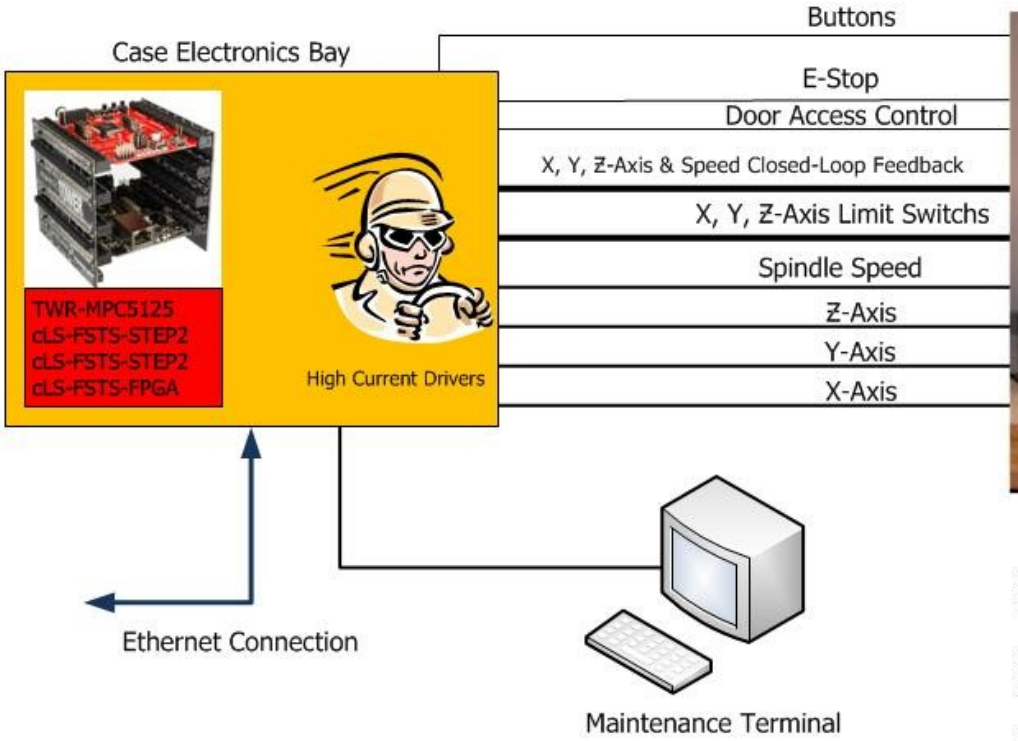
Custom Interconnect cable

PC – Early Windows
with Proprietary I/F Card
and software



Light Machines – Benchman CNC Mill

Servo drivers and feedback interface is on a proprietary circuit card set within the mill enclosure.
Supporting PC has custom software and proprietary interface card.



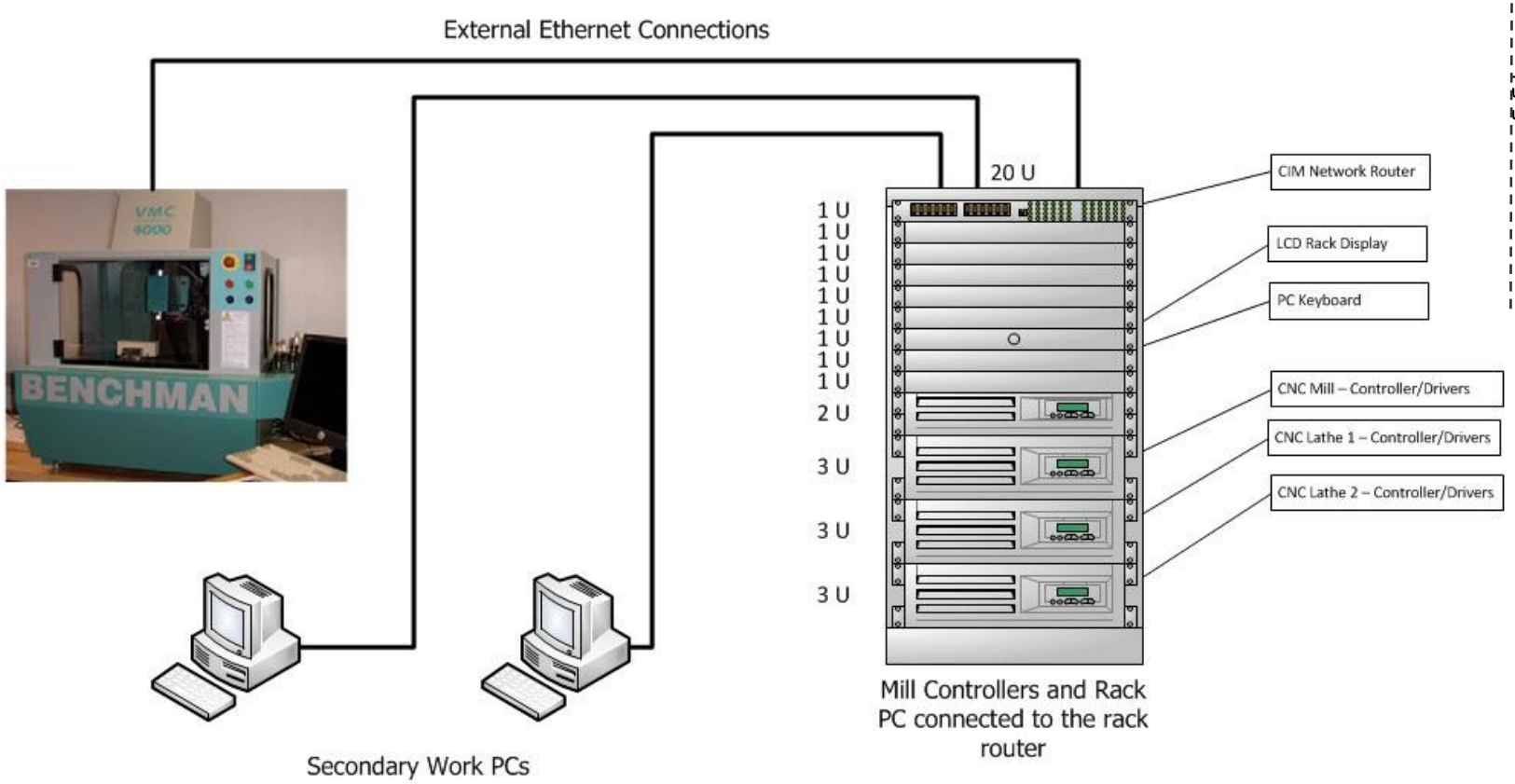
Light Machines – Benchman CNC Mill

Safety case – Case redesign for d automated opening for the robot

Servo drivers and feedback interface is within mill enclosure. Open-Source designed

Supporting PC functions handled via TWR-MPC5125 and a networked PC is used for monitor/control.

Maintenance Console.
Built-in Homing program.



Synopsis/Conclusion

With an ever changing world of electronics and the economic world fluctuating systems and equipment cannot be dedicated to one narrow function. This phase change will bring longer life to the equipment of this educational institution and any other who uses the concept. c-Link Systems is striving to maintain a low cost advanced platform to which additions and upgrades can be performed.

Corporate Brief

For the past seven years c-Link Systems, Inc. has focused on industrial control/ automation of process lines in metal rolling and paper mills. Out of this emerged our expertise in Industrial Robotics and high speed fiber optic communications. A previous background in mechanics, dynamics and satellite guidance systems has positioned the company to support our customers in the growing field of robotics as it relates to autonomous robotic vehicles (ARV) with numerous commercial/industrial applications.—SEA

References Links

TWR-MPC5125—MPC5125 MPU Industrial Networking, Automotive and HMI Module

TWR-MPC5125

Tower System— Overview

Tower System

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