

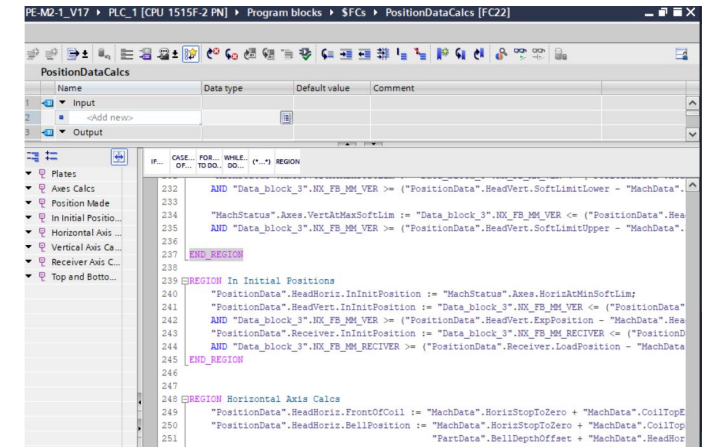
Controls & Embedded



PLC program support – Case Study

- A leading manufacturer of machines producing Heat exchanger coils for the HVAC industry in the US approached MNES to test and validate PLC program for their new machines.
- MNES converted the outdated program to the latest TIA portal version.
- We upgraded and optimized the program with functional blocks, tested and validated for seamless operation of virtual & physical machine.
- MNES tested the program in virtual PLC after which functional validation was performed in the physical PLC for efficient working of the machine.
- With our PLC support, the customer was able to identify & rectify errors during the program development stage before the commissioning of the machine.
- The customer saved 30% of their program development time.

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```
PE-M2-1_V17 | PLC_1 [CPU 1515F-2 PN] | Program blocks | SFCs | PositionDataCalcs [FC22]
PositionDataCalcs
Name      Data type  Default value  Comment
1 Input
2 <Add new>
3 Output

#... CASE_FOR... WHILE... (*...*) REGION
232 AND "Data_block_3".NX_FB_MM_VER >= ("PositionData".HeadVert.SoftLimitLower - "MachData".
233
234 "MachStatus".Axes.VertActMaxSoftLim := "Data_block_3".NX_FB_MM_VER <= ("PositionData".Hea
235 AND "Data_block_3".NX_FB_MM_VER >= ("PositionData".HeadVert.SoftLimitUpper - "MachData".
236
237 END_REGION
238
239 END_REGION In Initial Positions
240 "PositionData".HeadHoriz.InInitPosition := "MachStatus".Axes.HorizActMinSoftLim;
241 "PositionData".HeadVert.InInitPosition := "Data_block_3".NX_FB_MM_VER <= ("PositionData"
242 AND "Data_block_3".NX_FB_MM_VER >= ("PositionData".HeadVert.ExpPosition - "MachData".Hea
243 "PositionData".Receiver.InInitPosition := "Data_block_3".NX_FB_MM_RECIVER <= ("PositionD
244 AND "Data_block_3".NX_FB_MM_RECIVER >= ("PositionData".Receiver.LoadPosition - "MachData
245 END_REGION
246
247
248 END_REGION Horizontal Axis Calcs
249 "PositionData".HeadHoriz.FrontOfCoil := "MachData".HorizStopToZero + "MachData".CoilTopE
250 "PositionData".HeadHoriz.BellPosition := "MachData".HorizStopToZero + "MachData".CoilTop
251 "PartData".BellDepthOffset := "MachData".HeadHor
```



Shaft & Tube Assembly Machine

Business Drivers

- To design a machine to help the operator assemble the product without error in assembly using the Poka-Yoke error proofing technique.

Solution

message to alert the operator, suggestive messages on HMI to help operator prepare for the next action.

PLC and HMI Details: Mitsubishi PLC: FX5U-16EX/EU, Mitsubishi HMI: WTBD GS2107

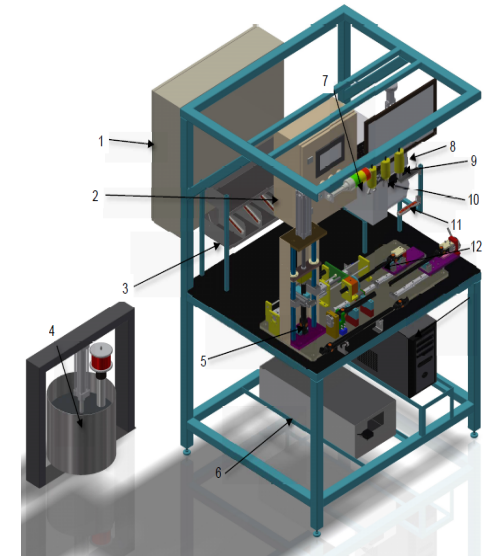
Major Devices and Operator Controls: HMI Operator Pendant, Cycle Start Operator Pendant, Barcode Printer, Scanner PC.

Modes of Control: Manual Operation, Assembly Sequence, Greasing Sequence

List of Safety Devices: Emergency Push Button, Safety Curtain.

- Any new operator can get familiar with the machine with the assistive messaging on HMI, so that he/she can get familiar with the system after couple of operations and get trained quickly.

Results



No.	Description
1	PLC Panel
2	HMI Panel
3	Bin Pickup Sensor
4	Grease Tank
5	Tube Assembly
6	Rejection Bin

Controls & Automation: Process Control System

- Designed and developed an automatic batch system for 40 Cu.meter plant using Siemens S7 controller
- 6 aggregates and 2 additives were considered
- Independent control processors were employed for cycle and batching controls
- Digital filters were employed at each of the aggregate weigh scale to minimize errors due to mechanical vibrations and to control fine batching at the end
- Batch automated print reports and history
- Provided interface options for higher end systems.
- Visualization was developed with VisiWin and custom VB6 controls.



Chain Industry - Smartlink Variants

Software Development

- Function: Wear Monitoring System function on LIVIUS, WinCE Platform
- Managed (.NET/C#) and Native (C, C++) based development
- Real Time data acquisition
- Installation and Auto Upgrade



SW Windows OS

- Storage: NAND, SD/MMC
- Connectivity: RS 232/485, Ethernet, USB, GPRS/GSM /3G, CAN.
- Sensor & actuator Interfaces: GPIO, ADC, DAC, UART
- User Interface: Telnet - command line interface.