Purpose and Overview

Nexteer's PLC logic library, Single Station, Multi-Station, and Dial Table examples, as well as HMI files have been updated. Nexteer's expectation is that our suppliers and designers have first reviewed SD-1020 and SD-1032 to have a level of understanding prior to reviewing this What's New document.

The purpose of this What's New document is to showcase significant changes to Nexteer's logic library and HMI files.

The What's New document includes two sections:
- Frequently Asked Questions
- Companion File Revisions

NOTE: The Nexteer logic library routines and HMI screens must be modified and designed by the OEM to match their machine application.

Frequently Asked Questions (FAQ)

- What is Nexteer's recommended starting point for an OEM designing a machine's PLC Logic?
  - It is recommended that the design start with a new PLC logic file configured to match the applications PLC type and I/O configuration. Nexteer Library routines should be exported and imported into the new machine file (or copy and paste).
  - The design should use the single station and multi station examples as a reference to help understand Nexteer's expectation of design philosophy and structure.
  - Nexteer library routines must be modified to match the machine application.

- How do I know which example to reference – the single station or multiple station?
  - Nexteer believes the real question pertains to those types of machines that fall into a grey area between a single station machine and a multiple station assembly line. Grey area machine might be dial tables or a two-station machine.
  - For these grey area machines Nexteer does not require the use of one reference or the other.
  - As an example: A simple dial table (with few stations and only one operator HMI) may be designed based on the single station reference with a single program, with controller scope tags, and with separate sequence routines for the index and for each of the stations. Conversely, a larger dial table (with several stations or multiple HMIs) may be designed based on the multiple station reference since the design-ease and maintenance-ease would warrant the use of multiple programs and program scope tags for each of the station.

- What about "duplicate" projects or "copy-jobs"?
  - A large portion of machines that are currently considered "duplicate" or "copy" are not exact copies of previous machines. Instead, the prior machine information was provided as a reference or "similar-to". Designs should be approached as a new machine. Sections of the reference machine may be used to provide import logic (sections such as sequence rungs, or fault rungs/routines) inserting into the new machine program and routines. The new machine logic must include the functions required from the new Nexteer SD-1032 and updated Library.
  - The logic expectations and requirements for exact copy machines must be discussed between the Nexteer controls engineer, the Nexteer purchasing engineer, and appropriate OEM personnel.

General Logic File Updates

Logic Studio 5000 Version Level
The logic files use Studio 5000 (Logix Designer) Version 32.

MultiStation Example File – MainTask changed to Continuous type.
The MultiStation example logic program's MainTask was changed to be a Continuous type task instead of the previous Periodic type. The 5380 and 5580 controllers have quad-core processors with a dedicated processor for handling communications. The 5370 and 5570 controllers shared resources on a single processor and required the use of a Periodic task to allow time for the controller to process communications.

Traceability Permission Lookups
The MultiStation and Dial Table example logic programs were updated to include permission lookups and sending of results to traceability system. This approach was a direction change to move to using the traceability system for all part permission requirements instead of relying on pallet array shift registers and dial table indexing of data.

Logic Library Updates

Add-On Instructions (AOIs)

- **AOI_NX_Festo_IOLink_BNI_V1**
  Created AOIs for the use of Festo IO-Link valve manifolds.

- **AOI_NX_LotTrackingJFK_V2_1_3**
  Updated AOI to provide additional data back to PLC based on requests from global plants. Supplier Name and QADID tags were added as part of the request.

- **AOI_NX_TraceNameBuilder_V2_1_7** and **AOI_NX_TraceDataBuilder_V2_1_7**
  Updated AOIs to align with the update of the R26_Trace_V2_Station routine changes for the Test Cycle function being added.

- **BMC_AOI_PROC_BNI00CR**
  Added the Balluff Metal Input Block AOI to the logic library for use as needed. BNI00CR input block is the replacement for the obsolete BNI0039 metal input block.

User-Defined Data Types (UDTs)

Nexteer Defined UDTs
- **NX_FANUC_InputData_V3** and **NX_FANUC_OutputData_V3**
  Updated the FANUC robot UDTs for compliance with SD-1040 updated UOP and DI/DO mapping.

- **NX_Traceability_V2_1_7**
  This UDT was updated based on the Test Cycle function being added to the R26_Trace_V2_Station routine.

Application (user) Defined UDTs

- **u_ModelSetup**
  The model setup UDT was updating for the dial table example program to include the Program and Revision tags to be consistent with the logic library and the standard HMI model setup screen.

- **u_EPVSetup**
  The EPV setup UDT was added to allow for individual EPV part setup parameters based on the EPV part being ran. This UDT was required based on the addition of the EPV routines.

- **u_FANUC_DigitalInputs** and **u_FANUC_DigitalOutputs**
  The FANUC digital I/O UDTs were updated due to plant feedback to only show the digital input and output numbers matching the robot configuration and not include an abbreviated tag name in place of the input or output number. The description for each will still include the functional meaning of each.

- **u_AtlasCopcoPF6000_InputData** and **u_AtlasCopcoPF6000_OutputData**
  These UDTs were added to accompany the R38_Screwdriver_PF6000 routine that was created to interface with the Atlas Copco Power Focus 6000 controller.

- **u_PalletControl**
  This UDT was added to provide additional members to be used in the R07_OutputMotions_PalletControl routine.

- **u_PROMESS_InputData** and **u_PROMESS_OutputData**
  These UDTs were added to accompany the R34_Press_PROMESS routine that was created to interface with the Promess MotionPro and UltraPro controllers.

Logic Library Routine Updates – MainProgram

R00_Main

Removed the Allen-Bradley Armor Block "Bx" CPS instruction from the Main routine in the logic library as well as all fault logic related to the device.
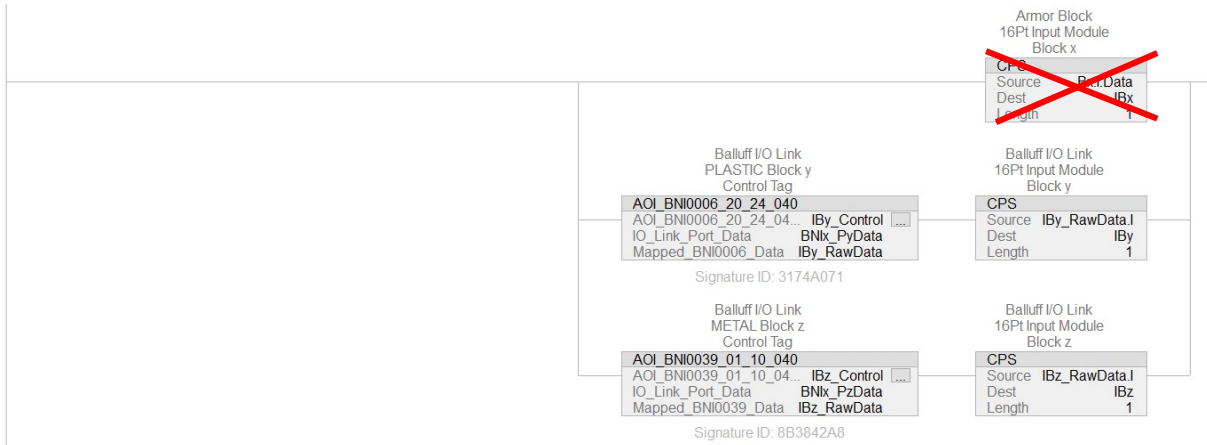

R00_Main

Added an example rung for mapping output motion tag addresses to a Festo IO-Link valve manifold. This was added as an option to replace the standard MP1 discrete hardwired valve manifolds.
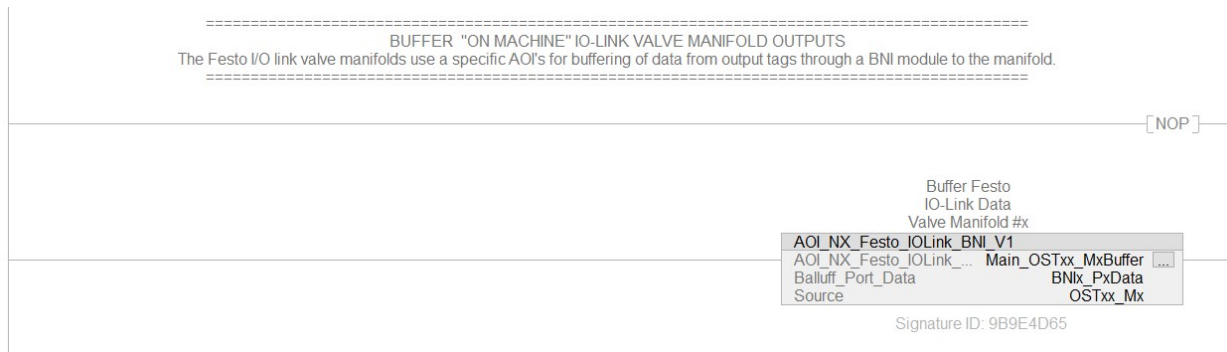
R03_Cycle

The All Motions Returned rung was updated to use the Output Motion Completed conditions instead of the actuator returned position sensors. This will require a Return All command after an E-Stop condition to ensure that all outputs are re-enabled and securely held in the initial (Home) position prior to allowing the machine cycle to start. Logic example files were updated as well.
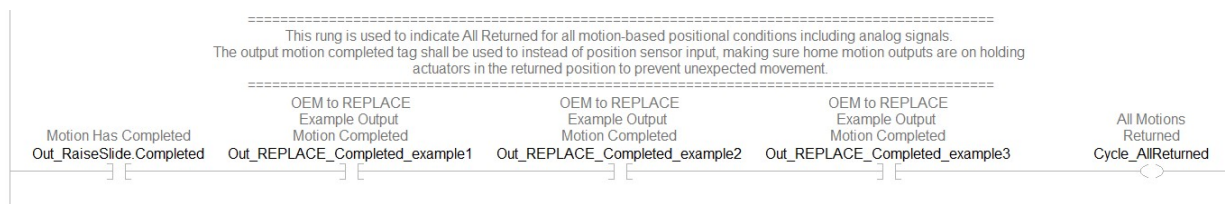
R05_Sequence

A *Cycle_ResetAllMemories* instruction was added to the *Seq_ResetSequence* rung to also reset the machine sequence step logic. Being each completed sequence step is sealed in and considered a memory status, it was determined that this condition was required to make sure they were reset. This will also aid in addressing unforeseen abnormal machine sequences or conditions that may not properly reset the sequence.

R08b_Fault_ImmedStop

Added example fault for Herion Blocking Valve OK diagnostic logic. The Herion valve is on a high percentage of our machines and therefore is appropriate to add the fault as a standard example in the logic library and the Single Station example program.

R08a_Fault_Control

Updated the **Dial Table** example to have individual **StaX** immediate and cycle stop fault arrays. This allows for better segmentation and organization of faults around the dial.
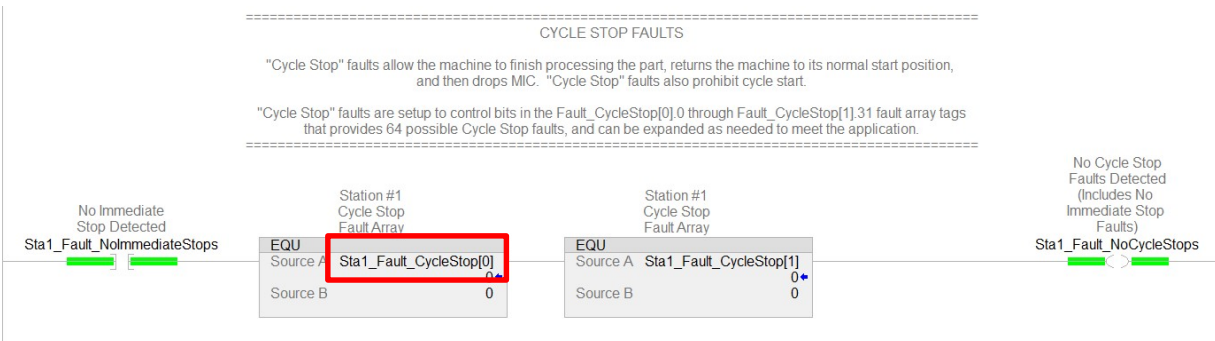
R21_ShiftTimes

Updated the Shift Times routine to set the appropriate Shift Active tag during a machine power up. The previous logic would only set the shift active OTE when the shift start time was reach, not necessarily if the machine powered up while in the middle of a shift.
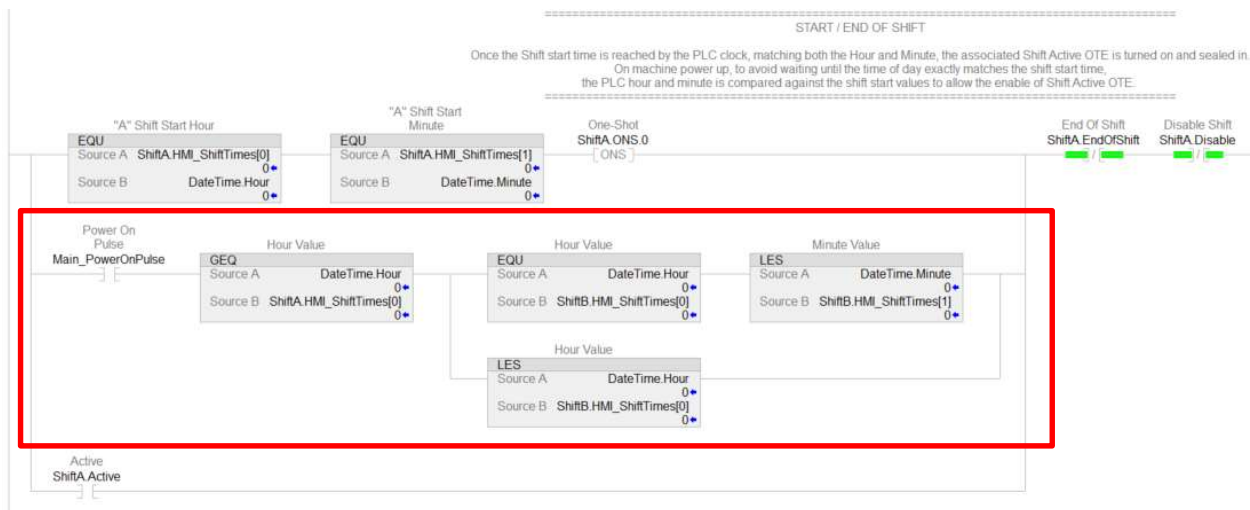
Logic Library Routine Updates - LIBRARY_Routines

R03_Cycle_TOOLS

The Cycle Tools routine was updated to include an example of Station Armed logic, which was only contained in the Multistation logic example.

R03_Cycle_TOOLS

The Cycle Tools routine was updated to include an example of Continuous Cycle Start, MIC, and Cycle Stop logic, which was only contained in the Multistation logic example.
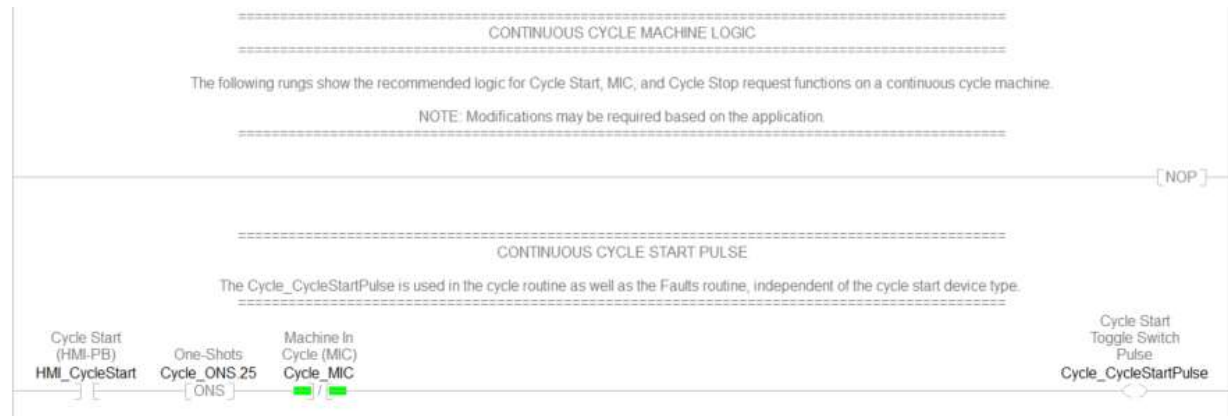
R03_Cycle

The Cycle routine was updated to include pallet release conditions for conveyor control in the Multistation example program. This logic is application specific and only an example is shown.
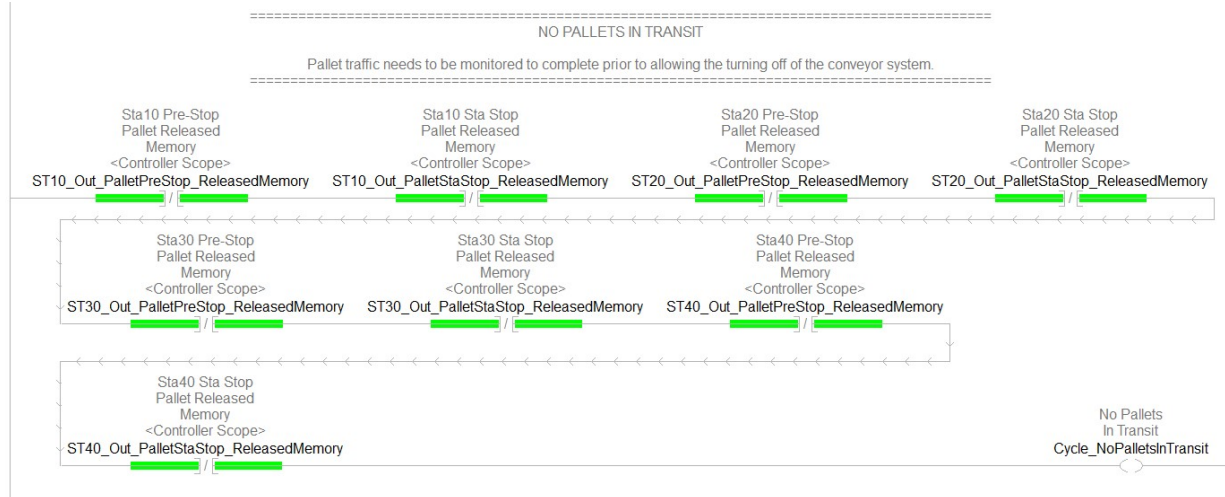
R03_Cycle

The Cycle routine was updated in the **Dial Table** example program to use the global *Cycle_AbortPulse* tag in each stations Cycle routine instead of the previous individual *StaX_HMI_AbortCycle*.
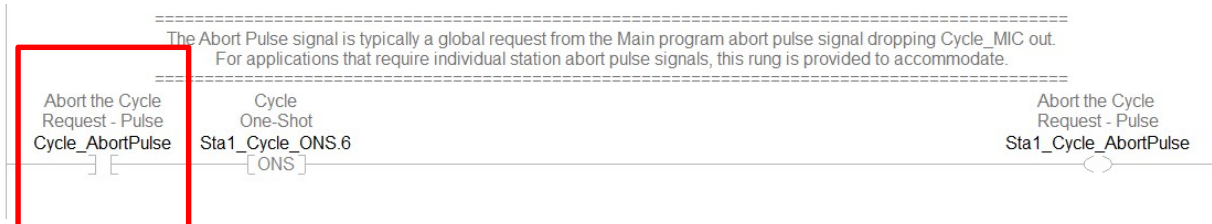
R05_Sequence_TOOLS

Provided an example of rungs using a DINT tag *Seq_StepNumber* to store the last sequence step the machine completed. These branches can be added in parallel to each sequence step OTE for troubleshooting purposes only. Step numbers may contain alpha-numeric codes and therefore the tag may have to be a STRING datatype.
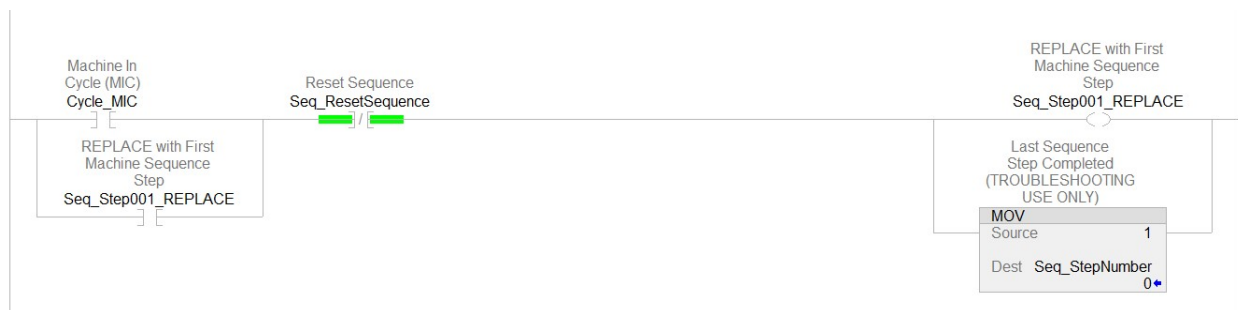
R07_OutputMotions_PalletStops

The Pallet Stops routine was updated to use the *u_PalletControl* UDT and includes additional pallet released conditions for conveyor control. The use of this UDT allows for a more modular use for this routine. This routine was updated in the multi-station logic example.

UDT
- u_PalletControl
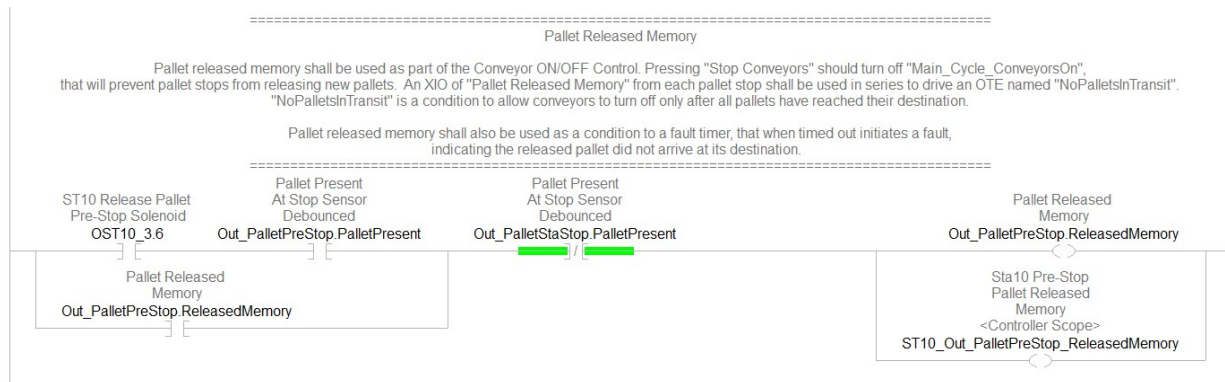
R08b_Fault_ImmedStop

The Dial Table Not In Dwell fault condition was updated in the **Dial Table** example program to use a One-Shot in the logic. The fault was causing problems when a dial table is stopped mid index. The fault was always on and the only way to recover was manually jogging the table. This can lead to issues if the operator does not know how far to jog.
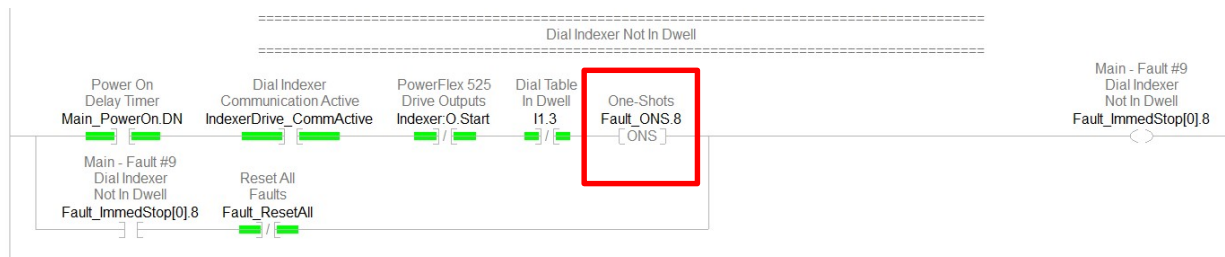
R09e_LotStatus

The Lot Status routine was updated to use the new JFK status tags for each component instead of the previous Basic Lot tracking tags. The basic lot tracking routine was removed from the library file as a direction from the Quality and ME organization.

R12_Safety

The Safety routine was updated to contain standard logic for controlling the unlocking of a perimeter guard locking safety interlock switch. It also includes the control of the Request To Enter indicator light and confirming the Robot Disable or Teach Pendant in teach mode are used prior to unlocking the guard door. The logic example for this function in the Dial Table example program was updated to Power-OFF to Release.

R13_IndexerDrive_POWERFLEX

This routine was added to the logic library file. It was previously only included in the Dial Table example logic program.

R13_Conveyor_POWERFLEX

This routine was added to the logic library file. This is a new routine based on requests to create a standard routine to be used on material handling systems which have VFD's controlling conveyor sections.

R25_LotBasic_V2_Component

REMOVED from the logic library file.

R25_LotJFK_V2_1

This routine tag "REPLACE_JFK_LotNumber was updated to be "REPLACE_JFK_LotLabel" to more accurately reflect the value it represented. The rung 3 rung comment was also updated to match.

R24_CodeReader_COGNEX and R24_CodeReader_KEYENCE

The code reader routine was updated to have a rung that extracts the first 20 characters from the string that is read and designate that as the product serial number. Too many products were being labeled with barcodes that had much more than 20 characters in the code. This was to establish a standard approach to extracting the first 20 characters that shall contain the serial number.

R26_Trace_V2_Station

The Traceability routine was updated to include the Test Cycle traceability permission bypass function. This added function required an update to the traceability UDT NX_Traceablity_V2_1_7 and the Name and Data Builder AOIs.

UDT
- NX_Traceability_V2_1_7

AOI
- AOI_NX_TraceNameBuilder_V2_1_7
- AOI_NX_TraceDataBuilder_V2_1_7

R34_Press_PROMESS

This routine was previously named *R34_PROMESS* and was updated to establish a naming convention for press systems used other than Promess. We also created the input and output data UDTs.

UDT
- u_PROMESS_InputData
- u_PROMESS_OutputData

R36_Robot_FANUC

The FANUC and Robot UDTs were updated due to the desire by the Automation group to require a new memory map layout between the robot and the PLC detailed in SD-1040. Additional members were created, and more detailed descriptions were provided for each member. This update coincided with the update of the *R36_Robot _FANUC* routine. The FANUC module in the I/O Configuration was also updated to 64 Bytes.

UDT
- NX_FANUC_InputData_V3
- NX_FANUC_OutputData_V3
- u_Robot_FANUC
- u_FANUC_GroupInputs and u_FANUC_GroupOutputs
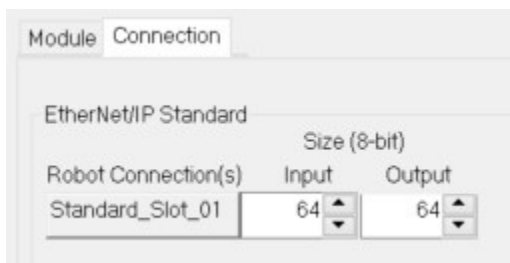
The routine was updated to include example logic for Teach Selection Switch use on robotic cells with multiple robots inside the same workspace. This logic requires both the robot controller and the Teach Mode selection switch to be placed in Teach for the appropriate robot.
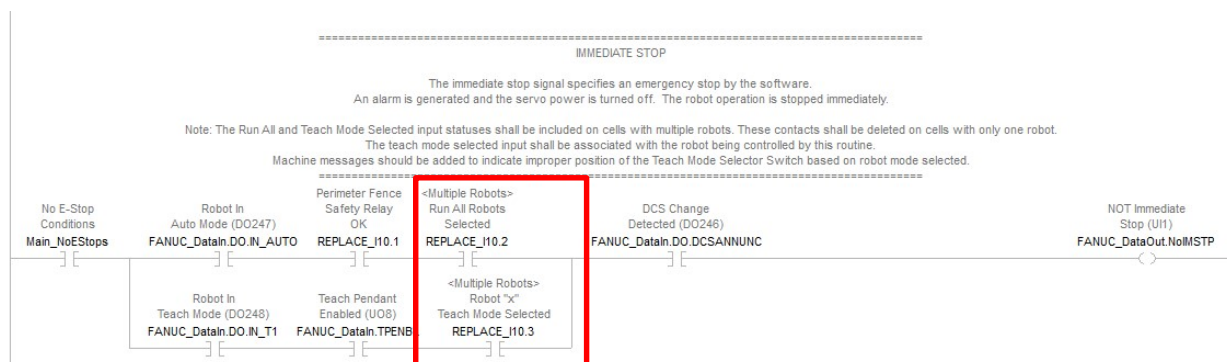
R38_Screwdriver_PF6000

The screwdriver routine was added an example for Atlas Copco Power Focus 6000 controllers that are extensively used for screwdriving applications on several assembly lines throughout Nexteer. This example does not cover all applications and will need to be modified based on the application.

R40_LaserMarker

The Laser marker routine was updated to only have one OTE instruction for the *MDF5200_DataOut.MarkCompleteClear* tag shown and removed it from the Clear All rung shown below.
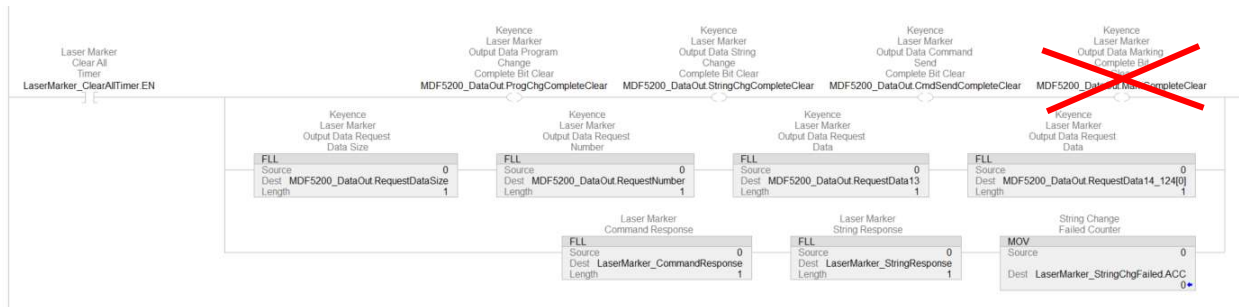
R50_IOModule_BALLUFF

The Balluff I/O Module routine was created and added to the logic library to provide a standard approach for configuration and interfacing with the IP20 In Cabinet IO-Link input module BNI004L. The routine is currently at Revision 002, due to Revision 001 routine being sent out to OEMs having an error in one of the rungs.
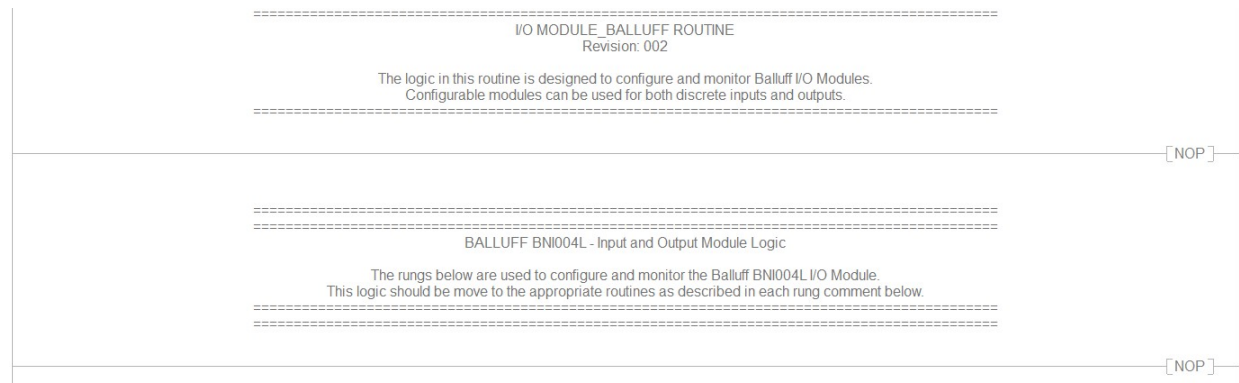
R60a_EPV_Cycle, R60b_EPV_PartSetup and R60c_EPV_Quality

Three EPV routines were added to the logic library to accommodate a standard approach for handling Error Proof Verification on machines. This is the initial version of the logic, based on several machine examples that utilized an EPV function. These routines are very generic with each application needing additional logic developed. Future logic libraries may include more complete version of these routines.

R95_BarrelPump_GP40_73

Updated rung comment to explain that both the "Close Relief Valve" and "Enable Ram Down" outputs are also enabled when the "Enable Pump Motor Solenoid" OTE is enabled.
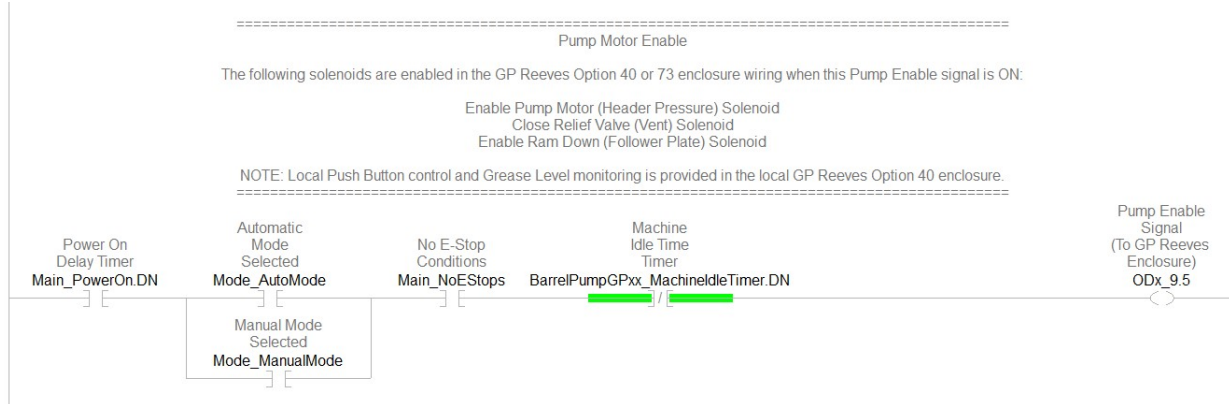
R95_BarrelPump_GP41_74

The GP Reeves Option 41 and 74 standard barrel pump interface routine was updated to include signals related to JFK Grease tracking implementation as well as recommended faults related to the barrel pump system. The standard GP Reeves Option 41 UDT was updated with additional members based on the addition of the Option 74 system and JFK interface.

UDT
- NX_GPReevesOP41_74_BarrelPump_V2

General HMI Updates

HMI screen FactoryTalk View Studio ME Version Level
The HMI screen files were created using FactoryTalk View Studio ME Version **12.**
- Archive (APA) files on the supplier's website can only be restored using version 12 or newer.
- Runtime (MER) files on the supplier's website can be restored using version 11 or newer.

PanelView Plus 7 Models Used for Files
The HMI screen files were created using the new PanelView Plus 7 models**.**
- PanelView Plus 7 6.5" display has 640 x 480 resolution.
- PanelView Plus 7 10.4" display has 800 x 600 resolution.

HMI Screen Updates

3_Automatic Screen
The Lot Tracking multi-state indicator was updated to have the JFK lot tracking status examples replacing the previous Basic Lot Tracking messages.
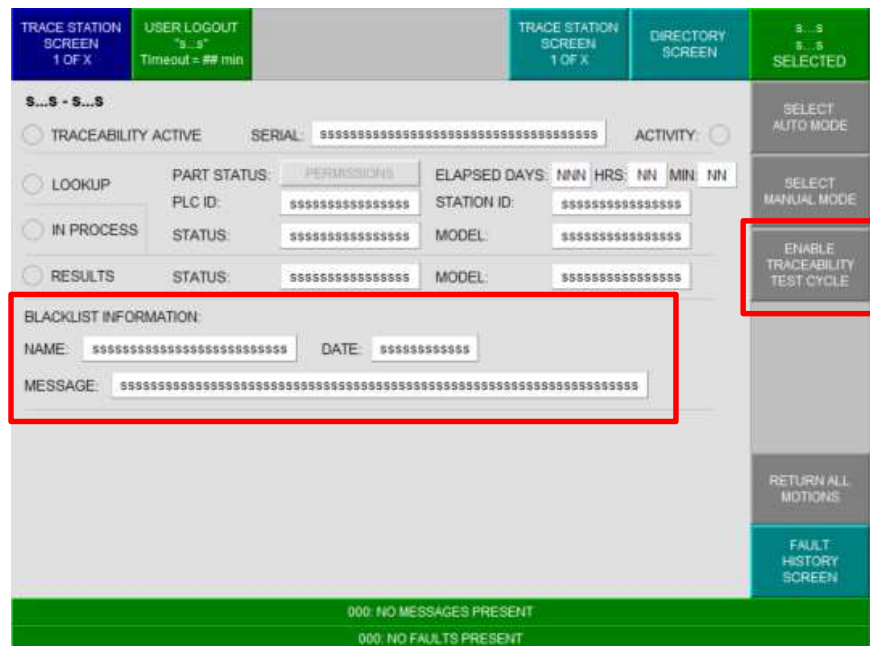
10_Fault History Screen
The fault history screen Polish translations for Date & Time were updated to not include "PLC" in the middle of the test.
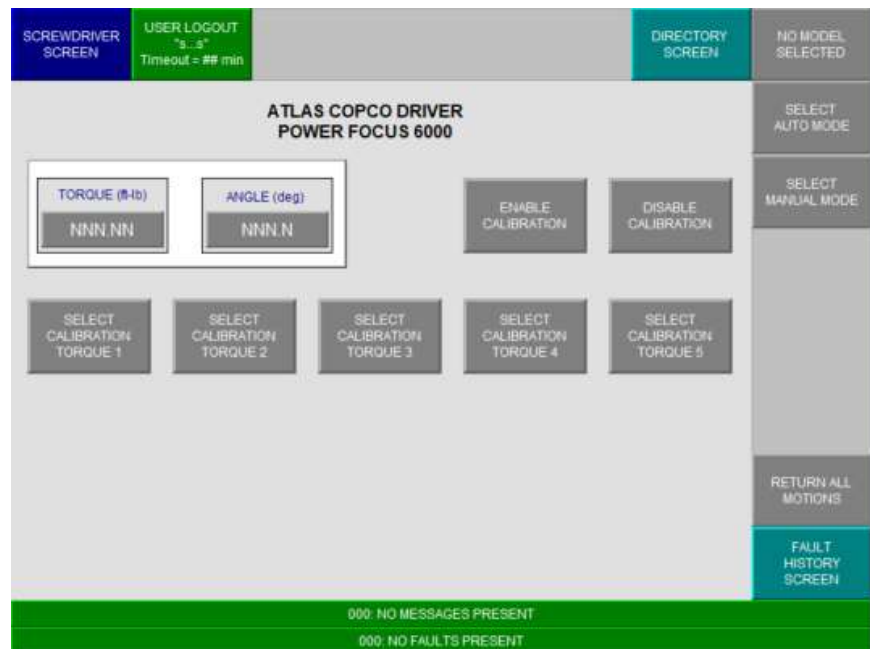
20_Trace Station Screen

The standard Blacklist display objects for Name, Date, and Message were added to the Trace Station screen. Also, a Test Cycle Enable PB was added to the border of the Trace Station screen, just below the Manual Mode selection PB. This was added as part of the initiative to provide a standard Test Cycle function to bypass traceability permissions on test parts.
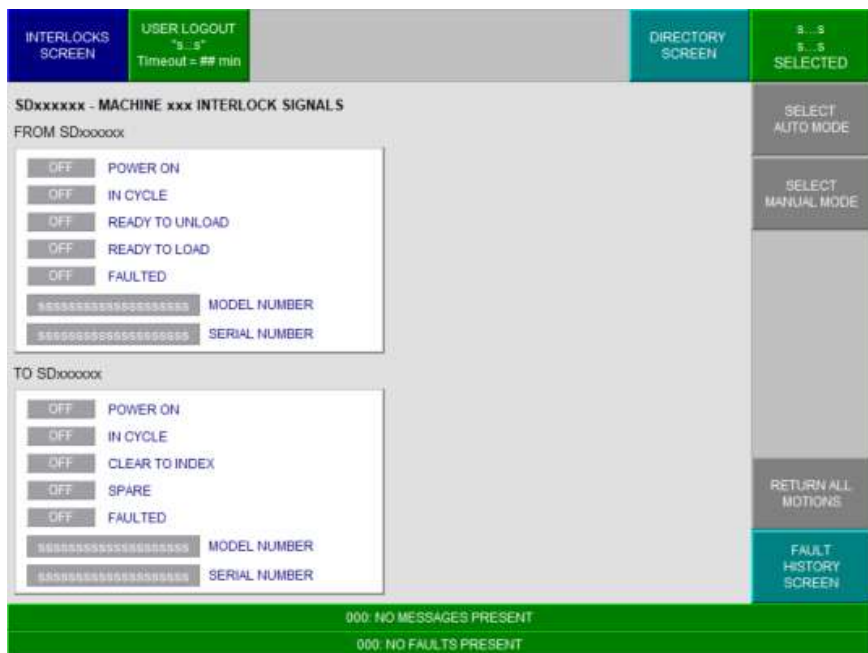
24_Screwdriver Screen

A new standard Screwdriver screen was added to the HMI templates to be used based on the application.

33_Interlock Screen
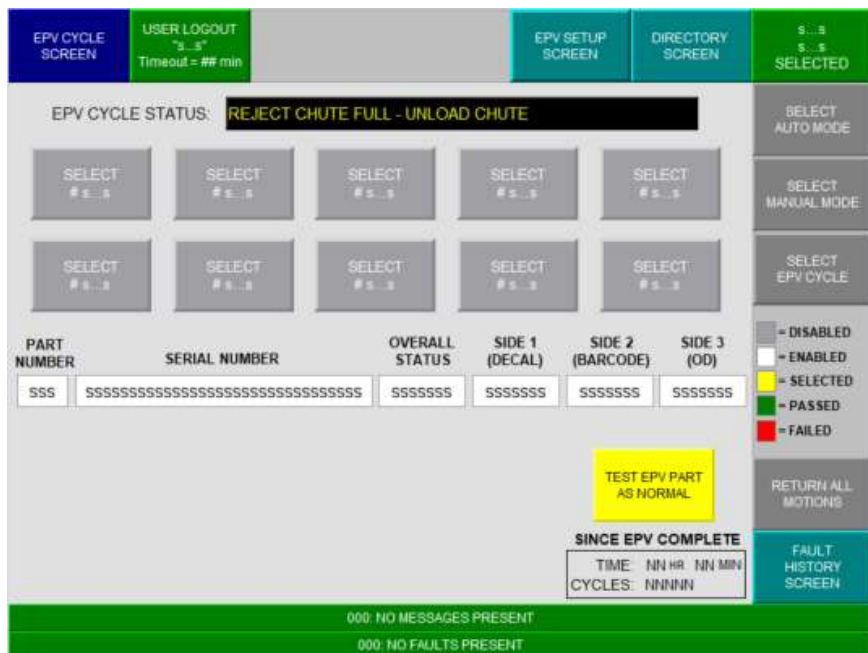
A new standard Interlock screen was added to the HMI templates to be used based on the application.

35_EPV Cycle Screen

A new standard EPV Cycle screen was added to the HMI templates to go along with the R60a_EPV_Cycle logic routine and to be used based on the application.

36_EPV Setup Screen

A new standard EPV Setup screen was added to the HMI templates to go along with the R60b_EPV_PartSetup logic routine and to be used based on the application.