Operations Manual

UWM CSI - Vial Fill Test Bed
Connected Smart Manufacturing (CSM)
APT Manufacturing Solutions

September 16, 2020
Version 1.0

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1 Introduction

1.1 Scope and Purpose

UWM CSI Vial Filling Connected Smart Manufacturing (CSM) System

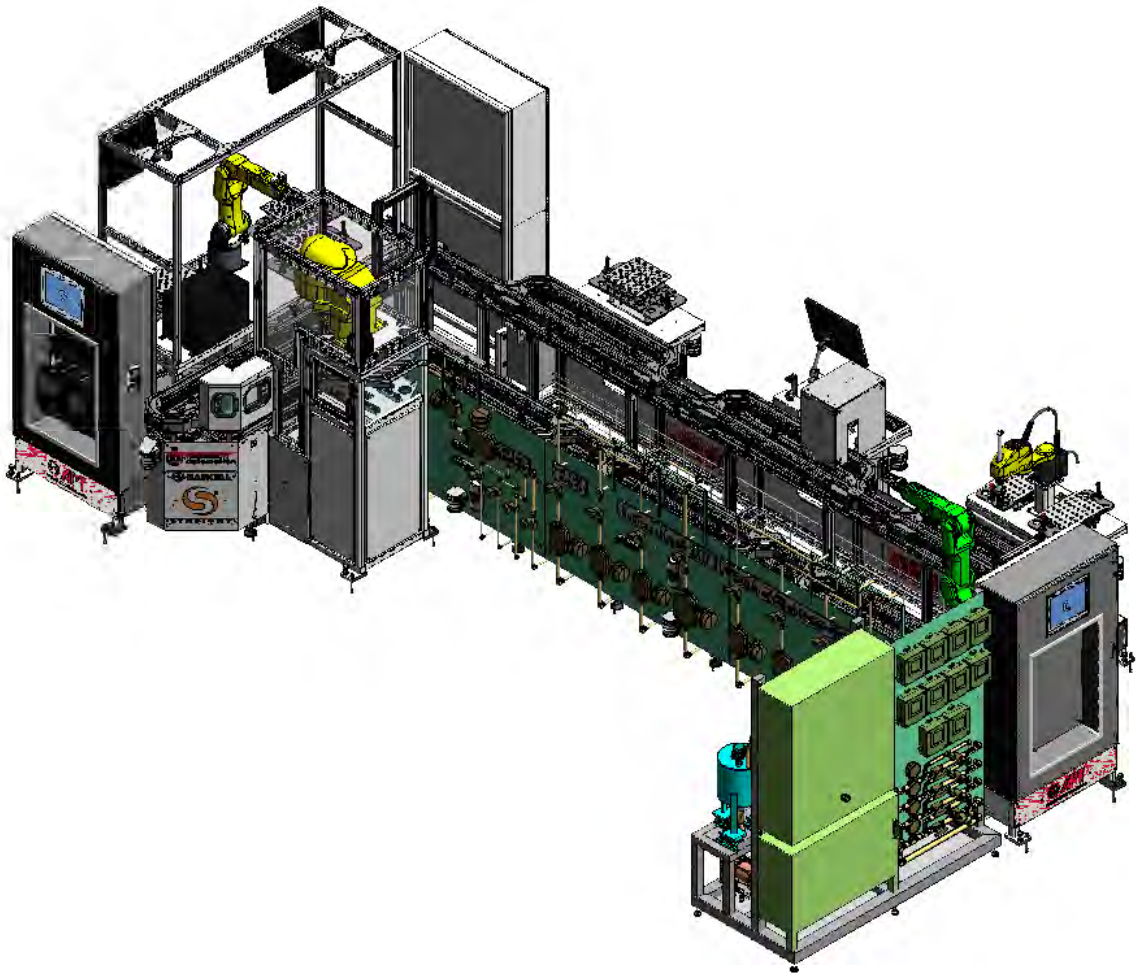

Figure 1-1 Vial Fill CSM System

The UWM CSI Vial Filling CSM System is an intelligent manufacturing system using the latest Industry 4.0 connected advanced manufacturing equipment and techniques to produce vials filled with varying product using a variety of filling methods and capturing process data that can be used for data analysis and system optimization.

The Vial Filling CSM System is a platform that university faculty and students will use for both education and research to further the advancement of a connected enterprise. The CAM components are integrated seamlessly within a fully integrated architecture and connected enterprise using cutting-edge smart-data devices at all layers.

1.2 Process Overview

The process overview detailed in this section describes in general how the Vial Filling Connected Smart Manufacturing system functions as a complete system processing components. Operational steps and slight variances in the process may differ from what is described here depending on the configuration parameters or using the stations in a dry cycle mode.

The Vial Filling CSM utilizes localized system configuration setting within the machine as well as process data requirements and parameters to determine how to process the product and which stations and inspections are required to complete the production job. When running under MES Production Center control, the process requirements and parameters are received from the MES system as to where and how to process and inspect the vials produced by the system.

1.2.1 Station1 – Load / Unload

The Figure 1-2 provides information in the Load/ Unload which is he starting point of the system where vials are inspected and loaded.

The visual shows a robotic arm, labeled as the FANUC LRMate 200iD 7L, which is likely used for precise handling of the vials. The station also includes a template for holding vials and a scale for weighing, which ensures that the vials are empty before they are filled. The integration of the Manufacturing Execution System (MES) Production Center is mentioned, which suggests that the process is closely monitored and controlled to optimize the workflow.

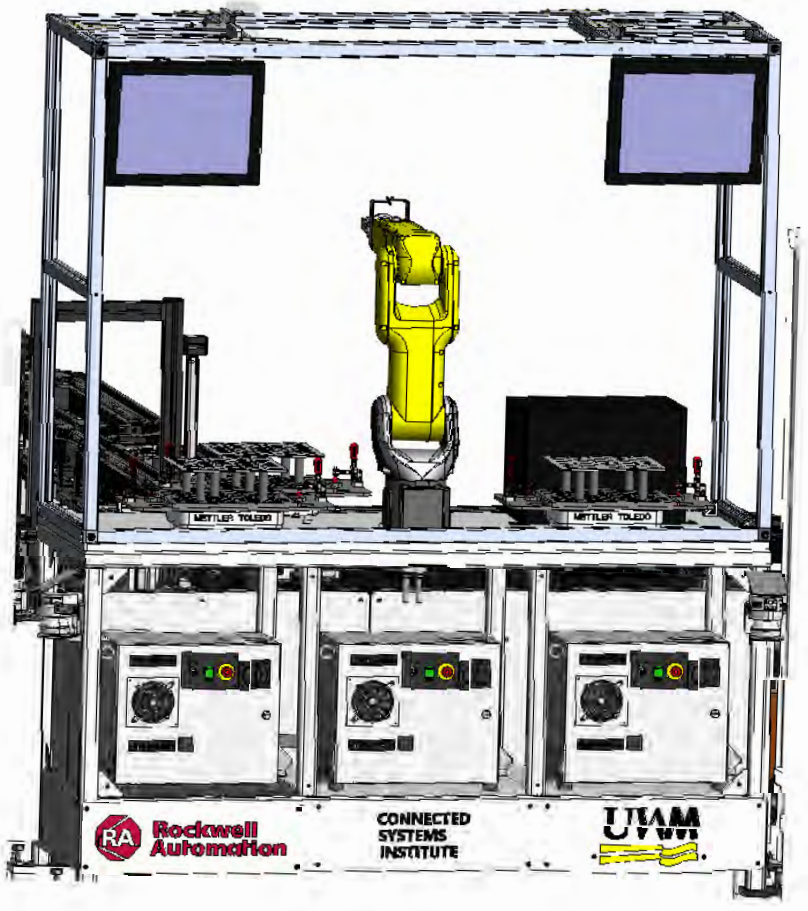

Figure 1-2 Station1 Load / Unload

Station1 is the start of system; Vial Inspect / Load Station. Empty vials are loaded to the system on an array template that sits atop a scale to determine empty vial weight. Once an order is received to process through the MES Production Center, the next available empty vial is retrieved by the FANUC LRMate 200iD 7L robot and then processed through a vision

inspection process as determined by the system configuration. The vial inspection consists of: inspecting the vials for damage or cleanliness by rotating the vial 360 degrees across three different sections of the vial; scanning and associating the vial's 2d bar code data to the scheduled production job. Once the vial inspection process has been completed, the vial is either loaded to the MagneMotion transport system or rejected to the reject parts tray.

Once a good vial is placed to the MagneMotion transport carrier, the production process parameters for that particular vial are loaded into the system's part tracking and traceability logic. These parameters are used and production data is updated as the vial is processed through the system.

Station 1 also received all finished product and stores them to one of two separate array templates. One array template for finished products that has met all process data and inspection criteria and are considered "Good Parts". The other array template for finished products that have failed to meet all process data parameters and inspection criteria and are considered "Bad Parts".

1.2.2 Station2 – Dry Fill

Figure 1-4 shows the physical setup required for the liquid filling process, including various containers and piping, which would be controlled by the PLC to ensure precise filling of the vials. This setup is likely a small part of a larger automated vial production line, designed for efficiency and minimal human intervention.

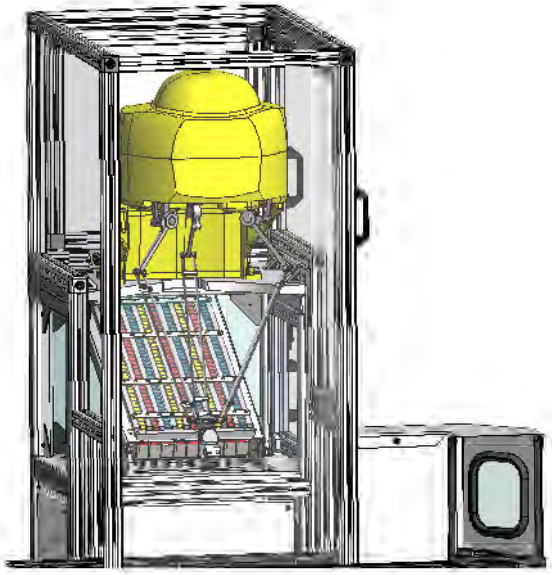

Figure 1-3 Station2 Dry Fill

The Dry Fill station consists of a gravity tray loaded with product of three varying-colored cubes. Each lane of product contains a color sensor to determine the appropriate color product is loaded into each channel. An M1iA robot is used to pick the colored product according to the process parameters.

An empty vial will arrive at this station on the MagneMotion transport system from the load station. The robot will receive the process parameters from the system's part tracking and traceability logic and picks the appropriate quantity in the appropriate order and places them to the vial at the station. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station.

1.2.3 Station3 – Wet Fill (Single Nozzle Sequential)

Figure 1-4 Wet Fill Single (Sequential)

The first Wet Fill station consists of a single nozzle used to dispense specified quantities of four different fluids sequentially into the vial located at the station on the MagneMotion carrier. The liquid fill parameters and resulting data are passed between the system PLC and the fluid delivery system PLC.

A vial will arrive at this station on the MagneMotion transport system from the load station or previous processing station. The station will receive the process parameters from the system's part tracking and traceability logic and dispenses the appropriate liquid in the appropriate order into the vial located at the station. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station.

1.2.4 Station4 – Wet Fill (Single Nozzle Mixed)

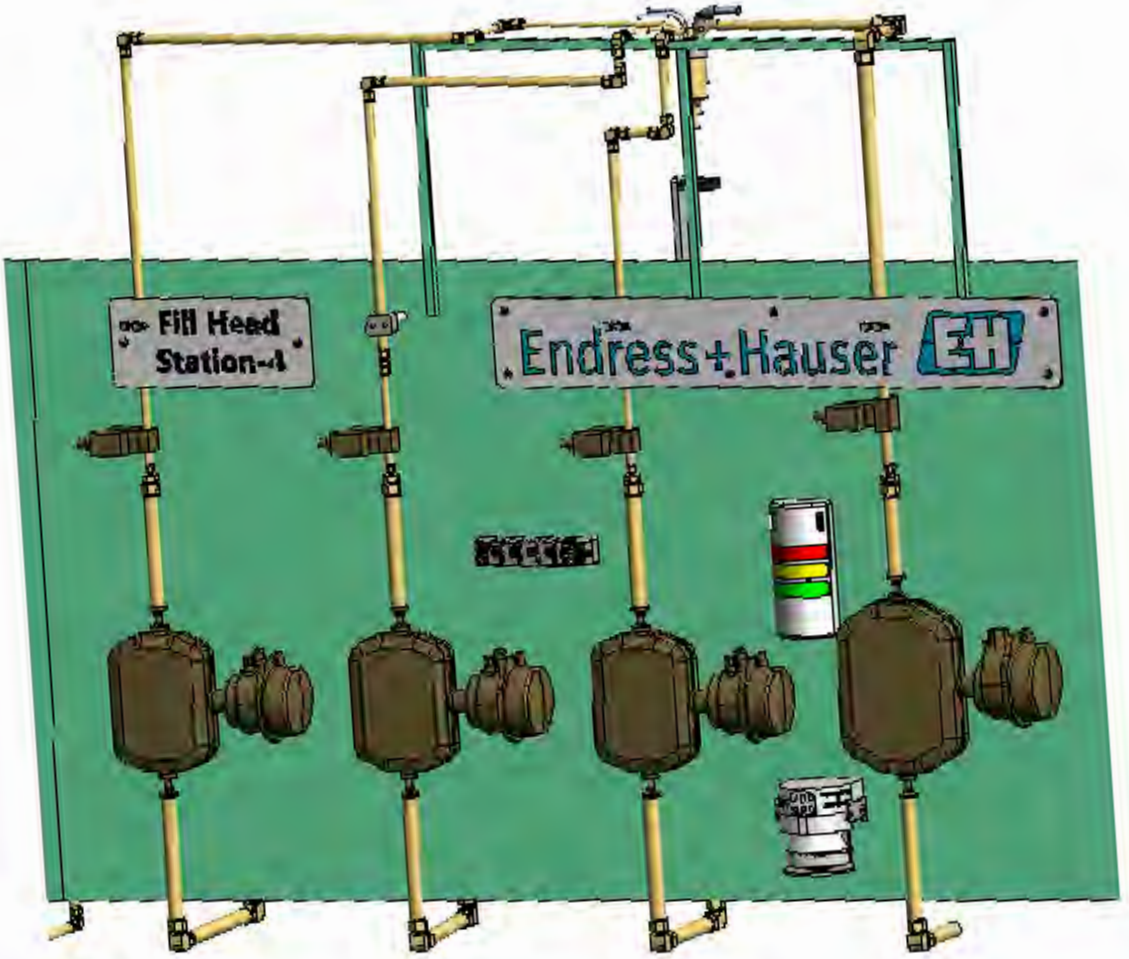

Figure 1-5 Wet Fill Single (Mixed)

The Second Wet Fill station consists of a single nozzle used to dispense specified quantities of four different fluids simultaneously into the vial located at the station on the MagneMotion carrier. The liquid fill parameters and resulting data are passed between the system PLC and the fluid delivery system PLC.

A vial will arrive at this station on the MagneMotion transport system from the load station or previous processing station. The station will receive the process parameters from the system's part tracking and traceability logic and dispenses the appropriate liquid in into the vial located at the station. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station.

1.2.5 Station5 – Wet Fill (Individual)

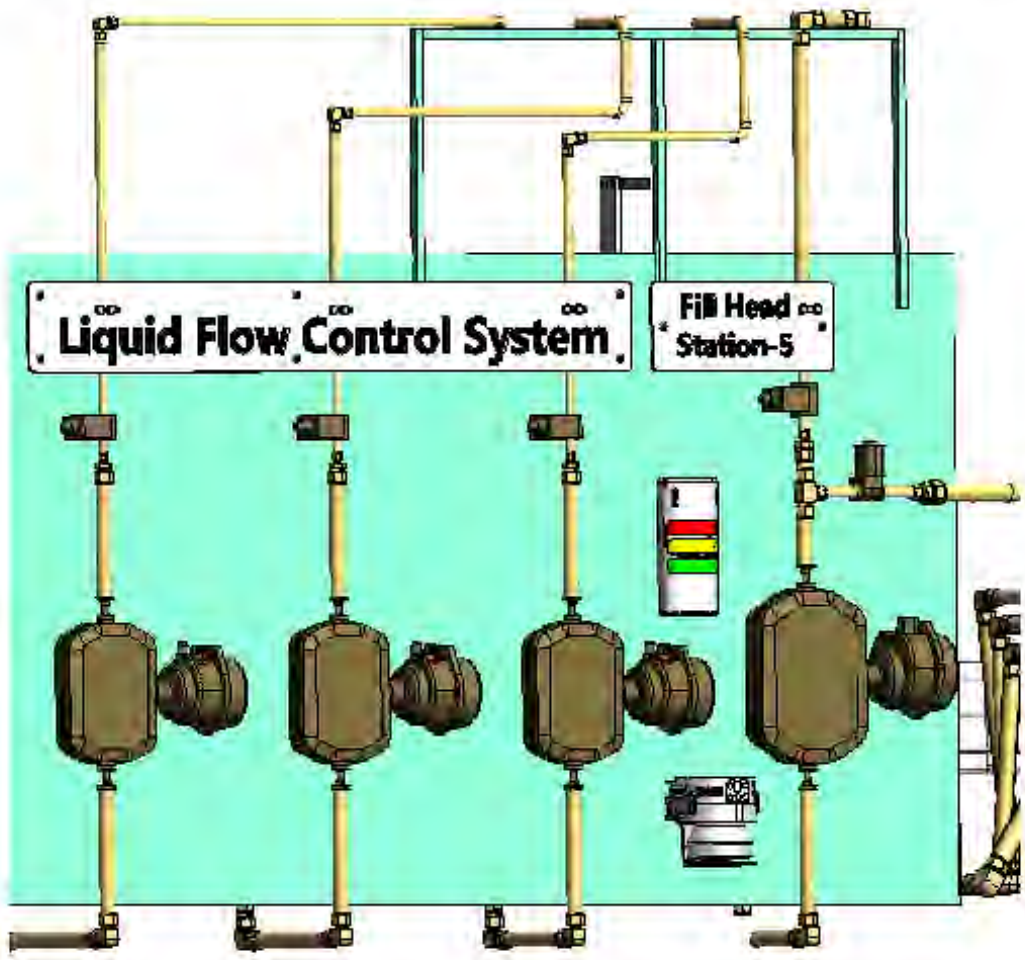

Figure 1-6 Wet Fill Individual (Seuqential)

The third Wet Fill station consists of four separate nozzles used to dispense specified quantities of four different fluids sequentially into the vial located at the station on the MagneMotion carrier. The liquid fill parameters and resulting data are passed between the system PLC and the fluid delivery system PLC.

A vial will arrive at this station on the MagneMotion transport system from the load station or previous processing station. The station will receive the process parameters from the system's part tracking and traceability logic and dispenses the appropriate liquid in the appropriate order into the vial located at the station. This process will repeat through the three other station nozzle positions. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station.

1.2.6 Station6 – Capping

Figure 1-7 represents the clapping station. This station is specifically designed to place caps onto the vials following the filling process. The caps are provided according to predetermined process parameters, ensuring that each vial receives the appropriate cap. T his step in the manufacturing process highlights the integration of robotics and data management in modern production lines, allowing for enhanced efficiency, accuracy, and traceability.

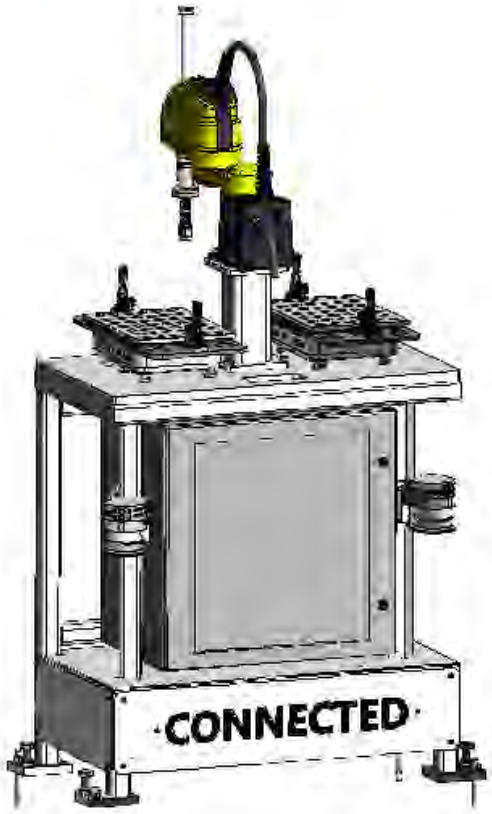

Figure 1-7 Capping Station

The capping station places caps onto the vials as determined by the process parameters for that vial. Caps are loaded to the system onto two array templates that sits atop a scale to determine cap weight. An SR3iA SCARA robot is used to pick the next available cap and place it to the vial loaded on the MagneMotion transport carrier. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station.

1.2.7 Station7 – Vision Inspection

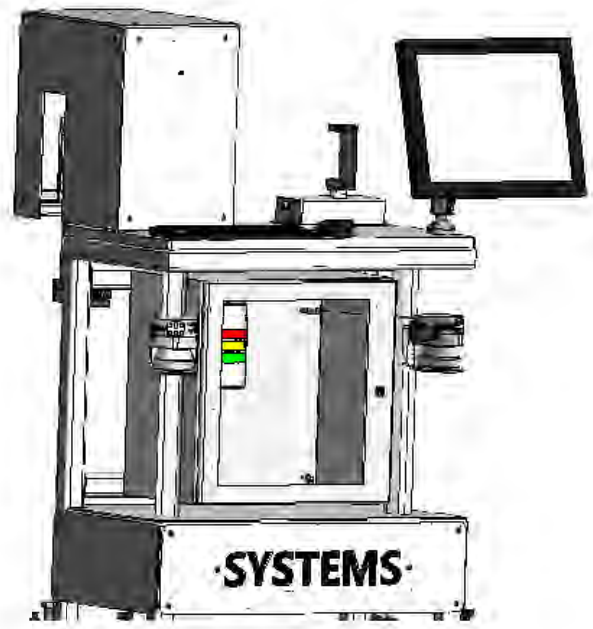

Figure 1-8 Vision Inspection Station

The vision inspection station is used to verify the contents of each vial that it inspects. Depending on the product that is to be inspected, the vision system loads one of two inspection programs. For liquid fill vials, the camera program evaluates the vial and returns RGB values (Red / Greed / Blue) of the inspection area. The resultant data is compared against MES provided process parameters to determine that the vial has the correct or incorrect color. For vials with dry fill contents, the vision system loads an inspection program that retrieved the RGB values for the seven different dry fill positions and compares them to the system's dry fill color setup parameters. The station determines if the vial is loaded with the correct color of dry fill cubes and that they are in the correct order as defined by the MES provided process parameters for that particular vial. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station.

1.2.8 Station8 – Weigh Check

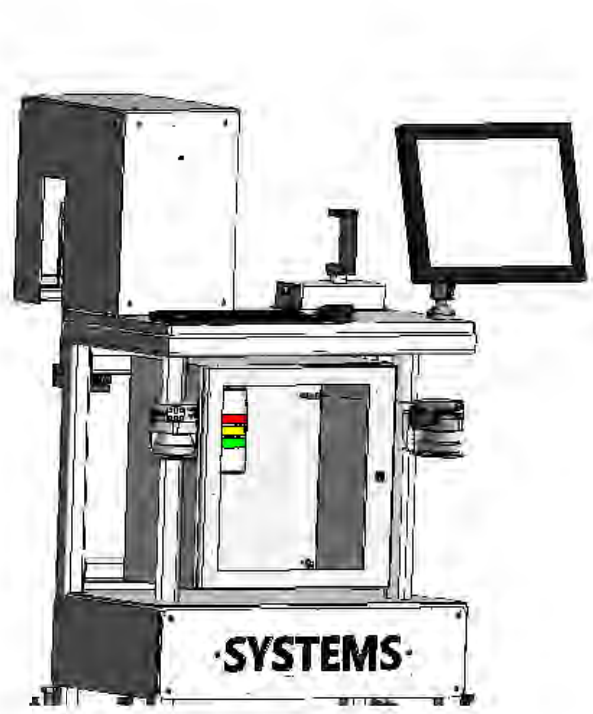

Figure 1-9 Weight Check Station

The weight check station is used to verify weight of the contents of each vial that it inspects against MES provided process parameters. Once a vial arrives at the station on a MagneMotion carrier, the Cr7 Robot retrieves the vial from the MagneMotion carrier and places it to the precision weigh scale. After a brief settling period, the station record the weight and compares the results to the MES parameters to determine to pass or fail the vial. Once completed, the CR7 robot picks the vial from the scale and places it back to the MagneMotion carrier. Upon completion, the station updates the system's part tracking and traceability database and then sends the vehicle on to the next processing station. and send it to the next processing station.

1.2.9 Station9 – Inspect / Repair

Figure 1-10 Inspect and Repair Station

The intent of the inspect and repair station is for product to be staged for inspection and possible repair by operating personnel. The demonstration program provided with the cell send vials whose process parameters were slightly outside the required specifications to the inspect and repair station. This station is designed for the end-user to develop their own processing and repair criteria and utilize it according to their processes.

Once a vial arrives at the station on a MagneMotion carrier, the Cr7 Robot retrieves the vial from the MagneMotion carrier and places it to the vial array.

1.2.10 MagneMotion Independent Cart Transport System

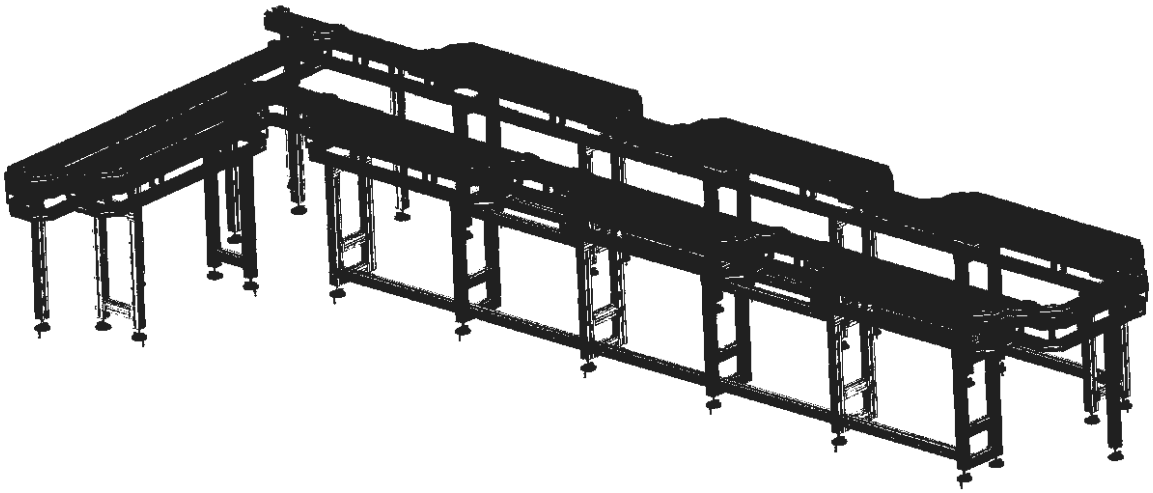

Figure 1-11 MagneMotion

The MagneMotion Independent Cart Transport system utilizes linear motor technology and magnetic carriers to transport vials throughout the CSI vial filling cell. The system is configured with 17 Nodes (locating positions) on 23 paths. Transport carriers flow through the system stopping at the required process stations or using bypass paths to continue moving throughout the system.

The MagneMotion node controller receives commands from the system's process PLC and in turn monitors and controls the direct motion of the independent cart trafficking, positioning and motion profiles. The system is designed for the end-user to build upon the basic programming provided and take advantage of the technology to develop and test varying delivery system configurations.

2 Safety

2.1 Follow Safety Instructions

Carefully read all safety messages in this manual and on the machine safety signs as depicted in Figure 2.1.

Keep safety signs in good condition. Replace missing or damaged safety signs.

Learn how to operate the machine and how to use controls properly. Do **NOT** let anyone operate the machine without instruction.

Keep the machine in proper working condition. Unauthorized modifications to the machine may impair its function and/or safety and affect the machine's life.

Whenever encountering the caution symbol in the manual (Fig. 2.2). Carefully read the message text that accompanies the symbol. This caution symbol signals that failure to follow the accompanying message can lead to injury or death to personnel or damage to the

Figure 2-1 Follow Safety Instructions

Figure 2-2 Caution Symbol

2.2 Residual Risks

The assembly cell is provided with fixed guarding along with a category 3 performance level d rated safety system. The safety system is meant to prevent the operator from coming into contact with any hazards. However, those hazards still exist. Those hazards are:

- Electrical shock hazard from the cabinet(s) and cable routing
- Pinch point crush hazard from robot(s) and mechanical motion
- Pinch points and trapping hazards from transport system
- Strobing lights from vision systems
- Sharp edges of machines parts
- Chemical / fluid exposure to liquid filling system
- Magnetic hazard from independent cart system
- Wet or slippery surfaces from liquid filling fluid.

2.3 Foreseeable Misuse

- This equipment is not for use within a residential area
- This equipment is designed for indoor use only
- This equipment is not designed for use within a potentially explosive environment
- This equipment is not designed for underground use
- Equipment is designed for educational use only simulating an assembly line with automation and robotics. Do not process any other material apart from that which the machine is designed to process
- Ensure that the correct LOTO is in place prior to any cleaning, repair or maintenance routines
- This equipment is not designed for use with personnel climbing over, on, or into the robot or conveyor and processing stations or maintenance area without following proper control of hazardous energy procedures.

2.4 Safety Precautions

The precautions outlined in this section are not intended to cover all hazards that may exist in a school or on this machine. Usage of safety equipment without common sense will not prevent accidents, nor will it reduce the severity of those accidents which do occur. It requires the constant attention of all personnel within the vicinity of this or any manufacturing operation to maintain a safe operation and work environment. A school and its equipment are only as safe as its faculty and students are safety conscious. Properly trained faculty and students, plus a well-maintained machine will contribute as much toward the overall safety program as any number of mechanical guards and safety devices.

1. Study the operating instructions thoroughly before attempting to install, operate, or maintain this machine.
2. Do **NOT** operate this machine unless all guards are in place and all safety devices are functioning properly. Check all devices before starting this machine.
3. Avoid wearing loose-fitting clothing and jewelry while working on or near moving components.
4. Never leave a running machine unattended. Shut down the machine before leaving the work area.
5. Keep the work area clean and free of grease, oil, water, or obstacles that could cause you to slip or trip and fall.
6. Always perform the safety lockout procedures listed on a LOTO Developed by the end user before performing any maintenance on this machine.

Never alter, by-pass, or otherwise deter the operation of any safety guard or other safety devices on this machine.

2.5 Robot Protective Safety Boundaries, Joint Limits, Force Monitoring

Each Fanuc Robot utilizing Advanced DCS is equipped with motion limiting features as an additional measure to protect personnel. Joint limitations and safety boundaries have been programmed specifically for the work envelope and function of each robot. Any modification to these safety features shall only be performed by qualified personnel and shall require the complete validation and certification of the system safety performance to be completed, then approved of by the end user safety engineer.

Joint limits restrict the individual robot axis to a pre-specified range of motion. Figure 2.3 depicts an example the allowable joint limitations and safety boundaries for the robot.

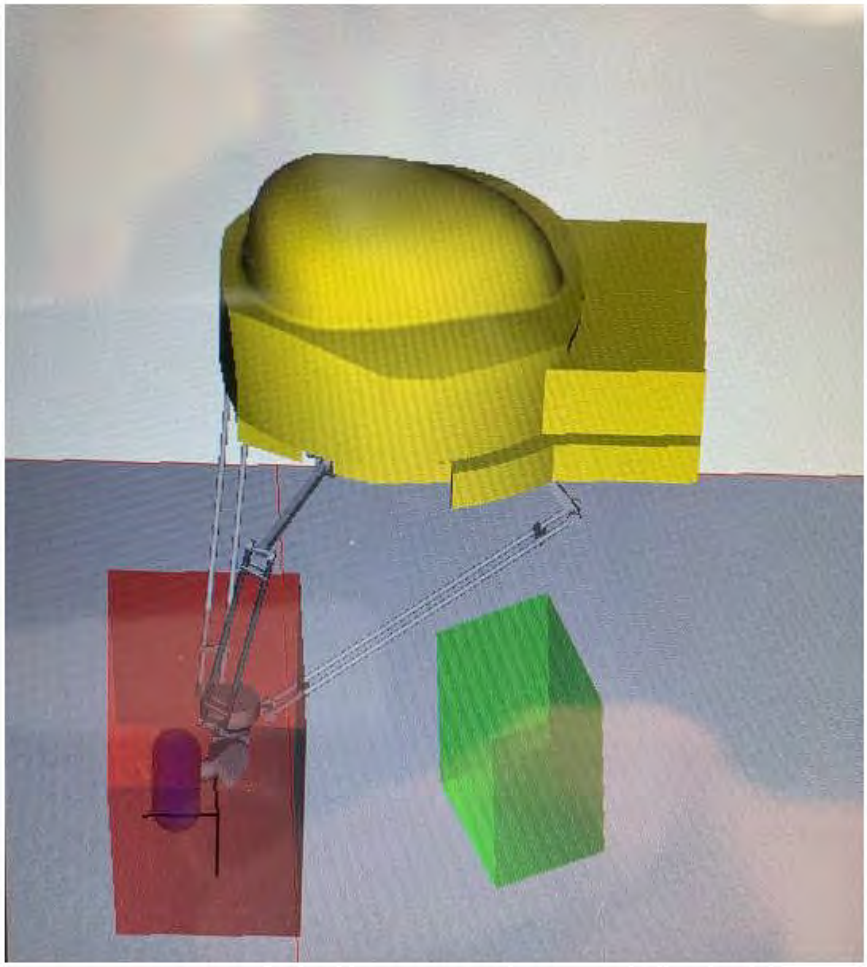

Figure 2-3 DCS Protective Zones

2.6 Robot Teach / Manual Mode

QUALIFIED INDIVIDUAL IS REQUIRED
FOR THE FOLLOWING PROCEDURE

Always use extreme caution while performing this procedure. Only a single person should ever be within the hazard area at any given time.

The machine is equipped with a teach mode to allow for robot adjustment through the use of the teach pendant while personnel are within the robot work envelope. It is beyond the scope of this operations manual to setup and teach the robot. This manual is not intended to replace the robot manufacturer's training or equipment manuals. Please refer to the manufacture's documentation and training for detailed procedures for working with and configuring the robot.

Figure 2-4 Teach Pendant / Teach Mode

2.7 Safety System

The Vial Fill Test Bed is equipped with a dedicated Allen Bradley L8 series GuardLogix programmable safety controller to monitor and control the safety of the entire system through control reliable means. The safety system for the cell consists of four dual channel emergency-stop push button with reset functionality, nine dual channel area scanners with warning and stop zones, two dual channel light curtains, a single dual channel solenoid locking door interlock, and four Fanuc robot controller with advanced DCS functionality and ethernet safety. The Fanuc robots are connected as a child to the system safety controller (e.g., an assembly cell emergency stop will emergency stop the robot). Activations of the robot controller and pendant emergency stop will also stop the assembly cell.

Figure 2-5 – System Safety Controller

2.8 Emergency Stop Circuit

The system is equipped with dual channel emergency stop push buttons. Upon activation, all hazardous electrical outputs are disabled by the monitoring safety controller and the robots are issued a stop category zero (emergency stop).

Figure 2-10 (SR3iA E-Stop): This image shows a section of machinery with an emergency stop button labeled with an "E-Stop" sign. The button is circled in red to highlight its location. It appears to be a part of a robotic system, with various cables and components visible in the background.

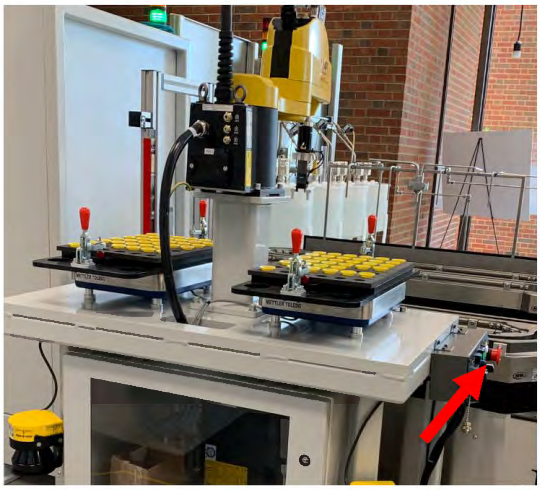

Figure 2-10 SR3iA E-Stop

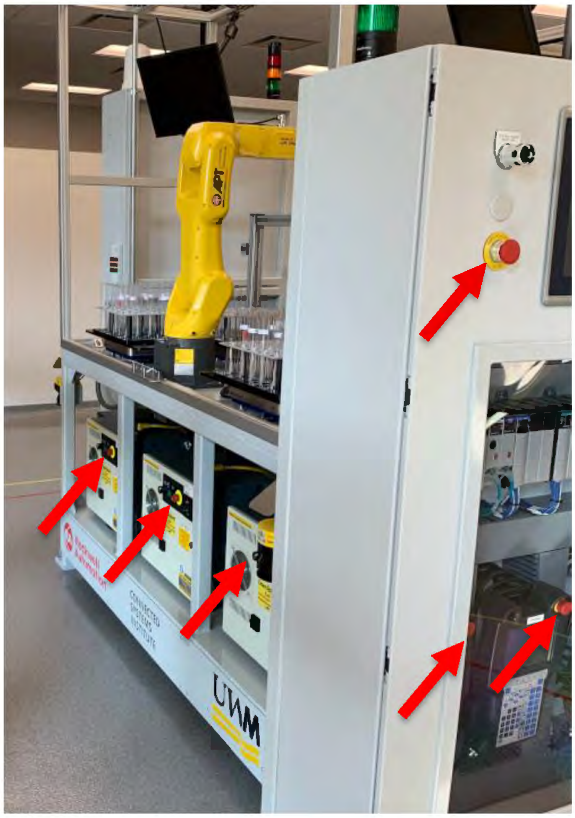

Figure 2-6 Robot E-Stops

Figure 2-9 Process Panel E-Stop

Figure 2-8 Robot & Power Panel E-Stop

Figure 2-7 Safety Panel E-Stop

Figure 2-6 (Robot E-Stops): The photograph captures a portion of a robotic assembly line with multiple emergency stop buttons. Each button is marked with a red arrow. The machine has a yellow robotic arm, and there are safety warning labels on the equipment. Figure 2-9 (Process Panel E-Stop): Here we see a control panel with an emergency stop button at the bottom, indicated by a red arrow. The panel has a glass window through which various controls and an electronic display are visible. Multiple red arrows point to important features on the panel. Figure 2-8 (Robot & Power Panel E-Stop): This image displays an industrial power panel with a clear glass window. An emergency stop button is located at the lower section of the panel, marked by a red arrow. Inside the panel, various switches and circuitry can be observed. Figure 2-7 (Safety Panel E-Stop): The photo shows a close-up of a safety control panel with an electronic display screen. An emergency stop button is indicated with a red arrow. The inside of the panel is visible, revealing electrical components and wiring.

2.9 Area Scanner

The area in front of each station is protected by an array of safety area scanner that has both a warning and stop zone.

Figure 2-11 Area Scanners

When an obstruction is detected within the warning zone (depicted in yellow) the scanner sends dual signals to the safety PLC which in turns signals the robot controller initiating slow-down mode of the robot via CIP safety over ethernet protocols.

When an obstruction is detected within the protective stop zone (depicted in red), the area scanner and safety system controller initiate a safe stop of the machine and robot. When the areas scanner stop is activated, all hazardous electrical outputs are disabled, and the robot initiates zero speed and position monitoring preventing the robot from autonomous cycling. Robot I/O controlled through the robot controller are not affected by the area scanner stop.

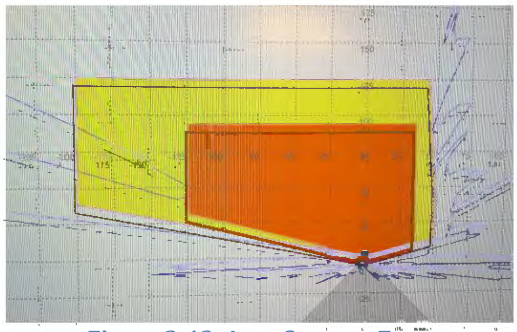

Figure 2-12 Area Scanner Zones

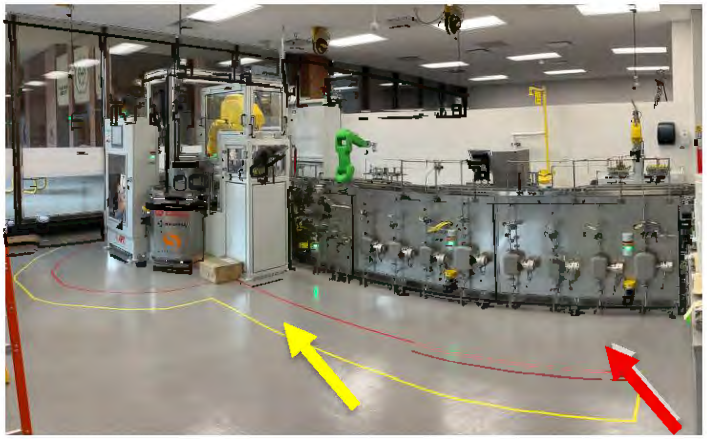

Figure 2-13 Area Scanner Zones

Figure 2-11 (Area Scanners): This image presents an industrial workstation with area scanners installed for safety. The scanners are marked by red arrows and are distributed around the station. The workstation includes a yellow robotic arm and various control boxes, one of which is labeled "Rockwell Automation". Safety warnings and operational instructions appear to be affixed to the equipment.

Figure 2-12 (Area Scanner Zones): A graphical representation is shown in this image, illustrating the layout of scanner zones around a robotic workstation. It delineates two zones: a warning zone in yellow and a stop zone in red. This diagram provides a visual guide to the spatial coverage of the safety scanners.

Figure 2-13 (Area Scanner Zones): The photo displays a wide view of a manufacturing floor with multiple workstations. Red arrows point to the area scanners located around the perimeter of each station. The scanners form part of a comprehensive safety system, likely to monitor the presence of personnel or objects within restricted areas to initiate safety protocols when necessary.

Figure 2-14 and Figure 2-15 (not visible in the image provided): According to the text, these figures would show components of the light curtains that are part of the safety system, specifically highlighting their arrangement around the robotic system in red. These light curtains are critical for detecting the presence of objects or individuals and activating emergency procedures to prevent accidents

QUALIFIED INDIVIDUAL IS REQUIRED
FOR THE FOLLOWING PROCEDURE

Only qualified personnel should setup or modify the protective fields of the safety area scanner. Full functionality check and validation of the safety system shall be completed upon any modification the system setup and area scanner protective fields.

The area scanner protective fields have been set to the proper location and distance corresponding to the system layout and stop time distance calculated for the system robot speed at time of shipping. At time of shipping, robots have been restricted to a maximum override speed through the advanced DCS functions of the robot controller while in the slow zone. It is not recommended to modify the maximum speed as it will adversely affect the stop time distance and zone layout of the area scanners.

The Vial Fill Cell stations have integrated the safety area scanners as its primary mode of protection of perimeter guarding. To aide is the openness and ease of use for training, the system has incorporated an automatic reset functionality once the area scanner protection zones have been cleared of obstruction. This is accomplished by the Safety PLC monitoring and sending the slow down and stop signals to the system. While this feature is incorporated into the system, the end users should not rely solely on this feature and shall ensure good safety practices are in place when working and training on the system.

2.10 Light Curtains

The CR7 Rail Robot incorporates a seventh axis which is NOT collaborative in nature. In conjunction with the system area scanners, two sets of dual channel light curtains are used to prevent the rail from moving while the safety system is impeded. The combination of light curtains and area scanners allow the robot to function as long as no objects are detected within the safety detection zones. The Light curtains only become relevant to the safety function if the area scanners detect an obstruction and can be thought of as a secondary safety system or alternate safety system.

Figure 2-14 Light Curtains Receivers

Figure 2-15 Light Curtain Transmitters

Figure 2-14 (Light Curtains Receivers): This image showcases a section of an industrial robotic workstation with a yellow robotic arm and various equipment labeled "Rockwell Automation" and "FANUC". A light curtain receiver is marked with a red arrow, indicating its location on the side of a metal frame. These receivers are part of a safety system designed to halt the robot's movement if an object or person interrupts the light curtain.

Figure 2-15 (Light Curtain Transmitters): Displayed here is a close-up view of light curtain transmitters, denoted by red arrows, which are positioned opposite to the receivers. The transmitters are attached to a vertical metal stand and emit beams that, when interrupted, send a signal to stop the robot's operation. The background shows a conveyor with multiple cylindrical objects, suggesting a manufacturing or processing setting.

3 Mode Status

The following modes are available on the individual stations. A brief description of each mode is provided for general information.

3.1 Control Power ON/OFF

Primarily a hard-wired interface that allows controls functions to be turned on and off. Alternately, an HMI based interface that allows for controls functions to be turned on and off. No Motions (Auto or Manual) shall occur if control power is not in an on state.

3.2 Manual Mode

Station motions are only allowed through manual interaction. Any fault condition shall place station into this mode of operation.

3.3 Auto Mode

Station is ready for automatic operation, but auto sequence is not started or processing. No manual functions can be performed.

3.4 Auto Cycle

Station's Auto Sequence is processing and repeating under normal conditions

3.4.1 Cycle Starting

Delay in auto cycle sequence start as needed based on application.

3.4.2 Cycle Stopping

Current Auto Cycle sequence continues until completed; Once completed station then drops out of Auto Cycle but remains in Auto Mode.

3.5 Dry Cycle

Emulation of Auto Cycle generally without parts or pallets. Simulates or ignores input sensors and inspection conditions to allow Auto Sequence to function. Primarily used for maintenance or troubleshooting.

3.6 Faulted

System has experienced a fault condition. Any fault condition shall drop the station out of automatic operation and place it into Manual Mode.

3.7 Idle

Station is in Auto Mode and Auto Cycle with the Cycle Started but is idle due to waiting on parts or operator input to continue processing the Auto Sequence.

Additional application specific modes may be added as needed. Any addition of mode types shall be approved during the design review process.

4 System Reset Types

The following four reset types are available on the individual stations. A brief description of each reset function is provided below for general information. Certain reset types may also include reset functions provided by other reset types.

4.1 Safety Reset

Used to reset the safety system of the machine when safety devices require a manual reset. This reset shall be of the trailing edge type. All safety devices must be physically ok to reset for the safety reset to complete.

4.2 Robot Reset

Used to reset the robot fault via UI[5]. Robot fault is cleared, servo power is turned on, but the paused program will not resume.

4.3 Reset

Used as a general system reset. Primarily thought of as a retry of the system state when the system fault occurred. After a general reset the system should start back up on its current process step and continue once placed back into auto mode and the cycle is started. In general, no manipulation of parts or machine functions should be needed when using the general reset function. However, there may be unique situation which may require intervention to have the system resume operations once restarted. System faults along with external device faults are cleared. The general system reset shall also invoke the Safety Reset and Robot Reset as applicable.

4.4 Master Reset

The Master Reset is the same functionality general system reset with the addition of resetting all sequence routines back to their initial starting points. This type of reset is used when the machine is to begin back at an initial configuration upon being placed back into auto cycle. This initial state a Master Reset induces requires that all parts and pallets be removed or put back to starting position.

5 Visual Indicators

5.1 Stack Light Indicators

The following are the status indicator definitions as provided with the default system programs.

Figure 5-1 Stack Light

5.1.1 Red – Flashing

System Faulted

5.1.2 Amber – Flashing

Attention Required

5.1.3 Green – Solid

System in Auto Mode and Running Auto Cycle

5.1.4 Green – Flashing

Cycle Stopping – Waiting Completion of Current Cycle to Stop Auto Cycling

5.2 Area Scanner Indicators

The following are the status indicator definitions which indicate the status of area scanner(s) for each cell station.

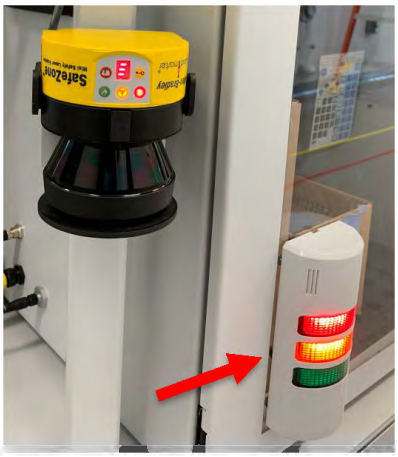

Figure 5-2 Area Scanner Indicator

5.2.1 Green

Area Scanner(s) Warning and Stop Zone(s)s are Cleared.

5.2.2 Yellow

Area Scanner(s) Warning Zone(s) Detect an Obstruction.

5.2.3 Red

Area Scanner(s) Stop Zone(s) Detect and Obstruction.

Figure 5-1 (Stack Light): This image depicts a vertical stack light, a type of visual status indicator commonly used on machinery. It consists of colored lights stacked on top of each other within a single unit. The colors, from top to bottom, are red, amber, and green. The manual specifies the meanings of each light's status: Red flashing indicates a system fault, amber flashing signifies that attention is required, solid green shows the system is in auto mode and running an auto cycle, and green flashing indicates the cycle is stopping and waiting for the completion of the current cycle to stop auto cycling.

Figure 5-2 (Area Scanner Indicator): The second image shows an area scanner with an indicator light on top. The area scanner is a device used to detect the presence and location of objects or persons within a designated area to ensure operational safety. The indicator light has three sections colored green, yellow, and red, which align with the status indicator definitions provided in the manual. Green indicates that warning and stop zones are cleared, yellow means the warning zone has detected an obstruction, and red signifies the stop zone has detected an obstruction.

6 HMI General Information

6.1 Splash Screen

The splash screen is by default the initial screen the system displays on startup. Touching anywhere on the screen shall navigate to the main operations screen. Splash screen images may vary based on the application.

The image appears to be a screenshot of a Human-Machine Interface (HMI) splash screen. The splash screen is a graphical representation that is typically displayed when a machine or system is first started. This particular splash screen features:

The logo and name of the University of Wisconsin-Milwaukee prominently displayed in the center, indicating the machine's ownership or association with the university.
The term "VIAL FILL MACHINE" just below the university's name, which describes the function or purpose of the machine.
Logos of Rockwell Automation and FANUC, suggesting that components or systems from these manufacturers are integrated into the machine.
The logo of APT Manufacturing Solutions, labeled "INTEGRATED BY," indicates the company responsible for assembling or configuring the HMI system.
According to the text above the image, touching anywhere on this splash screen will navigate to the main operations screen of the HMI. The appearance of the splash screen may vary based on the specific application it is used for. This initial screen is an integral part of the user interface, providing users with a clear and branded entry point to the machine's controls.

6.2 Navigation Screens

Tabs configured through global objects located at the top of every screen are used for general navigation through the HMI program. The exception to this requirement is the startup splash screens and small pop-up screens. While the content of a few of the tabs may change based on applications specifics; the System, Operation, and Production Tabs are universal to all projects. Tabs may be added or removed based on the application.

6.3 General Information Indicators

General information used by the application is to be located at the bottom of HMI application screens. Examples of this are: system date and time; robot indicators and alarms.

The image appears to be a screenshot of a Human-Machine Interface (HMI) splash screen. The splash screen is a graphical representation that is typically displayed when a machine or system is first started. This particular splash screen features:

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According to the text above the image, touching anywhere on this splash screen will navigate to the main operations screen of the HMI. The appearance of the splash screen may vary based on the specific application it is used for. This initial screen is an integral part of the user interface, providing users with a clear and branded entry point to the machine's controls.

6.4 System Screens

System screens are used for general machine setup and utilitarian operations. A majority of the functions available on the systems should screen more than likely should have security privileges associated with them. If the Security levels are not met, those functions should be not visible. Examples of system functions on the System HMI screens are: VFD frequency setup; Recipe Management System, Inspection Limits, IO Tests, Login, and Security Settings, Global Startup and Stopping Commands

Vial Fill System specific system screens and their uses shall be described in further detail in later section of this manual.

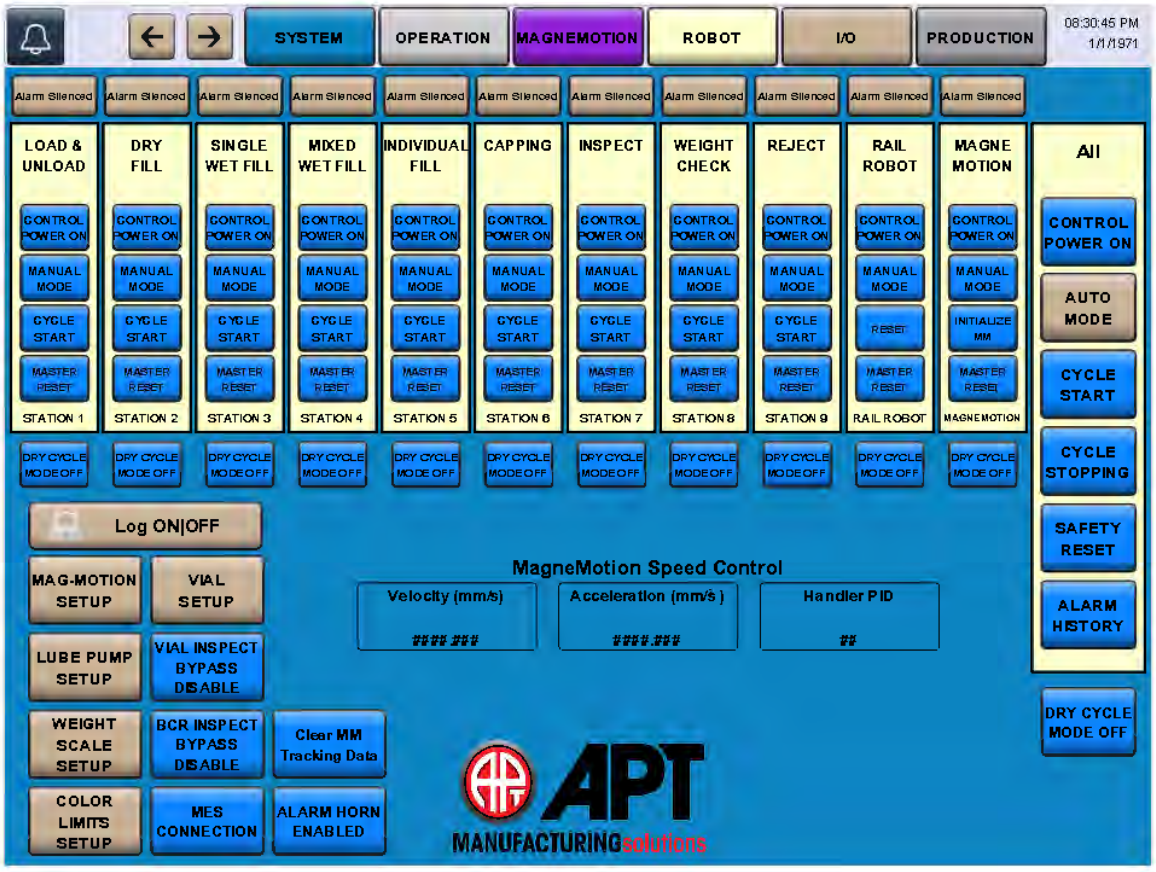


Figure 6-1 System Screen Example

The image Figure 6-1, appears to be a screenshot of a Human-Machine Interface (HMI) splash screen. The splash screen is a graphical representation that is typically displayed when a machine or system is first started. This particular splash screen features:

The logo and name of the University of Wisconsin-Milwaukee prominently displayed in the center, indicating the machine's ownership or association with the university.
The term "VIAL FILL MACHINE" just below the university's name, which describes the function or purpose of the machine.
Logos of Rockwell Automation and FANUC, suggesting that components or systems from these manufacturers are integrated into the machine.
The logo of APT Manufacturing Solutions, labeled "INTEGRATED BY," indicates the company responsible for assembling or configuring the HMI system.
According to the text above the image, touching anywhere on this splash screen will navigate to the main operations screen of the HMI. The appearance of the splash screen may vary based on the specific application it is used for. This initial screen is an integral part of the user interface, providing users with a clear and branded entry point to the machine's controls.

6.5 Operation Screens

Operation screens are used for general machine operation and functionality. Use of 3d model images are used wherever possible to aid with the intuitiveness and ease of use. Sensor indicators are located as close to the actual position of the input device as represented on the 3d image. In addition, the following are incorporated into the operations screen:

- Mode operators for machine control (Global Functions)
- Additional operation screen navigation
- Local messages to display current operational sequence step number and description
- Fault banner on top of the screen indicating current active alarms
- Manual functions and indicator of the function
    - E.g. Button, Output State, Sensor Input of manual function

Vial Fill System specific operation screens and their uses shall be described in further detail in later section of this manual.

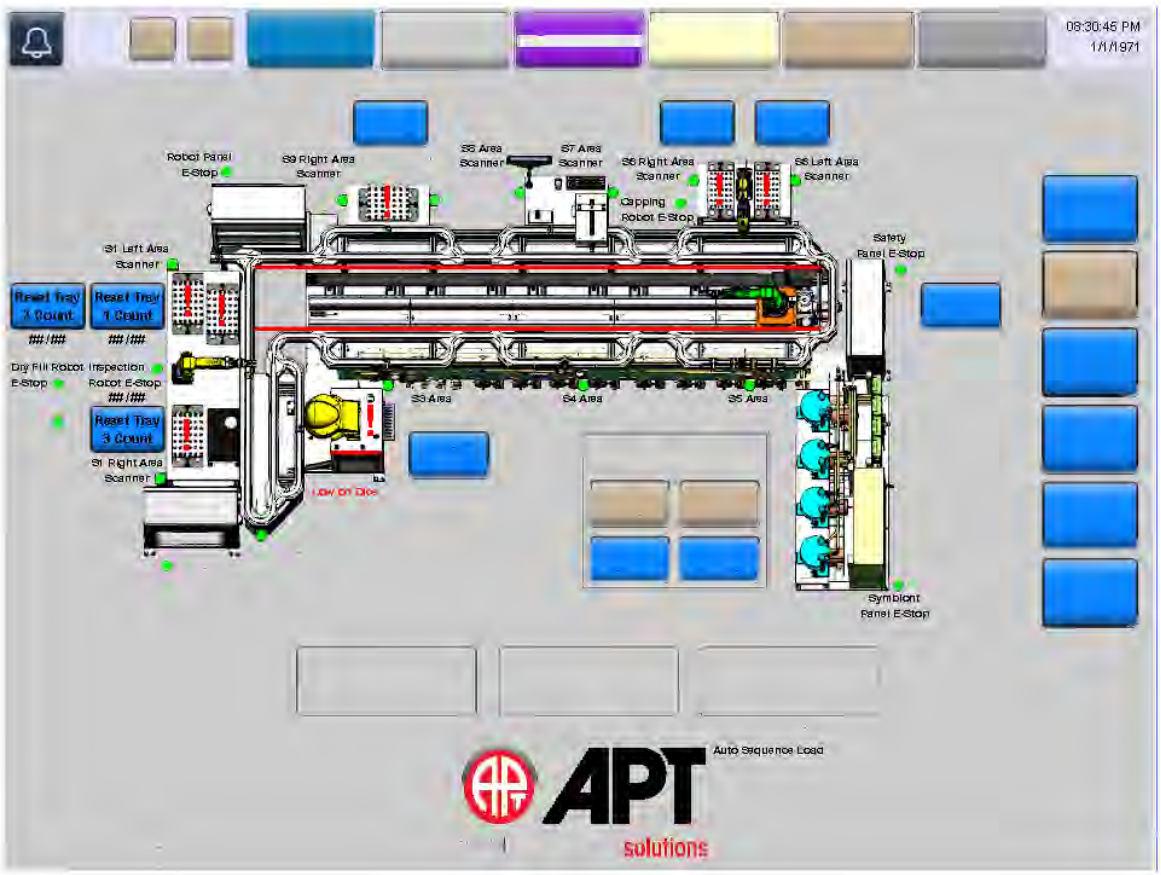


Figure 6-2 Operation Screen Example

The image Figure 6-2, appears to be a screenshot of an operational screen from a Human-Machine Interface (HMI) for industrial automation. This HMI screen provides a detailed overview of the system's status and controls for a manufacturing process, likely involving a vial filling machine based on previous context. The following elements are included in the screen:

Menu and Status Bar: At the top, there are tabs for system navigation such as "SYSTEM", "OPERATION", "ROBOT", and "PRODUCTION", along with a timestamp indicating the current time.

Process Visualization: The central part of the screen presents a graphical representation of the manufacturing process. It includes conveyor belts, robotic arms, and area scanners with various operational indicators.

Emergency Stops and Area Scanners: There are multiple Emergency Stop (E-stop) buttons and safety features such as area scanners highlighted throughout the process flow.

Control Buttons: On the right side, there are buttons labeled "CONTROL POWER ON", "AUTO MODE", "CYCLE START", "CYCLE STOPPING", "SAFETY RESET", and "ALARM HISTORY", which are used to manage the operation mode, start or stop production cycles, reset safety protocols, and review alarm logs.

Speed Control Settings: At the bottom, there are controls for "MagneMotion Speed Control", including settings for velocity and acceleration, indicating the system's capability to adjust the speed of the automated process.

Automation Sequences: There are indications of various automation sequences for different operational modes, such as dry fill and wet fill, suggesting the machine can handle different types of filling processes.

APT Manufacturing Solutions Branding: The logo at the bottom suggests that APT Manufacturing Solutions is the integrator or provider of this HMI system.

This operational screen serves as an interactive control panel for operators to monitor and control the vial filling machine's processes, indicating a highly automated and configurable system.

6.6 Robot Screens

Robot screens are used to view and manipulate the robot functions, I/O, and parameters. Manual control of the robot shall also be located on these screens. This includes pick, place, and go to operations along with manual control of the robot controlled I/O functions such as gripper open and close.

All I/O and interface signals should be displayed on the robot screens to aide in maintenance and troubleshooting efforts. This includes but not limited to digital I/O, Universal I/O, and Group I/O.

As with all manual functions, actions that may cause damage to the equipment or product should be interlocked through the PLC program or not allowed to be selected via the HMI. Modification of the HMI operator though "visibility" options is the preferred method.

Vial Fill System specific robot screens and their uses shall be described in further detail in later section of this manual.

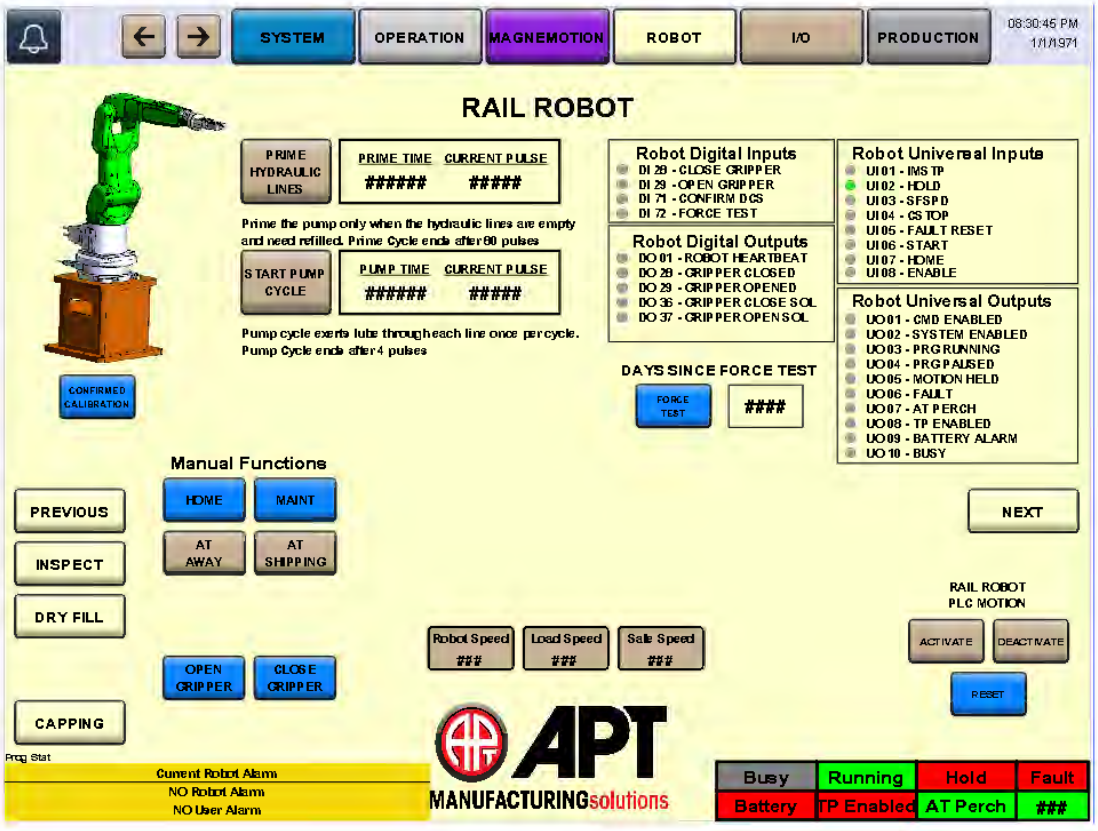


Figure 6-3 Robot Screen Example

The image Figure 6-3, appears to be another screenshot of an HMI (Human-Machine Interface) screen for a "RAIL ROBOT" system. Here's a description of the various components and information presented:

Navigation Bar: The top bar includes navigation tabs such as "SYSTEM", "OPERATION", "MAGNEMOTION", "ROBOT", "I/O", and "PRODUCTION". This suggests the interface is highly modular, allowing the user to switch between different operational views and settings.

Main Section: The central portion of the screen is divided into three columns with different types of information:

The left column lists operations like priming hydraulic lines, starting pump cycles, and manual functions such as "HOME", "MANUAL", "INSPECT", and "DRY FILL". This area is likely for initiating specific operational procedures or maintenance checks.
The middle column displays digital inputs and outputs for the robot, such as gripper open/close signals, robot heartbeat, and force test indicators, suggesting detailed monitoring and control over the robot's functions.
The right column shows universal inputs and outputs, including system status indicators like CV enabled, programming mode, fault, and battery alarm, providing a quick reference to the robot's various states and functionalities.
Robot Control and Status Indicators: At the bottom, there's a status bar showing the robot's operational status with indicators for "Busy", "Running", "Hold", "Fault", and a battery indicator. This offers real-time feedback on the robot's current condition.

APT Manufacturing Solutions Branding: The logo at the bottom of the screen indicates that APT Manufacturing Solutions may be the developer or integrator of this HMI system.

This screen is a user interface designed for operators to control and monitor various aspects of the rail robot's operation, providing vital information for efficient and safe machine handling.

6.7 I/O Screens

I/O screens include all I/O integrated into the system to aide in maintenance and troubleshooting efforts. Should faceplate pop-up screens be used, they shall be called from an I/O main screen.

Vial Fill System specific I/O screens and their uses shall be described in further detail in later section of this manual.

Figure 6-4 I/O Screen Example

The image Figure 6-4, is a screenshot from an HMI (Human-Machine Interface) displaying the status of various safety inputs and controls, specifically from a section called "Local Safety Input Module - Slot 3". Here's a detailed description:

The screen is divided into two columns, each listing different safety-related components with corresponding status indicators. All listed items are marked as "ON", suggesting they are currently active or engaged.

Left Column:

Safety Panel E-Stop: Two entries for channel A and B, indicating emergency stop buttons on a safety panel are engaged.
Process Panel E-Stop: Two entries for channel A and B, showing that emergency stops on a process control panel are active.
Robot Panel E-Stop: Two entries for channel A and B, suggesting that emergency stops on a robot control panel are in operation.
Symbiont Panel E-Stop: Two entries for channel A and B, indicating that emergency stops on a symbiont (possibly a system working in conjunction with the main robot) panel are activated.
Right Column:

Guard Door Interlocks OSSD1 and OSSD2: These are safety devices that ensure the guard doors are properly closed before machinery can operate. There are two interlocks listed, suggesting multiple safety checkpoints.
Guard Door Locked: This indicates that a guard door is secured in place, which is a necessary safety precaution in industrial settings.
Safety Panel Control Power Reset and Process Panel Control Power Reset: These entries suggest there are reset controls for power on both the safety and process panels.
Robot Panel Control Power Reset: Similar to the above, this is a reset control for the robot panel's power.
E-Stop Power Safety EDM: Two entries, possibly referring to an Emergency Stop Power Safety External Device Monitoring system, which ensures that the emergency stops are functional and will trigger as expected in case of an emergency.
The interface provides critical safety status information to the operator, ensuring that all emergency protocols are ready to be deployed and that safety interlocks are properly engaged for secure operation. The "PREVIOUS" and "NEXT" buttons suggest the user can navigate through different screens, possibly viewing various modules or aspects of the safety system.

6.8 Production Data Screen

Production data screens display the relevant information collected from the machine. A number of data points are automatically collected within the program provided.

Vial Fill System specific production screens and their uses shall be described in further detail in later section of this manual.

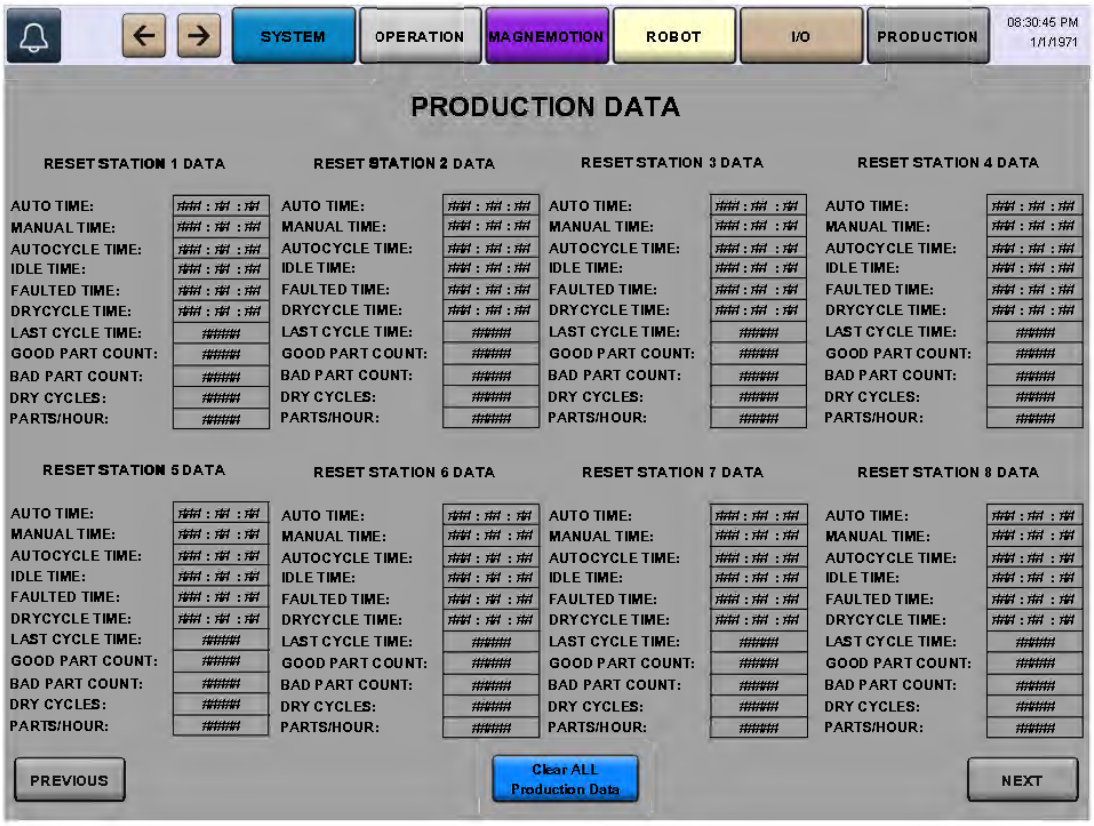


Figure 6-5 Production Data Screen Example

The image Figure6-5, is a screenshot of a "Production Data Screen" from an HMI (Human-Machine Interface). It seems to be designed for monitoring and resetting the operational data of various production stations. Here's a detailed description:

General Layout:
- The screen is organized into a grid with eight sections, each corresponding to a different station's data.
- Each section contains a set of parameters that are tracked for the production process, such as "AUTO TIME", "MANUAL TIME", "AUTOCYCLE TIME", etc.
- "GOOD PART COUNT", "BAD PART COUNT", and "PARTS/HOUR" are likely key performance indicators for the production quality and efficiency.
- The "DRYCYCLE TIME" might refer to the time taken for operations without actual production, perhaps for setup or testing.

Parameters Tracked:
- **AUTO TIME**: The duration when the station operates automatically without manual intervention.
- **MANUAL TIME**: The time the station is operated manually by a worker.
- **AUTOCYCLE TIME**: The time for one complete cycle of automatic operation.
- **IDLE TIME**: The time when the station is not active or producing.
- **FAULTED TIME**: The duration for which the station was down due to faults or errors.
- **DRYCYCLE TIME**: The time taken by the station to perform a cycle without producing any parts, possibly for testing or calibration.
- **LAST CYCLE TIME**: The duration of the last completed cycle.
- **GOOD PART COUNT**: The number of quality parts produced that meet the standards.
- **BAD PART COUNT**: The number of parts produced that do not meet quality standards.
- **DRY CYCLES**: The number of dry cycles completed, which could refer to cycles run without actual production for purposes such as cleaning or maintenance.
- **PARTS/HOUR**: The production rate, indicating how many parts are produced per hour.

Functional Buttons:
- There's a "Clear ALL Production Data" button that likely resets all the data fields for each station to start fresh data tracking.
- "PREVIOUS" and "NEXT" buttons suggest that this screen is part of a series of screens the user can navigate through.

This interface would be crucial for operators and production managers to monitor performance, identify inefficiencies, and make data-driven decisions to improve the production process.

6.9 MagneMotion Screen

MagneMotion screens are used to view and manipulate the MagneMotion transport system's functions, I/O, and parameters.

Vial Fill System specific MagneMotion screens and their uses shall be described in further detail in later section of this manual.

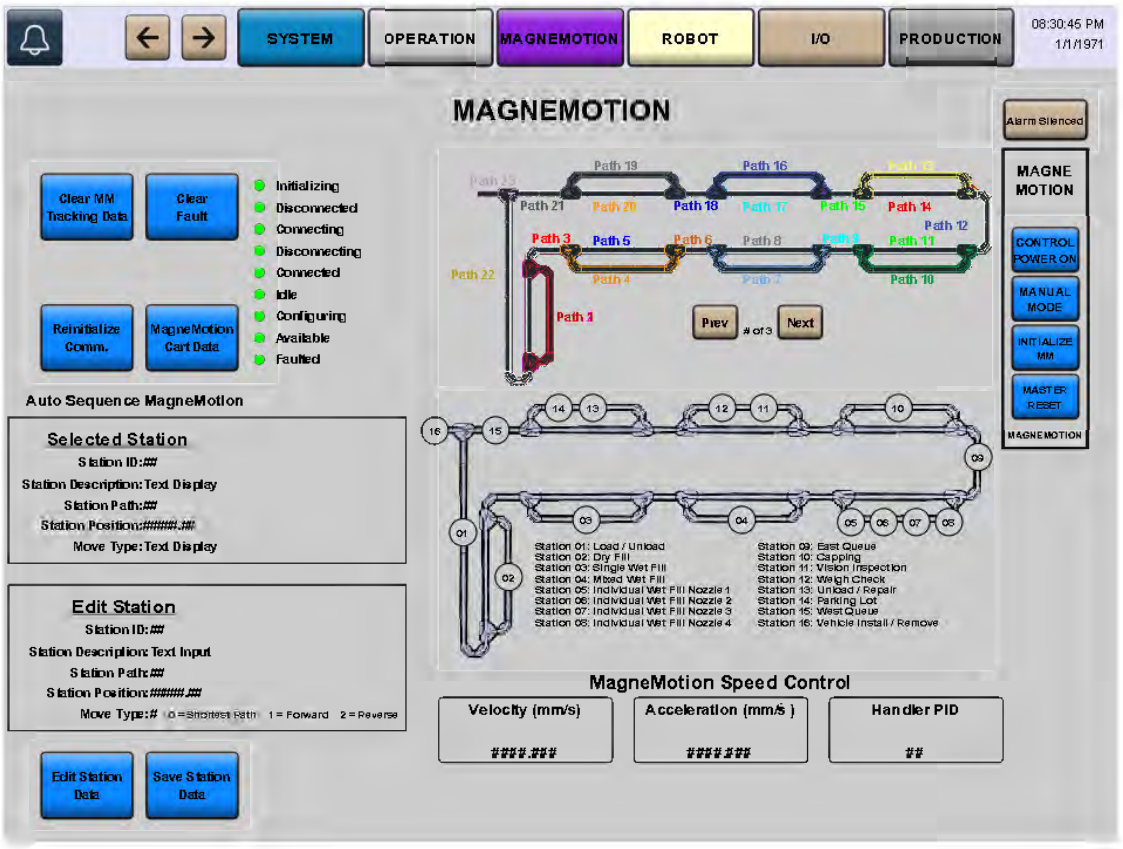


Figure 6-6 MagneMotion Screen Example

Figure 6-6: The provided image is a screenshot from an HMI (Human-Machine Interface) detailing the MagnaMotion system, which is likely a type of automated guided vehicle (AGV) system or conveyor for material handling in a production environment. Here's a breakdown of the screen components:

System Map and Pathways:
- The central area of the screen shows a schematic of the production floor with various paths labeled (Path 1, Path 2, etc.), indicating the routes that the AGV or materials can take within the system.
- Each path interconnects different stations, which are likely locations where specific tasks are performed (e.g., filling, capping, inspection).
- The schematic also indicates the current position of objects on the paths with numbers (01, 02, etc.), representing either the AGVs or the stations.

Station Information:
- A sidebar lists specific stations along with their functions, such as "Dry Fill", "Capping", "Vision Inspection", etc., which correspond to the numbered points on the system map.
- There is functionality to select, view, and edit specific station details like the station ID, description, path, and movement type. This allows for customizing the behavior of stations or the paths between them.

Control and Status Indicators:
- On the left side, there are buttons and status lights indicating the connection and operational status of the MagnaMotion system, including "Disconnected", "Connecting", "Idle", "Faulted", etc.
- There are also options to clear tracking data, clear faults, and reinitialize communications, suggesting troubleshooting and maintenance features.
- On the right, there are buttons for "CONTROL POWER ON", "MANUAL MODE", "INITIALIZE HM", and "MASTER RESET", offering direct control over the system's operational mode and setup.

Speed Control:
- At the bottom, there are adjustable settings for "Velocity" and "Acceleration", indicating the parameters can be tuned for the speed at which the AGVs or conveyor belts move.
- A "Handler PID" setting is also present, which might refer to a proportional-integral-derivative controller used for precise control of the motion system.

Interface Navigation:
- "PREV" and "NEXT" buttons suggest the ability to navigate through different pages or sections of the HMI.
- The "Clear MM Tracking Data" button likely resets the movement history of the system for tracking purposes.

This interface would be used by operators to monitor and adjust the flow of production, manage the movement of materials, and troubleshoot the automated system. It provides a high-level overview of the MagnaMotion system's operation and allows for real-time interaction and control.

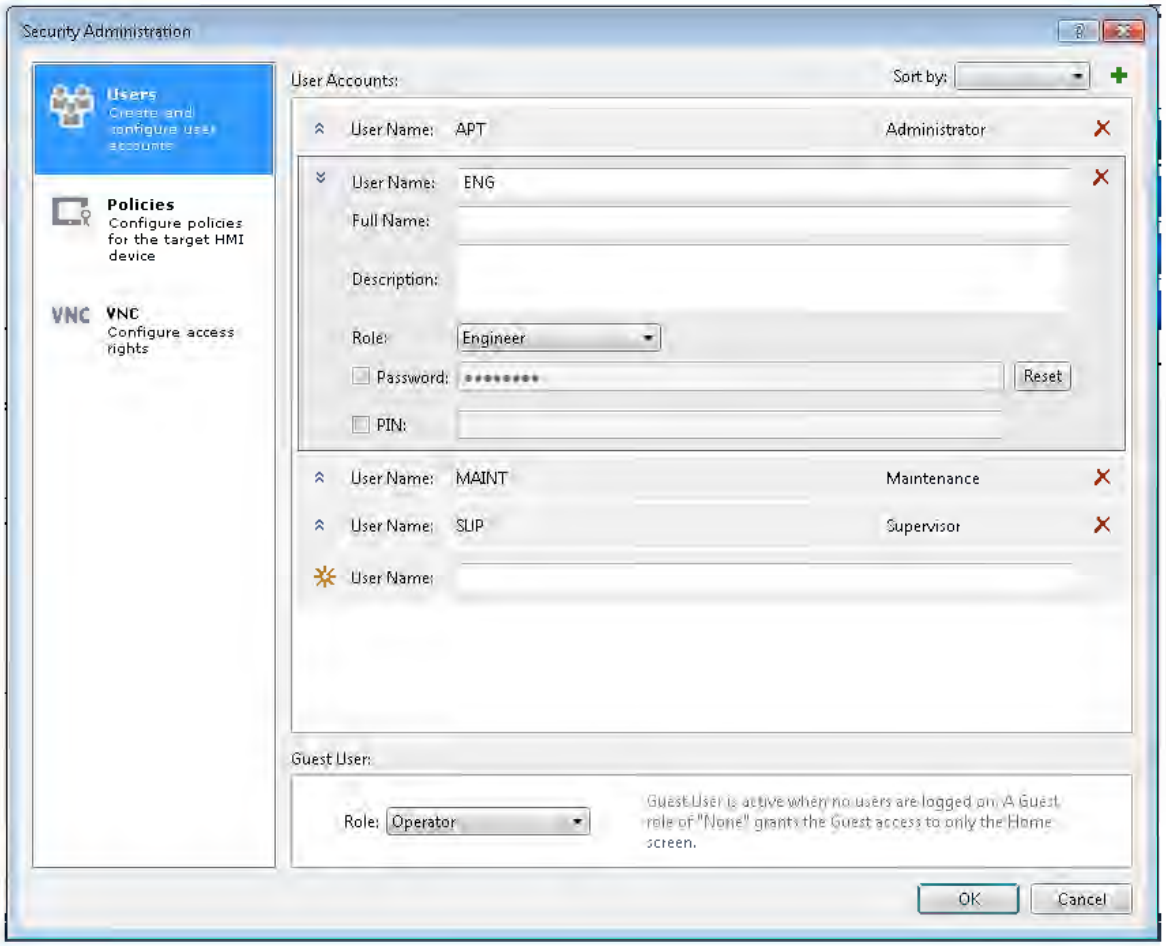
7 HMI Security

Typical application and HMI Security shall utilize the built-in security features of the HMI. Only applications that need to interface with plant systems for security authorizations shall use PLC based security functionality.

Unless otherwise provided by the customer at the time of Purchase Order and Project Kick-Off meeting, the following security levels and passwords have been used.

Security:

User	Password
APT	801
SUP	see
MAINT	fix
ENG	idea



The uploaded image shows a section of an operational manual concerning HMI (Human-Machine Interface) security. It describes the security features and user access levels within the HMI system.

Key Points from the Text:
- The HMI utilizes built-in security features for typical applications.
- For interfaces with plant systems that require security authorizations, PLC (Programmable Logic Controller) based security functionality is used.
- Security levels and passwords are predefined unless specified otherwise by the customer at the time of purchase or during project kickoff meetings.

Table of User Access Levels:
The table lists different user roles with their corresponding passwords:
- APT (Administrator) with password '801'.
- SUP (Supervisor) with password 'see'.
- MAINT (Maintenance) with password 'fix'.
- ENG (Engineering) with password 'idea'.

Screenshot of Security Administration Window:
- The window displays user accounts and roles such as Administrator, Engineer, Maintenance, and Supervisor.
- It appears to allow for the creation, editing, and deletion of user accounts.
- It includes fields for User Name, Full Name, Description, and Role, with a password field that can be reset.

Security Implications:
- The security measures ensure that only authorized personnel can access certain levels of the HMI system, likely to make changes to operational parameters, settings, or to perform maintenance and troubleshooting tasks.

Caution:
- The displayed passwords should be changed from their defaults to maintain security.
- Access to this manual section should be controlled and monitored to prevent unauthorized use of the HMI system.

The manual emphasizes the importance of security in HMI systems, outlining the default access credentials and the methodology for managing user roles and access rights.he uploaded image shows a section of an operational manual concerning HMI (Human-Machine Interface) security. It describes the security features and user access levels within the HMI system.
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- Access to this manual section should be controlled and monitored to prevent unauthorized use of the HMI system.
The manual emphasizes the importance of security in HMI systems, outlining the default access credentials and the methodology for managing user roles and access rights.

8 Passwords

APT makes all efforts to use the default passwords provided with the hardware. However, it is common for the hardware manufacture to require changing of the default passwords. Unless otherwise provided by the customer at the time of Purchase Order and Project Kick-Off meeting, the following passwords shall be used.

Standard Password:	APTmfg801
Password Requiring Special Character:	APTmfg801!
Numeric Only Password:	801
Numeric and Special Character:	801!
Studio 5000 VNC Password:	APTmfg

**HMI equipment with VNC server installed will be configured with read and control access set to the numeric password listed in the table above. VNC hardware requiring special characters will use the numeric and special character password listed in the table above.

9 Vial Fill Machine Setup

9.1 Station Setup

This section provides a brief description of how to navigate and configure the stations through the HMI system setup screens. Some setup configurations are only accessible under security accounts.

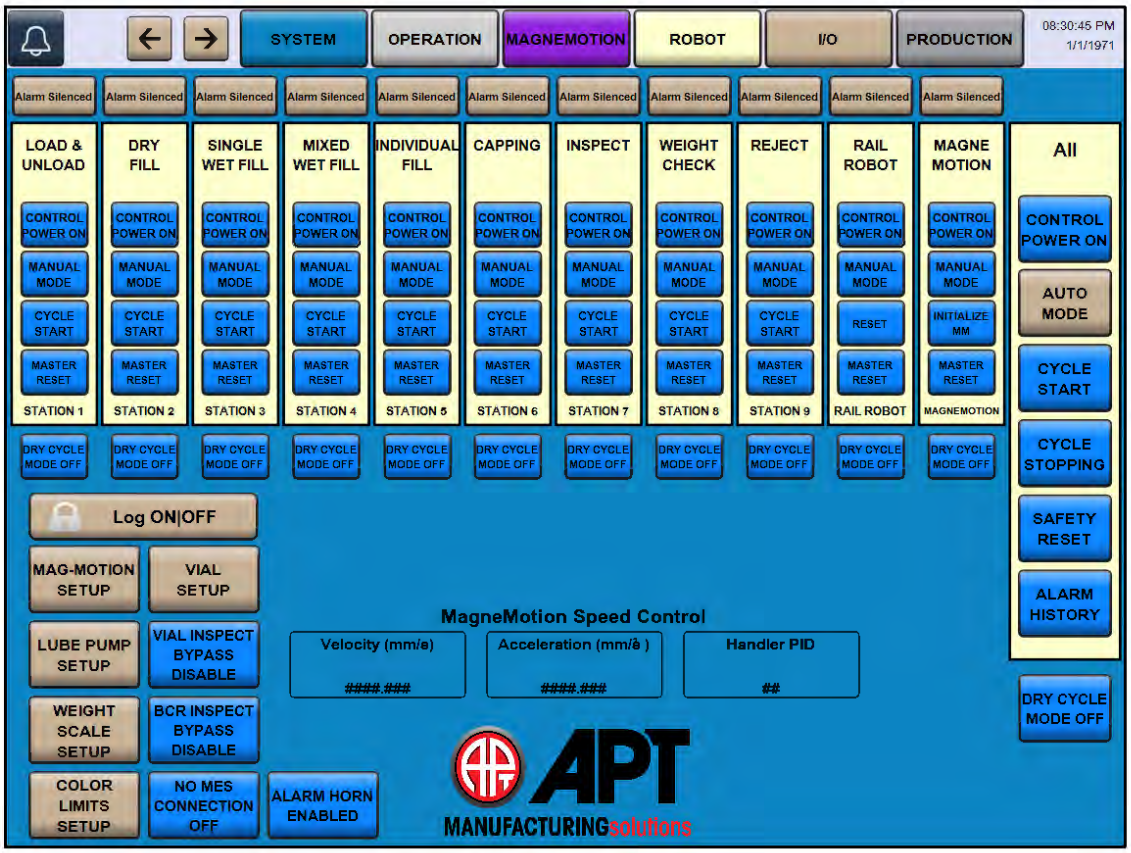


Figure 9-1 System Setup Main Screen

The image Figure 9-1, is a screenshot of the "System Setup Main Screen" from an HMI (Human-Machine Interface), specifically for a Vial Fill Machine setup. This screen is likely used for configuring various stations and parameters of the vial filling process. Here's a detailed description of the screen's components:

Configuration Buttons:

The screen features a series of buttons corresponding to different stations and their operational modes, such as "LOAD & UNLOAD", "DRY FILL", "SINGLE WET FILL", "MIXED WET FILL", and so on, up to "MAGNE MOTION" and "All".
Each station button has associated controls for "CONTROL POWER ON", "MANUAL MODE", "CYCLE START", and "MASTER RESET", indicating the ability to power the station, set it to manual or automatic mode, begin a production cycle, and reset the station to default settings.
Station Specifics:

Beneath the station buttons, there are indicators for "DRY CYCLE MODE OFF", showing the status of a dry run mode for each station, which may be used for testing or setup without actual production.
Setup and Configuration Options:

Lower in the screen, there are additional setup options for "MAG-MOTION SETUP", "VIAL SETUP", "LUBE PUMP SETUP", and other specific configurations for the machine's operation.
These include the ability to bypass certain features (like "VAL INSPECT" or "WEIGHT SCALE"), adjust "COLOR LIMITS", and toggle "ALARM HORN ENABLED".
Speed Control:

At the bottom, there are controls for "MagneMotion Speed Control", with fields to input "Velocity (mm/s)", "Acceleration (mm/s)", and "Handler PID", suggesting these are adjustable parameters for the movement of the machine components or transport system.
Interface Navigation:

The top of the screen includes a navigation bar with tabs for "SYSTEM", "OPERATION", "MAGNEMOTION", "ROBOT", "I/O", and "PRODUCTION", along with a timestamp in the top right corner.
Each tab appears to represent a different aspect of the machine's operation or setup, with "MAGNEMOTION" presumably relating to a conveyor or transport system within the machine.
Security Note:

The text above the screen indicates that some setup configurations are only accessible under certain security accounts, emphasizing the importance of user permissions in managing machine settings.
Branding:

The "APT MANUFACTURING solutions" logo at the bottom center suggests the company responsible for the HMI software or machine integration.
This main setup screen is a centralized control panel for operators to manage various aspects of the vial filling machine, enabling precise adjustments to optimize the production process.

9.1.1 Login / Logout

The system login screen is where different security accounts can be entered or exited to access different functions of the HMI. The display shows the current user logged in. By selecting the login button, a pop-up will allow for entry of a user and password. Selecting the logout button, the system will log out to the “Default” user security profile. User accounts and passwords are only editable via the View Designer Application development software.

Figure 9-2 Login Screen PopUp

9.1.2 Dry Cycle Mode

When Dry Cycle Mode On is selected, the station will emulate an auto sequence once the system is started ignoring part presence indicators. For Dry Cycle to function, no parts can be in the system. Each time the system is started up in Dry Cycle mode, the Dry Cycle count is reset.

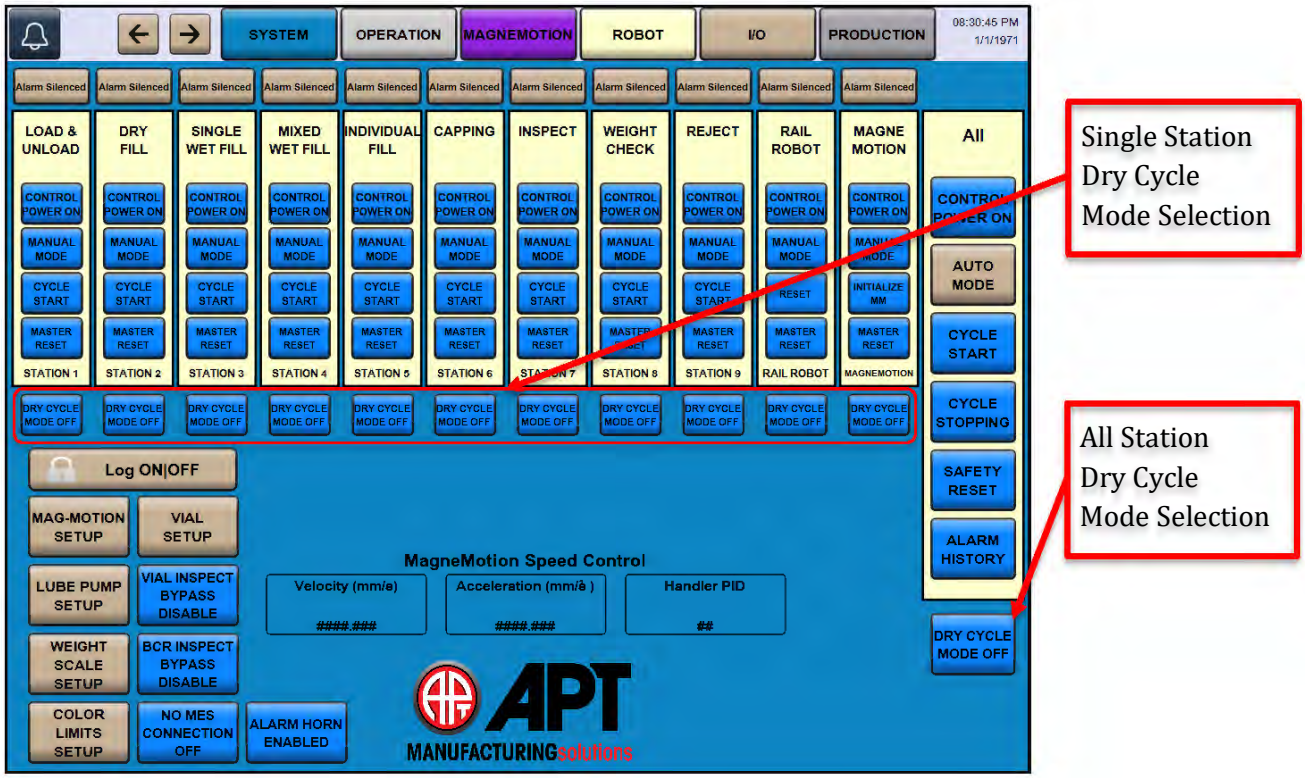


Figure 9-3 Dry Cycle Mode Selection

The Figure 9-3, appears to be of the "System Setup Main Screen" for a Vial Fill Machine HMI (Human-Machine Interface). This screen is part of the machine's control system used to configure various operational parameters.

Here's a breakdown of the elements visible in the screenshot:

Navigation and Status Bar: The top of the screen has a navigation bar with tabs labeled "SYSTEM," "OPERATION," "MAGNEMOTION," "ROBOT," "I/O," and "PRODUCTION." These likely correspond to different sections of the HMI for controlling various aspects of the machine. Each tab has an 'Alarm Silenced' indicator next to it.

Station Setup Section: The main part of the screen contains a grid of buttons for different stages of the vial filling process, such as "LOAD & UNLOAD," "DRY FILL," "SINGLE WET FILL," etc. Each stage has associated control buttons for power, mode selection, cycle start, and reset.

Dry Cycle Mode Indicators: Beneath the station buttons are indicators showing whether the "DRY CYCLE MODE" is off for each station. This mode is likely used for running the machine without actual production, possibly for setup, testing, or cleaning.

Setup and Configuration Options: Below the station indicators, there are additional settings for deeper configuration, such as "MAG-MOTION SETUP," "VIAL SETUP," and "LUBE PUMP SETUP." Options to bypass certain systems (e.g., "VAL INSPECT BYPASS") and to toggle alarms are also present.

MagneMotion Speed Control: At the bottom of the screen, there are fields to adjust the "Velocity" and "Acceleration" of the MagneMotion system, which is presumably the conveyor or transport mechanism within the machine. There's also a field for "Handler PID," which might be a setting for a motion control algorithm.

Branding: The "APT MANUFACTURING solutions" logo suggests the company associated with the HMI or the machine.

Security Note: A note above the main screen indicates that some setup configurations are accessible only under certain security accounts, emphasizing the role of user permissions in system configuration.

Log On/Off: A button for logging on or off is provided, suggesting that user authentication is necessary for accessing certain functions.

This interface is crucial for technicians and operators who need to set up the machine for different production requirements and perform troubleshooting or maintenance tasks. The HMI provides a user-friendly way to control complex machinery with precision.

9.1.3 Robot Speeds

Robot general override speeds are linked and controlled by the system PLC and are configurable through the HMI robot screens. Three override speeds are available for modification.

The general robot speed sets the speed of the robot for all general movements.

The robot load speed configuration controls the speed of the robot while the robot has a part on the end of arm tool (EOAT).

The robot safe speed configuration controls the speed of the robot during safe move functions such as performing a safe home routine, or when an obstruction is detected in the area scanner warning zone.

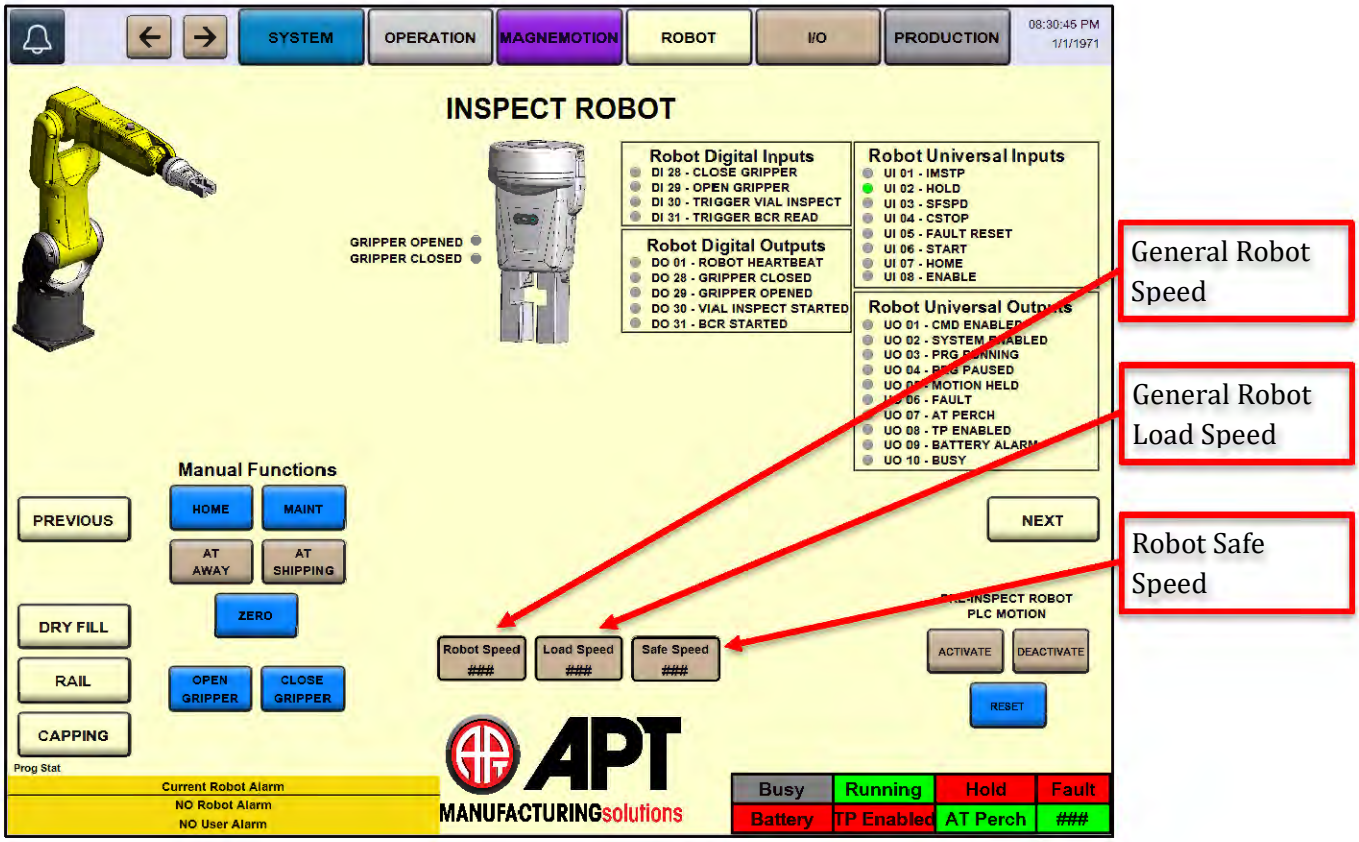


Figure 9-4 Robot Speed Configuration

The Figure 9-4, is a screenshot from an HMI (Human-Machine Interface) section that outlines "Robot Speed Configuration" within a manufacturing setting. The section is detailed in the manual as "9.1.3 Robot Speeds."

Here's a breakdown of the elements present in the screenshot:

Text Description: The text above the screenshot provides an explanation of the robot speed settings, which are linked to the system PLC (Programmable Logic Controller) and can be modified through the HMI robot screens. It mentions three types of override speeds:

General Robot Speed: This is the default speed setting for the robot's general movements.
General Robot Load Speed: This setting adjusts the robot's speed when it has a part on the end of its arm tool (EOAT - End Of Arm Tool).
Robot Safe Speed: This speed is specifically for safe movement functions such as executing a safe home routine or responding to obstructions detected in the area scanner warning zone.
HMI Interface:

The interface features a navigation bar at the top with tabs for "SYSTEM," "OPERATION," "MAGNEMOTION," "ROBOT," "I/O," and "PRODUCTION," which allow the user to switch between different operational views of the HMI.
The "INSPECT ROBOT" section of the screen appears to be highlighted, suggesting that this is the current focus within the HMI.
Control Buttons:

Below the robot image are manual function buttons such as "HOME," "MAINT," "AT AWAY," and "SHIPPING," indicating quick access for operators to perform common tasks.
There are also controls for "DRY FILL," "RAIL," "CAPPING," including "OPEN GRIPPER" and "CLOSE GRIPPER" buttons, which are likely used for direct manipulation of the robot's gripper.
Speed Configuration Sliders:

Three sliders are shown: "Robot Speed," "Load Speed," and "Safe Speed," each with numerical values, presumably to adjust the speed of the robot's movements according to different operational requirements.
Branding:

The "APT MANUFACTURING solutions" logo is visible, which likely identifies the company associated with the HMI or the machinery.
Status Indicators:

At the bottom of the interface, there are status indicators for the robot such as "Busy," "Running," "Hold," "Fault," along with a battery indicator, "TP Enabled," and a field labeled "AT Perch."
Security and Control Features:

There are additional operational controls such as "ACTIVATE," "DEACTIVATE," and "RESET," and the screenshot also includes an indication of the current robot alarm status.
This screen is used to finely control the robot's speed during various operations to ensure efficiency and safety in the facility's workflow. The speed settings are likely critical for maintaining optimal performance while adhering to safety standards, especially when the robot interacts with human operators or other machinery.

9.1.4 Inspection Bypass

The vial inspect bypass will accept vials with pass conditions while enabled.

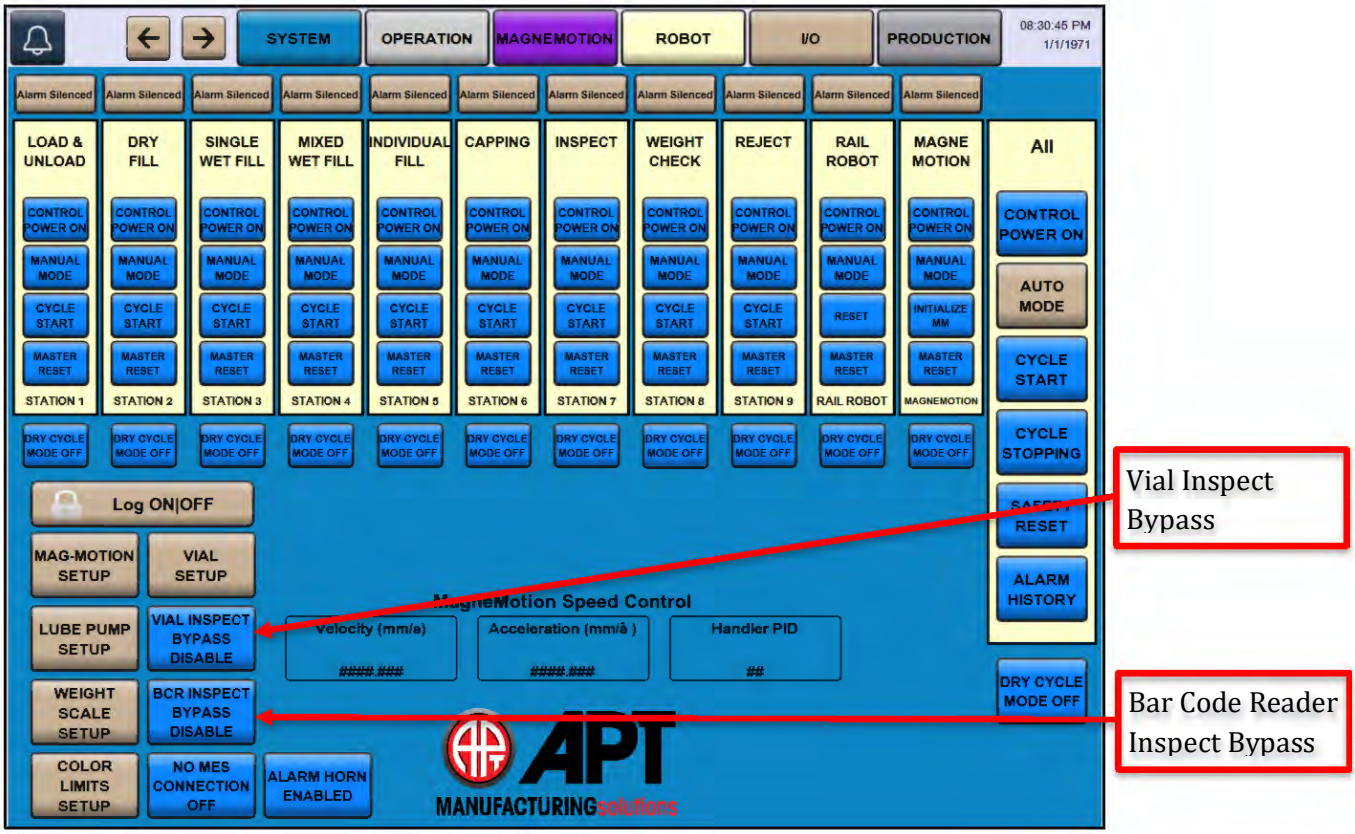


Figure 9-5 Stack Light Test Feature

The Figure 9-5, is a screenshot from an HMI (Human-Machine Interface), specifically focusing on a feature called "Inspection Bypass" under section 9.1.4 of an operational manual.

Key Features Identified in the Screenshot:

Inspection Bypass Function: The text above the interface explains that the "Vial Inspect Bypass" will allow vials with pass conditions to bypass the normal inspection process when this feature is enabled. This could be used to streamline operations when conducting inspections is not necessary, such as when running known good samples or during certain testing scenarios.

HMI Interface:

The interface includes various control buttons for different production stages, such as "LOAD & UNLOAD", "DRY FILL", "SINGLE WET FILL", "MIXED WET FILL", and more, suggesting a comprehensive control system for the vial filling process.
Each production stage button has associated controls for power, mode selection, cycle start, and master reset.
Setup Options:

There are lower-level setup options for "MAG-MOTION SETUP", "VIAL SETUP", "LUBE PUMP SETUP", and other machine-specific configurations.
The "VIAL INSPECT BYPASS" toggle is highlighted, which matches the section title, indicating that this is the interface control for the inspection bypass feature.
The "BAR CODE READER INSPECT BYPASS" might be another specific bypass feature for barcode inspection processes.
MagneMotion Speed Control:

At the bottom of the screenshot, there are fields to adjust the "Velocity" and "Acceleration" of the MagneMotion system, along with a "Handler PID", which are likely parameters for the speed control of the conveyor or transport system.
Branding:

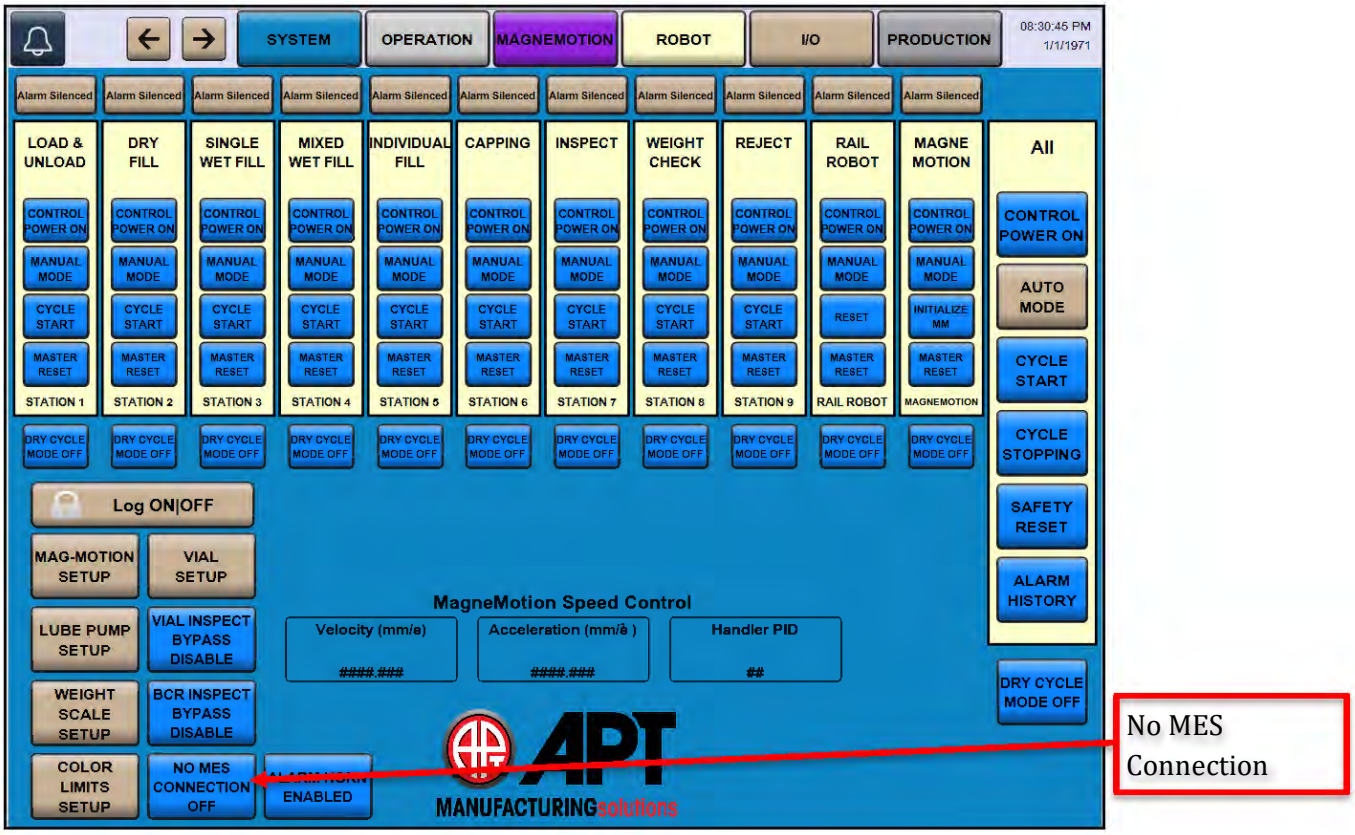
The "APT MANUFACTURING solutions" logo indicates the company associated with the HMI or the machinery.
Navigation and Status Bar:

A navigation bar at the top of the interface includes tabs for different operational aspects of the machine, such as "SYSTEM", "OPERATION", "MAGNEMOTION", "ROBOT", "I/O", and "PRODUCTION".
Status indicators for alarms, likely related to the operational status of different system components, are also visible.
Security Note:

The option to "Log ON/OFF" suggests that user authentication is important for accessing and altering system configurations.
This section of the HMI allows operators to control the flow of production and manage specific functions such as bypassing certain inspections for efficiency or testing purposes. It highlights the detailed level of control provided to operators and the importance of secure access to such controls.

9.1.5 No Mes Connection

Randomly populates process data into the production queue.



The above image provided is a screenshot of an HMI (Human-Machine Interface) from a section titled "9.1.5 No Mes Connection". The interface is likely part of a control system for a manufacturing process, and the highlighted "No MES Connection" feature indicates that this part of the HMI deals with scenarios where there is no connection to the Manufacturing Execution System (MES).

Key Elements on the Screen:

No MES Connection Feature: This toggle switch is set to "OFF," implying that when turned on, it would allow the system to populate process data into the production queue randomly. This feature might be used for testing or when the MES is unavailable to provide real-time data.

HMI Interface:

The interface shows a navigation bar at the top with different tabs like "SYSTEM," "OPERATION," "MAGNEMOTION," "ROBOT," "I/O," and "PRODUCTION," reflecting the various sections or modules of the manufacturing system that can be controlled or monitored through the HMI.
Each section of the manufacturing process from "LOAD & UNLOAD" to "MAGNE MOTION" has corresponding control buttons for "CONTROL POWER ON," "MANUAL MODE," "CYCLE START," and "MASTER RESET."
Operational Control:

Beneath the process section, there are "DRY CYCLE MODE OFF" indicators for each station, showing the status of a non-production mode for the system.
Additional Setup Options:

The bottom section of the screen includes various setup options like "MAG-MOTION SETUP," "VIAL SETUP," "LUBE PUMP SETUP," and others, which provide detailed control over specific aspects of the manufacturing process.
The "VIAL INSPECT BYPASS" and "BCR INSPECT BYPASS" options suggest functionality to skip certain inspection steps, potentially for speed or testing purposes.
Speed Control:

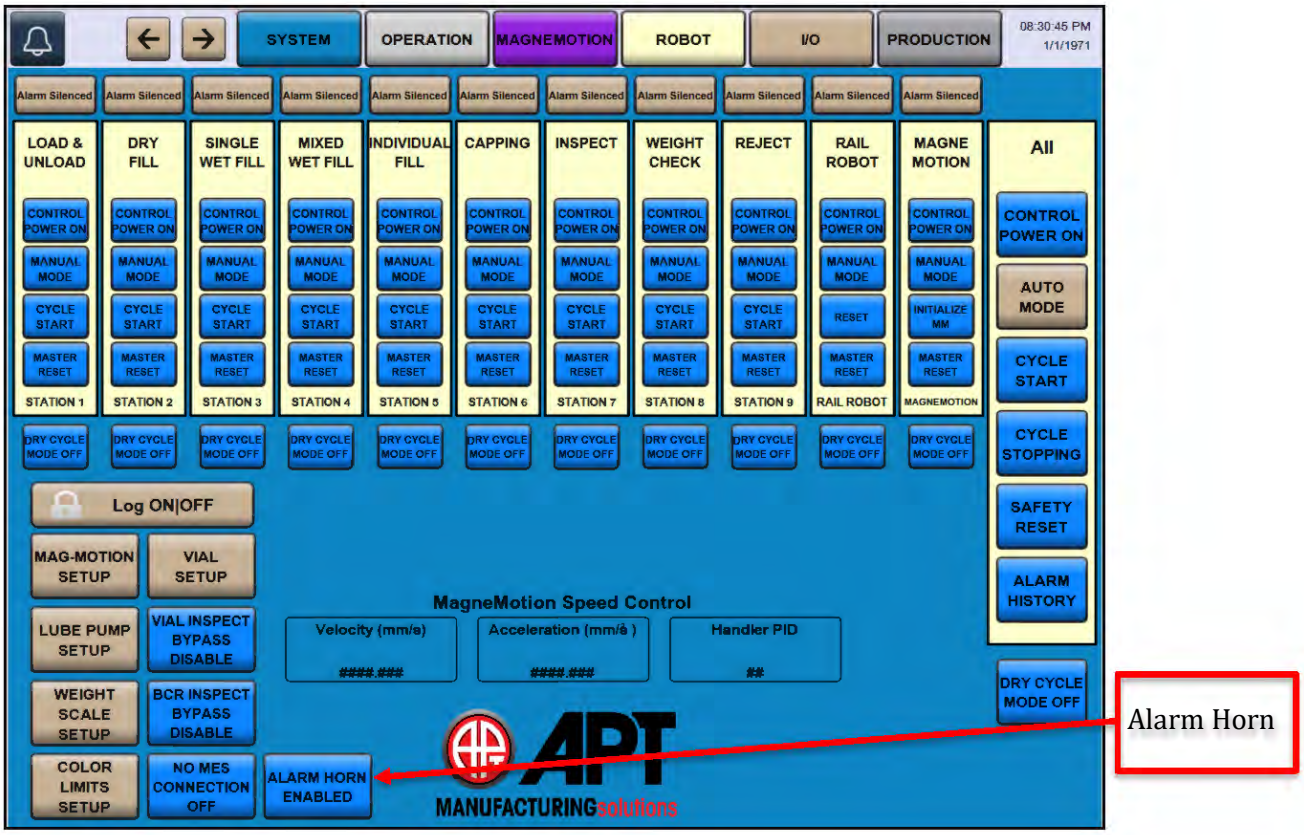
There are controls for "MagneMotion Speed Control" with fields to input "Velocity" and "Acceleration," indicating adjustable parameters for the transport system's motion.
Branding:

The "APT MANUFACTURING solutions" logo implies the company associated with the HMI or machine integration.
Security and Authentication:

The "Log ON/OFF" button points to the system's security measures, requiring user authentication for accessing or modifying configurations.
This HMI screen is designed to provide operators with a comprehensive set of tools for managing a complex manufacturing system, ensuring they can maintain production even in the absence of MES data integration.

9.1.6 Alarm Horn

Disables the alarm from emitting noise when a system fault is triggered. Horn will still trigger when cycle starting the cell.



The above image is a screenshot of an HMI (Human-Machine Interface) screen, specifically highlighting the "Alarm Horn" feature under section 9.1.6 of a manual.

Key Elements on the Screen:

Alarm Horn Feature: The text above the interface explains that this feature, when enabled, prevents the alarm from making noise in the event of a system fault. However, the horn will still activate when starting the cycle of the cell. This function allows for a quieter work environment while maintaining important audible alerts for specific operations.

HMI Interface:

Similar to previous screenshots, the top of the interface features a navigation bar with tabs labeled "SYSTEM," "OPERATION," "MAGNEMOTION," "ROBOT," "I/O," and "PRODUCTION," indicating different sections of the machine's control system.
Each stage of the manufacturing process, from "LOAD & UNLOAD" to "MAGNE MOTION," has associated control buttons for "CONTROL POWER ON," "MANUAL MODE," "CYCLE START," and "MASTER RESET."
Setup and Configuration Options:

The lower section of the screen provides setup options for "MAG-MOTION SETUP," "VIAL SETUP," "LUBE PUMP SETUP," and other machine-specific configurations.
Notably, the "ALARM HORN ENABLED" option is highlighted, showing that it is active and thus the system is set to emit an audible alert under the conditions described.
Speed Control:

There are fields for "MagneMotion Speed Control" to adjust the "Velocity" and "Acceleration" of the system, as well as a field for "Handler PID," which might be a setting for precise motion control.
Branding:

The "APT MANUFACTURING solutions" logo is prominently displayed, indicating the company associated with the HMI or machine integration.
Security and Authentication:

The "Log ON/OFF" button suggests that secure access is required for system configuration changes.
This screen is a centralized control panel for operators to manage various aspects of the manufacturing system, enabling customization of auditory alerts for a more efficient and less disruptive operation. The ability to disable the alarm horn except for cycle initiation ensures that operators are alerted to important events without unnecessary noise.

9.2 Sequence of Operations

PLC logic provided with the demonstration program uses sequence-based logic otherwise known as step logic. The following section details the sequence of operations for all stations in the logic. This information is also provided on the HMI as the station steps though its sequence.

9.2.1 Station 1 Load Auto Sequence

Station 1 Step 10: Pick Empty Vial from Tray 3
Station 1 Step 20: Waiting for Vial to be Picked from Tray 3
Station 1 Step 30: Inspect Vial Position 1
Station 1 Step 40: Waiting for Vial Inspection Position 1 to Complete
Station 1 Step 50: Checking Position 1 Inspection Results
Station 1 Step 60: Inspect Vial Position 2
Station 1 Step 70: Waiting for Vial Inspection Position 2 to Complete
Station 1 Step 80: Checking Position 2 Inspection Results
Station 1 Step 90: Inspect Vial Position 3
Station 1 Step 100: Waiting for Vial Inspection Position 3 to Complete
Station 1 Step 110: Checking Position 3 Inspection Results
Station 1 Step 115: Checking for BCR Bypass
Station 1 Step 120: Inspect Vial Bar Code Reader
Station 1 Step 130: Waiting for Vial Bar Code Reader to Complete
Station 1 Step 140: Checking Bar Code Reader Results
Station 1 Step 150: Merge Current Vial Data with Scheduler Data
Station 1 Step 160: Wait for MagneMotion Vehicle Present
Station 1 Step 170: Load Vial to MagneMotion
Station 1 Step 180: Waiting for Vial to be Loaded onto MagneMotion
Station 1 Step 190: Transfer Vial Data to MagneMotion Vehicle
Station 1 Step 200: Updating Production Data / End of Cycle
Station 1 Step 300: Load Vial to Tray 1 Reject
Station 1 Step 310: Waiting for Vial to be Loaded to Reject Tray
Station 1 Step 320: Transferring Vial Data from Robot to Reject Tray

9.2.2 Station 1 Unload Auto Sequence

Station 1 Step 10: Pick Vial from MagneMotion
Station 1 Step 20: Waiting for Vial to be Picked from MagneMotion
Station 1 Step 30: Transfer Part Tracking Data to Robot
Station 1 Step 40: Evaluating Tracking Data
Station 1 Step 50: Place Bad Vial to Reject Tray (Tray 1)
Station 1 Step 60: Waiting for Vial to be Placed to Reject Tray (Tray 1)
Station 1 Step 70: Transfer Part Tracking Data to Reject Tray (Tray 1)
Station 1 Step 80: Increment Reject Tray Count
Station 1 Step 90: Place Good Vial to Finished Tray (Tray 2)
Station 1 Step 100: Waiting for Vial to be Placed to Finished Tray (Tray 2)
Station 1 Step 110: Transfer Part Tracking Data to Finished Tray (Tray 2)
Station 1 Step 120: Update Production Data / End of Cycle

9.2.3 Station 2 Auto Sequence

Station 2 Step 10: Sending Process Data to Robot
Station 2 Step 20: Trigger Dry Fill Robot to Run
Station 2 Step 30: Waiting for Robot to Run (PNS 100)
Station 2 Step 40: Waiting for Robot Program to Finish (PNS 100)
Station 2 Step 50: Update Tracking Data
Station 2 Step 60: Updating Production Data / End of Cycle

9.2.4 M1iA Robot PNS Sequence of Operations

Step 00: Waiting for Sequence Start
Step 10: Set PNS Program Number
Step 20: Strobe PNS and Wait for Acknowledgement
Step 30: Send Production Start
Step 40: Wait for Robot to Run

9.2.5 Station 3 Auto Sequence

Station 3 Step 10: Sending Required Data to Symbiont
Station 3 Step 20: Triggering WetFill
Station 3 Step 30: Waiting for WetFill to Complete Process
Station 3 Step 40: Spare
Station 3 Step 50: Updating Tracking Data
Station 3 Step 60: Updating Production Data / End of Cycle

9.2.6 Station 4 Auto Sequence

Station 4 Step 10: Sending Required Data to Symbiont
Station 4 Step 20: Triggering Mixed WetFill
Station 4 Step 30: Waiting for Mixed WetFill to Complete Process
Station 4 Step 40: Spare
Station 4 Step 50: Updating Tracking Data

9.2.7 Station 5 Auto Sequence

9.2.7.1 Wet Fill Individual A Auto Sequence

Station 5 Wetfill A Step 10: Sending Required Data to Symbiont
Station 5 Wetfill A Step 20: Triggering WetFill
Station 5 Wetfill A Step 30: Waiting for WetFill to Complete Process
Station 5 Wetfill A Step 40: Waiting for Robot Program to Finish (PNS 100)
Station 5 Wetfill A Step 50: Updating Tracking Data
Station 5 Wetfill A Step 60: Updating Production Data / End of Cycle

9.2.7.2 Wet Fill Individual B Auto Sequence

Station 5 Wetfill B Step 10: Sending Required Data to Symbiont
Station 5 Wetfill B Step 20: Triggering WetFill
Station 5 Wetfill B Step 30: Waiting for WetFill to Complete Process
Station 5 Wetfill B Step 40: Waiting for Robot Program to Finish (PNS 100)
Station 5 Wetfill B Step 50: Updating Tracking Data
Station 5 Wetfill B Step 60: Updating Production Data / End of Cycle

9.2.7.3 Wet Fill Individual C Auto Sequence

Station 5 Wetfill C Step 10: Sending Required Data to Symbiont
Station 5 Wetfill C Step 20: Triggering WetFill
Station 5 Wetfill C Step 30: Waiting for WetFill to Complete Process
Station 5 Wetfill C Step 40: Waiting for Robot Program to Finish (PNS 100)
Station 5 Wetfill C Step 50: Updating Tracking Data
Station 5 Wetfill C Step 60: Updating Production Data / End of Cycle

9.2.7.4 Wet Fill Individual D Auto Sequence

Station 5 Wetfill D Step 10: Sending Required Data to Symbiont
Station 5 Wetfill D Step 20: Triggering WetFill
Station 5 Wetfill D Step 30: Waiting for WetFill to Complete Process
Station 5 Wetfill D Step 40: Waiting for Robot Program to Finish (PNS 100)
Station 5 Wetfill D Step 50: Updating Tracking Data
Station 5 Wetfill D Step 60: Updating Production Data / End of Cycle

9.2.8 Station 6 Auto Sequence

Station 6 Step 10: Pick Vial Cap
Station 6 Step 20: Waiting for Robot to Pick Vial Cap
Station 6 Step 30: Place Cap onto Vial
Station 6 Step 40: Waiting for Cap to be Placed on Vial
Station 6 Step 50: Transfer Vial Data to MagneMotion
Station 6 Step 60: Updating Production Data / End of Cycle

9.2.9 Station 7 Auto Sequence

Station 7 Step 00: Waiting for Load Request
Station 7 Step 10: Sending Required Process Data to Camera
Station 7 Step 20: Triggering Vision Inspect
Station 7 Step 30: Waiting for Inspect to Complete
Station 7 Step 40: Evaluating Inspect Results
Station 7 Step 50: Updating Tracking Data
Station 7 Step 60: Updating Production Data / End of Cycle

9.2.10 Station 8 Auto Sequence

Station 8 Step 10: Waiting for Rail Robot to be Available
Station 8 Step 20: Pick Vial From MagneMotion
Station 8 Step 30: Waiting for Robot to Pick Vial From MagneMotion
Station 8 Step 40: Transferring Vial Data to Robot
Station 8 Step 50: Place Vial to Check Weight
Station 8 Step 60: Waiting for Vial to be Placed in Check Weigh Station
Station 8 Step 70: Transferring Vial Data to Check Weigh Station
Station 8 Step 80: Evaluating Vial Weight
Station 8 Step 90: Waiting for Rail Robot to be Available
Station 8 Step 100: Pick Vial from CW
Station 8 Step 110: Waiting for Vial to be Picked from CW
Station 8 Step 120: Transfer Vial Data to Robot
Station 8 Step 130: Place Vial to MagneMotion
Station 8 Step 140: Waiting for Vial to be Placed into MagneMotion Cart
Station 8 Step 150: Transferring Vial Data to MagneMotion Cart
Station 8 Step 160: Production Data / End of Cycle

9.2.11 Station 9 Auto Sequence

Station 9 Step 10: Waiting for Rail Robot to be Available
Station 9 Step 20: Picking Vial From MagneMotion
Station 9 Step 30: Waiting for Robot to Pick Vial From MagneMotion
Station 9 Step 40: Transferring Vial Data to Robot
Station 9 Step 50: Place Vial to Reject Tray
Station 9 Step 60: Waiting for Vial to be Placed in Reject Tray
Station 9 Step 70: Transferring Vial Data to Reject Tray
Station 9 Step 80: Updating Tray Count
Station 9 Step 90: Production Data / End of Cycle

9.3 Mode Selection / Station Reset

Mode selection is accomplished through operators on the station HMI. The operators will be display different values and control based on the current state of the machine. Depress the operator to toggle between the modes.

1. Auto / Manual Mode
2. Cycle Start / Reset
3. Cycle Stop / Master Reset
4. Safety Reset

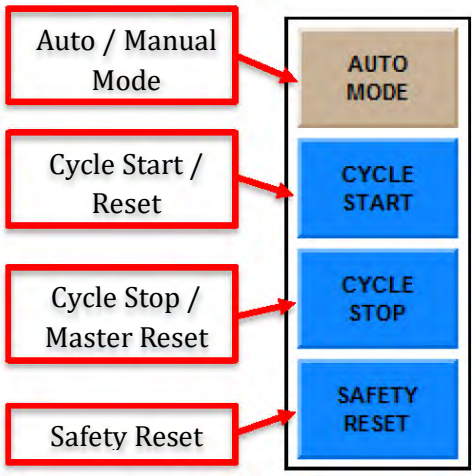


Figure 9-6 Mode Operators

The station has three types of reset functionality:

1. Reset – Resets current faults conditions, send the robot to its safe home position, and readies the station to resume operation from where it left off at the time of fault or disruption. Best thought of as a "resume or retry" operation. Once the Station is placed back into Auto Mode and Cycle Start, the system resumes its previous sequence step.
2. Master Reset – Resets current faults conditions, send the robot to its safe home position, resets the stations sequence of operation back to 0 (starting step number), and readies the station to begin operations as if not parts are in that station. This reset functionality is best thought of as a "give up and start over". Parts or Pallets may need to be removed from the station or robot in the event a Master Reset is induced.
3. Safety Reset – Resets the safety controller and enables the systems hazardous functions controlled by the safety system. This reset is identical to depressing the reset push button on the station electrical enclosure.

Station reset is accomplished through operators on the station HMI. Depress the appropriate operator based on the need to reset the station.

The Figure 9-6, image is a close-up screenshot of an HMI (Human-Machine Interface) display showing a set of control buttons, which are likely used to manage the operational modes and cycles of a machine or system. These controls allow an operator to switch between automatic and manual modes, start or stop a cycle, reset the system to a safe state, or perform a master reset to reinitialize the system. Here's a brief description of each button:

Auto Mode: This button is used to set the machine to operate automatically, where it would run according to pre-programmed cycles without manual intervention.

Cycle Start: This control starts the operational cycle of the machine, which could involve a series of automated tasks or functions.

Cycle Stop: This button is used to halt the ongoing cycle. It may be used in case of an issue or when there's a need to pause operations.

Safety Reset: The safety reset is likely a feature that clears any safety-related faults or alerts and returns the machine to a known safe state.

These controls are crucial for the day-to-day operation of automated machinery, providing operators with the ability to quickly respond to changes in the production environment or emergency situations.

9.4 Manual Functions

While the station is in Manual Mode, the operator may manually manipulate motions for the station through operators on the HMI. Manual operators may only be visible or function while in manual mode. Manual operators that are displayed while in Auto mode provide an indication of their status only.

Improper movement of motions manually may result in damage to product, pallets, conveyor systems or station components.

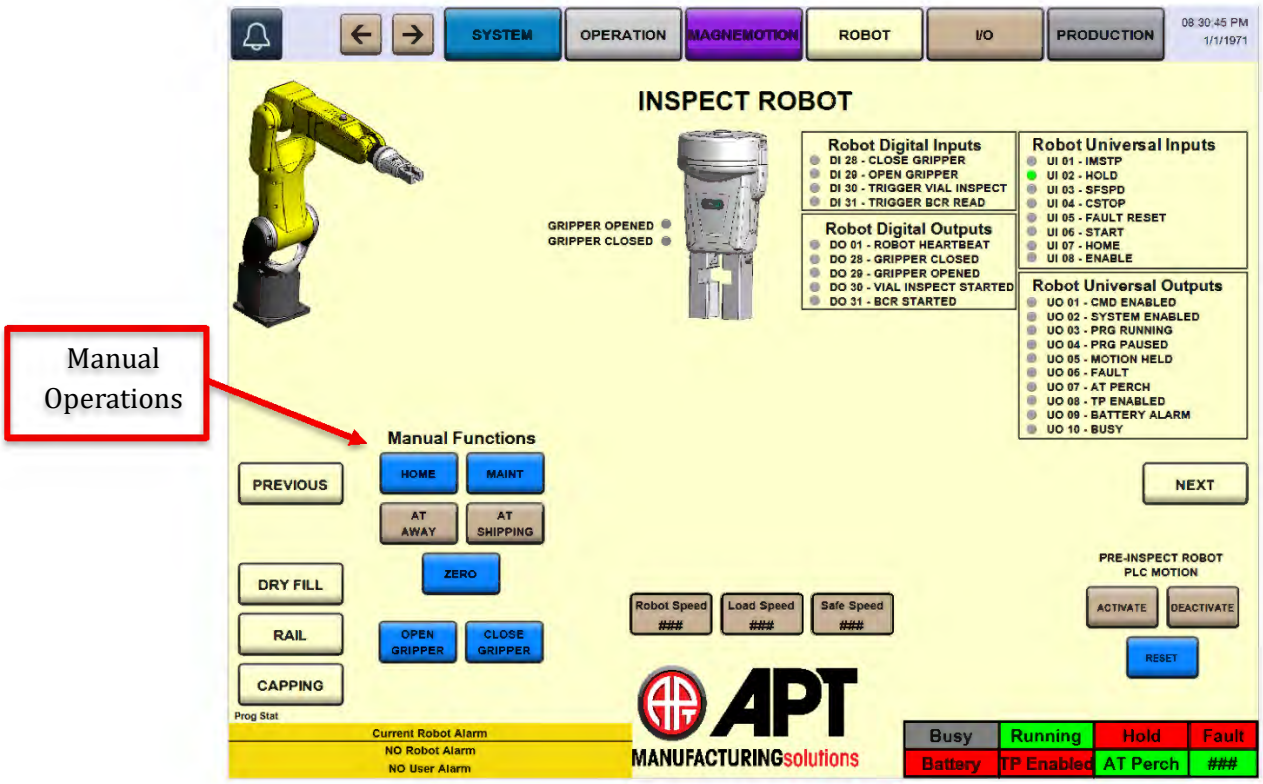


Figure 9-7 Manual Mode Operators

The Figure 9-7, image is a screenshot from a section of an operational manual discussing "Manual Functions" within an HMI (Human-Machine Interface) for a robotic system, likely used in an industrial setting for tasks such as inspection or assembly.

Key Points from the Manual Section:

Manual Mode Operation: The text explains that when the station is in Manual Mode, the operator can manipulate motions through controls on the HMI. It implies a distinction between the functionality and visibility of manual operators in different modes, with manual operators being functional in manual mode and providing status indications in auto mode.

Warning Sign: A warning icon cautions against improper manual movement, which could lead to damage to products, pallets, conveyor systems, or other station components. This highlights the importance of careful operation when in manual mode to avoid accidents or equipment damage.

HMI Interface Elements:

The interface includes buttons for "HOME," "MAINT," "AT AWAY," and "SHIPPING," which are likely shortcuts for common manual tasks or positions the robot might need to move to.
Additional buttons for "DRY FILL," "RAIL," and "CAPPING" operations are present, along with controls to open and close the robot's gripper, suggesting direct control over the robot's functions.
Control and Status Indicators:

At the bottom of the interface, status indicators such as "Busy," "Running," "Hold," "Fault," and battery level are shown, along with the current robot alarm status, providing the operator with real-time feedback on the robot's condition.
Branding:

The "APT MANUFACTURING solutions" logo suggests the company responsible for the HMI or the machinery's integration.
Navigation and System Information:

A navigation bar at the top of the interface includes tabs for different operational aspects of the machine, such as "SYSTEM," "OPERATION," "MAGNEMOTION," "ROBOT," "I/O," and "PRODUCTION".
A timestamp in the top right corner indicates the current time and date of the system.
This section of the manual is crucial for operators to understand how to engage with the robot in manual mode and the potential risks involved. The interface provides the necessary controls and information to execute manual operations safely and effectively.

9.5 Automatic Operation

Automatic operation continually cycles through the sequence of operations defined in section 9.3. To enter automatic operation from initial startup: system control power must be on; the station must be clear of any fault conditions (Reset); Station sequence of operation should be on Step 0 (Master Reset); Place the station in Auto Mode by depressing the "Manual Mode" HMI operator; once in Auto Mode, depress the Cycle Start HMI Operator after holding it for 5 seconds. The station will now begin Automatic Operation.

To safely shut down the station at the end of a cycle, depress the cycle stop HMI operator. The station will continue processing through its current sequence of operations and once that cycle is complete the station will take itself out of Auto Cycle but stay in Auto Mode.

In the even a fault condition occurs during automatic operation, the station will display the appropriate fault message and place itself in manual mode with the cycle stopped. Once the fault condition is resolved, the operator should attempt to retry the operation by the following sequence of HMI interface: Reset; Auto Mode, Cycle Start. The station will resume its previous sequence of operation.

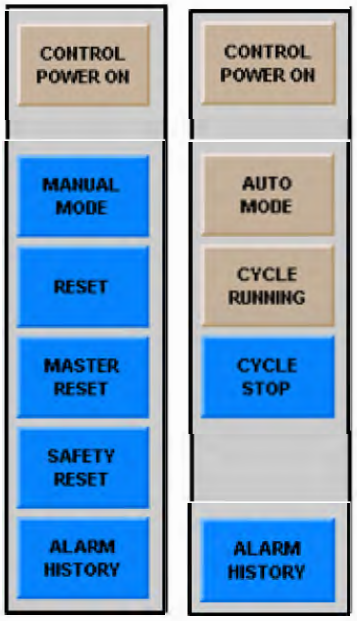


Figure 9-8 Startup & Shutdown Operators

The Figure 9-8, shows a section of an HMI (Human-Machine Interface) screen titled "Figure 9-8 Startup & Shutdown Operators." It displays two columns of buttons that are likely used for initiating and controlling the startup and shutdown sequences of a machine or system.

Left Column Buttons:

Control Power On: This button is used to power up the system, initiating the startup sequence.
Manual Mode: A mode selection button that allows the operator to put the system into a state where it can be operated manually.
Reset: Resets any non-critical faults to allow for a fresh start.
Master Reset: A more comprehensive reset that likely reinitializes the system software or hardware to its default state.
Safety Reset: Resets the safety circuit and clears any safety-related faults.
Alarm History: Provides access to the log of past alarms for review and troubleshooting.
Right Column Buttons:

Control Power On: Same as the left column, for powering up the system.
Auto Mode: Switches the system to automatic operation where it can run without manual intervention.
Cycle Running: Indicates when a cycle is in progress in auto mode.
Cycle Stop: Used to halt the ongoing cycle, either completing the current operation or pausing it safely.
Alarm History: Same as the left column, for accessing the alarm log.
These controls provide operators with the necessary tools to manage the operation of the machine safely and efficiently, with the ability to review historical data for alarms that may have occurred during operation.

9.6 HMI Screens & Operations

9.6.1 System Screen

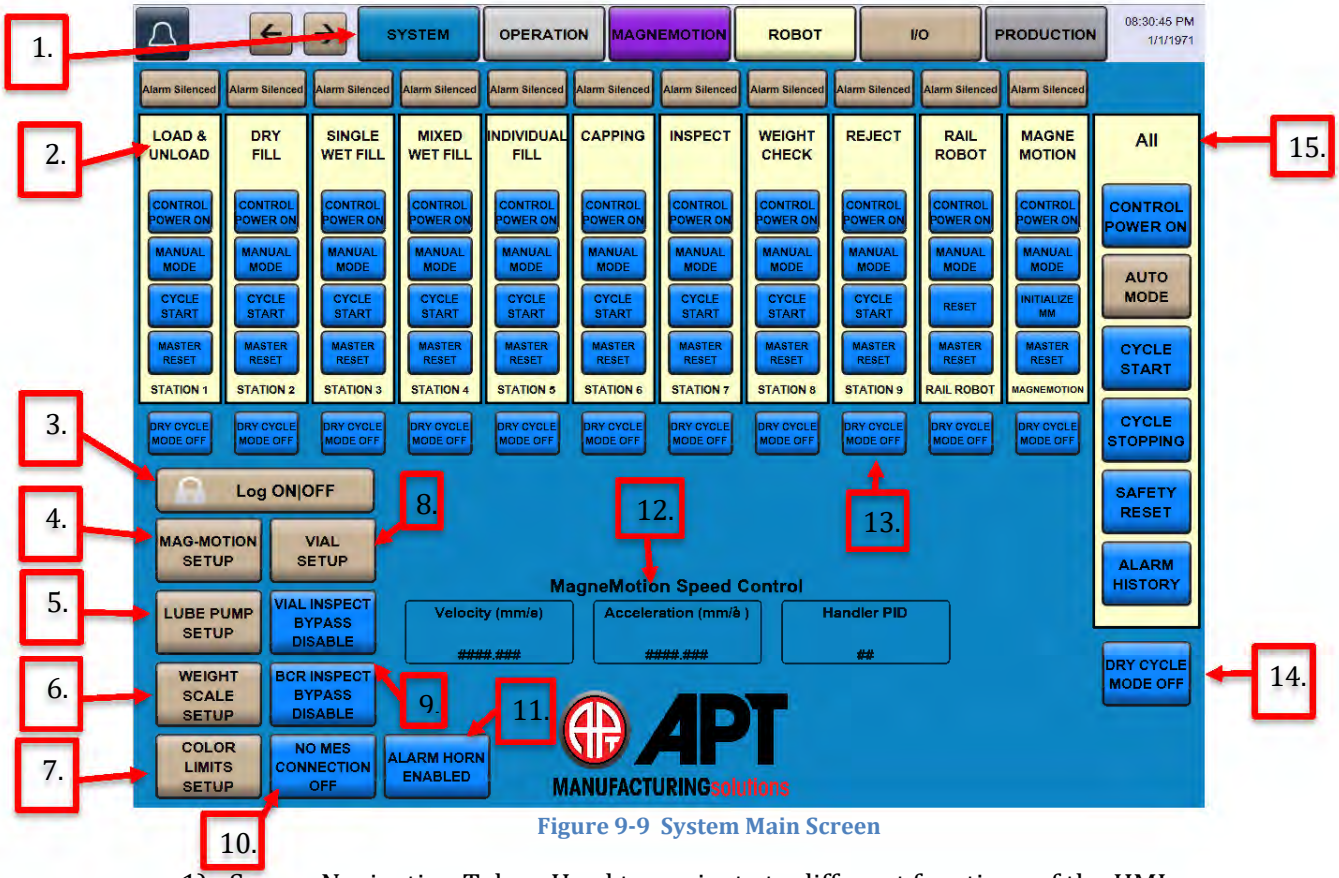


Figure 9-9 System Main Screen

1) Screen Navigation Tabs – Used to navigate to different functions of the HMI.
2) Individual Station Modes – Touch Text to navigate to the station operation screen
3) Login / Logout button
4) Navigate to MagneMotion Setup Screen
5) Navigate to Lube Pump Setup Screen
6) Navigate to Weight Scale Setup Screen
7) Navigate to Color Limits Setup Screen
8) Navigate to Vial Setup Screen
9) Inspect Bypasses – Determines whether the BCR and Vial Inspects are enabled
10) Toggle MES Connection – Determines whether Process Data is randomly generated
11) Toggle Alarm Horn
12) MagneMotion Speed Controls
13) Toggle Individual Dry Cycle Mode
14) Toggle All Dry Cycle Mode
15) All Station Mode Operators

The Figure 9-9, is a labeled screenshot of the "System Main Screen" from an HMI (Human-Machine Interface), detailing various controls and operations for a manufacturing system. The labels correspond to different features and functions within the HMI, which provide comprehensive control and monitoring capabilities for the system. Here's a breakdown of the labeled features:

Screen Navigation Tabs: These tabs allow users to navigate between different functions of the HMI, like system settings, operation modes, and production data.

Individual Station Modes: These areas can be touched to navigate to specific station operation screens for detailed control.

Login / Logout Button: This button is for logging in or out of the system, which is likely tied to user access control and security.

Navigate to MagneMotion Setup Screen: Leads to the setup options for the MagneMotion system, which is likely a conveyor or material handling system.

Navigate to Lube Pump Setup Screen: Opens the configuration screen for the lubrication pump, essential for maintenance and operation.

Navigate to Weight Scale Setup Screen: Allows access to settings related to the weight scale, which might be part of the quality control or measurement processes.

Navigate to Color Limits Setup Screen: This takes the user to the color limits setup, probably related to a vision system used for quality inspection.

Navigate to Vial Setup Screen: Directs to settings for vial handling within the production process.

Inspect Bypasses: Controls whether the barcode reader (BCR) and vial inspections are bypassed during operation.

Toggle MES Connection: Switches the Manufacturing Execution System (MES) connection on or off, affecting how process data is generated or used.

Toggle Alarm Horn: Turns the alarm horn on or off, which is used to signal operators audibly in case of specific events or errors.

MagneMotion Speed Controls: Adjusts the velocity and acceleration parameters for the MagneMotion system.

Toggle Individual Dry Cycle Mode: This switch turns the dry cycle mode on or off for individual stations, which is typically used for testing or setup without actual production.

Toggle All Dry Cycle Mode: Similar to the individual dry cycle mode, but applies the setting to all stations simultaneously.

All Station Mode Operators: Controls that affect all stations, such as global start or stop functions.

This interface provides a centralized panel for operators to control various aspects of the manufacturing process, from individual station adjustments to global system settings. The clear labeling and structured layout of the HMI screen ensure ease of use and efficiency in managing production operations.

9.6.1.1 System Lube Pump Screen

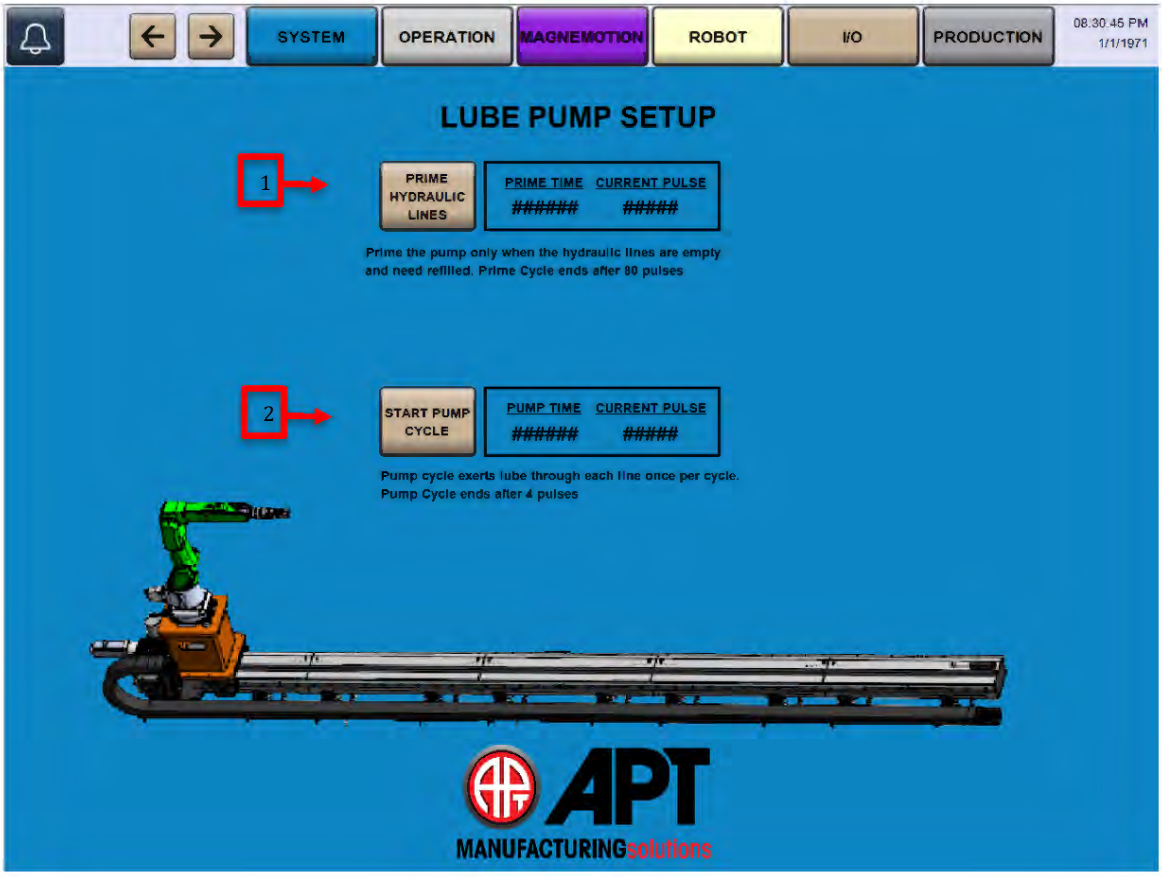


Figure 9-10 Lube Pump Screen

1) Prime Hydraulic Lines – Primes the Lube Lines
2) Start Pump Cycle – excretes one pump of Lube out of each line

The Figure 9-10, provided is a screenshot from a section of an operational manual, specifically from a subsection detailing the "System Lube Pump Screen" of an HMI (Human-Machine Interface). This screen allows operators to control the lubrication system of machinery.

Here's a summary of the labeled features and their functions based on the annotations provided in the image:

Prime Hydraulic Lines: This control is used to prime the lube lines, which should be done when the hydraulic lines are empty and need refilling. The priming cycle ends after 80 pulses, which ensures the lines are properly filled before regular operation begins.

Start Pump Cycle: This button initiates a pump cycle that excretes lubricant through each line once per cycle, ensuring all parts of the machine receive lubrication. The cycle ends after 4 pulses, which likely corresponds to the number of lines or points that need lubrication.

The screenshot also includes a visual representation of a lubrication system, possibly to provide a clearer understanding of the system's components and operation.

The interface is designed for efficient maintenance and operation of the machine's lubrication system, highlighting the HMI's role in streamlining and simplifying complex industrial processes. The "APT MANUFACTURING solutions" logo indicates the company associated with the HMI software or machinery integration.

9.6.1.2 Weight Scale Setup Screen

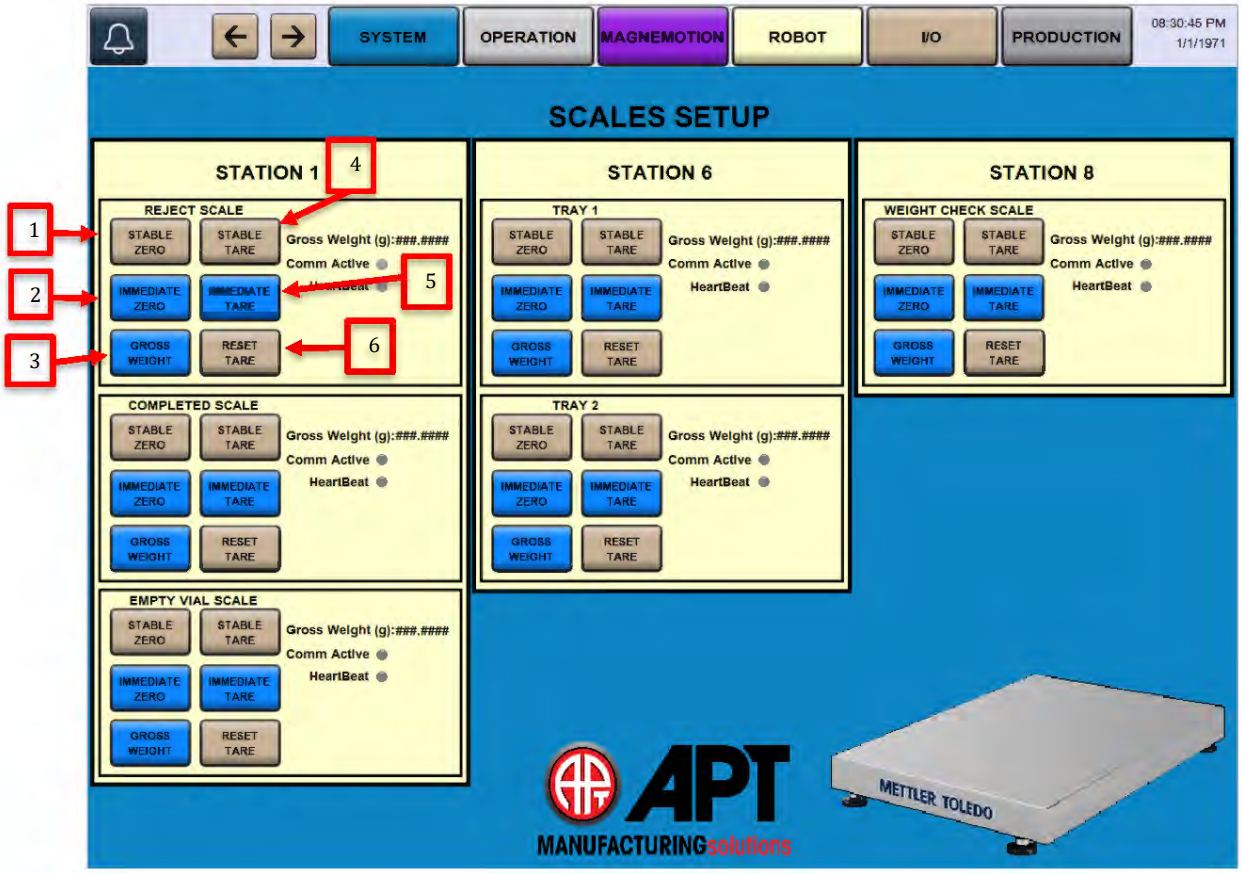


Figure 9-11 Weight Scale Setup

1) Stable Zero Scale
2) Immediate Zero Scale
3) Toggle Gross/Net Weight
4) Stable Tare
5) Immediate Tare
6) Reset Tare

The Figure 9-11, appears to be a section of an operational manual, specifically for the "Weight Scale Setup Screen" within an HMI (Human-Machine Interface). This screen is part of the control system for managing the weight scales at different stations of a manufacturing or packaging process.
Key Functions and Annotations in the Image:
Stable Zero Scale: This function is likely used to zero the scale when there's no weight on it, ensuring accuracy before starting operations. Immediate Zero Scale: This may be a quicker way to zero the scale, possibly without waiting for stabilization, which could be useful in fast-paced environments. Toggle Gross/Net Weight: This toggle switch likely allows the operator to switch the scale display between gross weight (total weight including the container) and net weight (weight of the product alone). Stable Tare: The tare function is used to subtract the weight of the container or packaging to measure only the weight of the product. A stable tare would ensure the container's weight is measured accurately before the product is added. Immediate Tare: Similar to the immediate zero, this function might quickly set the tare weight, potentially without waiting for the scale to stabilize. Reset Tare: This function would clear the current tare setting, allowing for a new tare weight to be established. The layout of the screen shows individual control sections for different stations, indicating that each weight scale can be configured independently. The "SCALES SETUP" header implies that the screen is dedicated to configuring the scales across multiple stations in the system. The inclusion of a Mettler Toledo scale in the image suggests that this is the type of weight scale hardware being used within the system, and the "APT MANUFACTURING solutions" logo indicates the company associated with the HMI or machinery integration. The annotations provide clear guidance on what each button does, which is essential for accurate and efficient operation of the weight scales within the system.

9.6.1.3 Camera Dice Color Limits Setup Screen

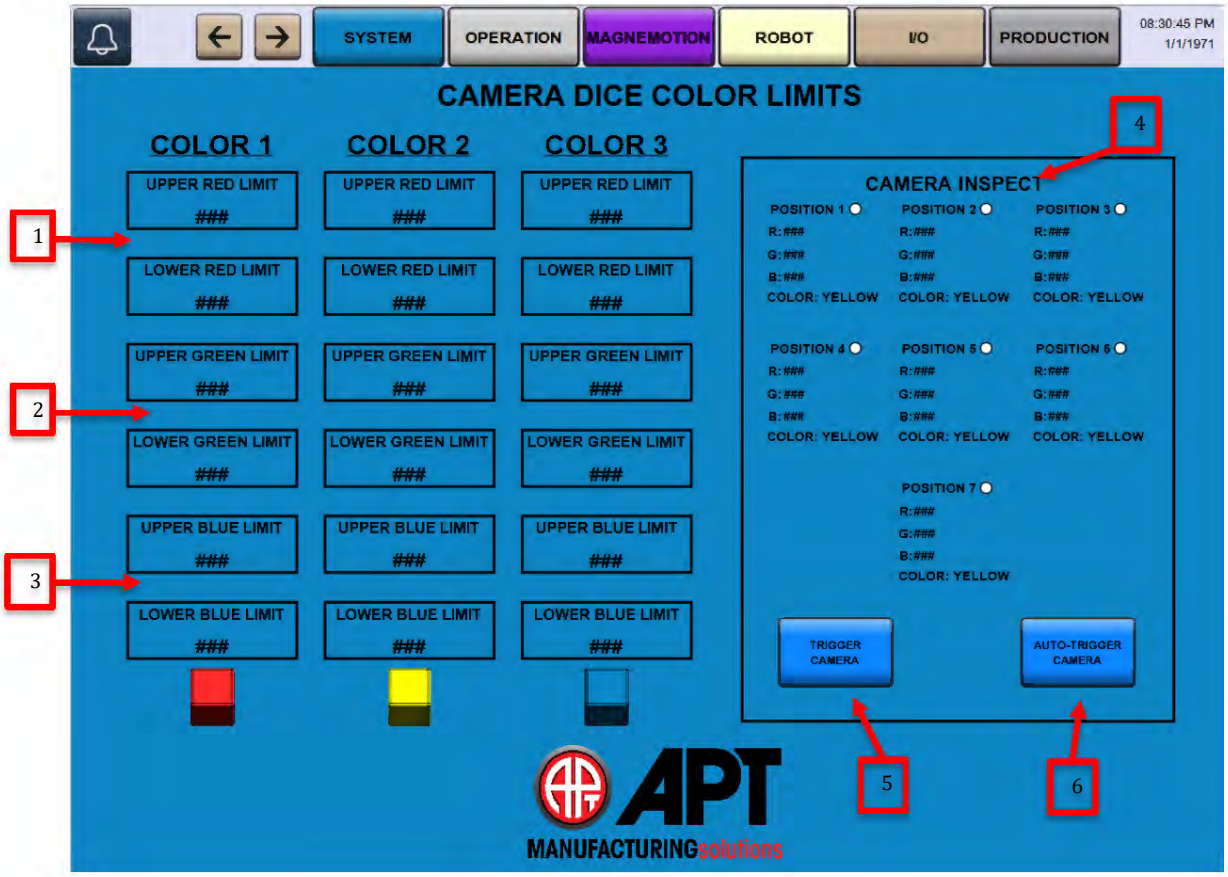


Figure 9-12 Stack Light Setup

1) Adjust Upper and Lower Red Limits
2) Adjust Upper and Lower Green Limits
3) Adjust Upper and Lower Blue Limits
4) Displays last triggered camera inspect
5) Trigger camera once
6) Trigger camera repeatedly

The Figure 9-12, is from an HMI (Human-Machine Interface) screen, specifically the "Camera Dice Color Limits Setup Screen" as titled in the manual. This section of the HMI is used for adjusting the color detection parameters of a camera-based inspection system. The labeled points on the image correspond to controls and indicators on the HMI:

Adjust Upper and Lower Red Limits: These controls likely allow the operator to set the threshold values for what the camera system recognizes as the upper and lower limits for the color red. Adjust Upper and Lower Green Limits: Similar to the red limits, these controls adjust the threshold for detecting green hues. Adjust Upper and Lower Blue Limits: These controls are for setting the detection range for the color blue. Displays Last Triggered Camera Inspection: This area might show the results or status of the last camera inspection trigger, providing feedback on the most recent color detection event. Trigger Camera Once: This button is used to manually trigger the camera to perform a single inspection, useful for testing or calibrating the system. Trigger Camera Repeatedly: This button likely initiates continuous or repeated camera inspections, which could be used during setup or for continuous monitoring. The screen appears to be part of a system that uses camera inspection to verify the color of objects, possibly as part of a quality control process in manufacturing. The ability to fine-tune the color detection limits is crucial for ensuring that the camera system accurately identifies products that meet the required specifications. The layout of the HMI provides a user-friendly interface for operators to interact with the camera inspection system, enabling precise control over its color detection capabilities. The "APT MANUFACTURING solutions" logo suggests the company responsible for the machine or HMI software.

9.6.1.4 Camera Dice Color Limits Setup Screen

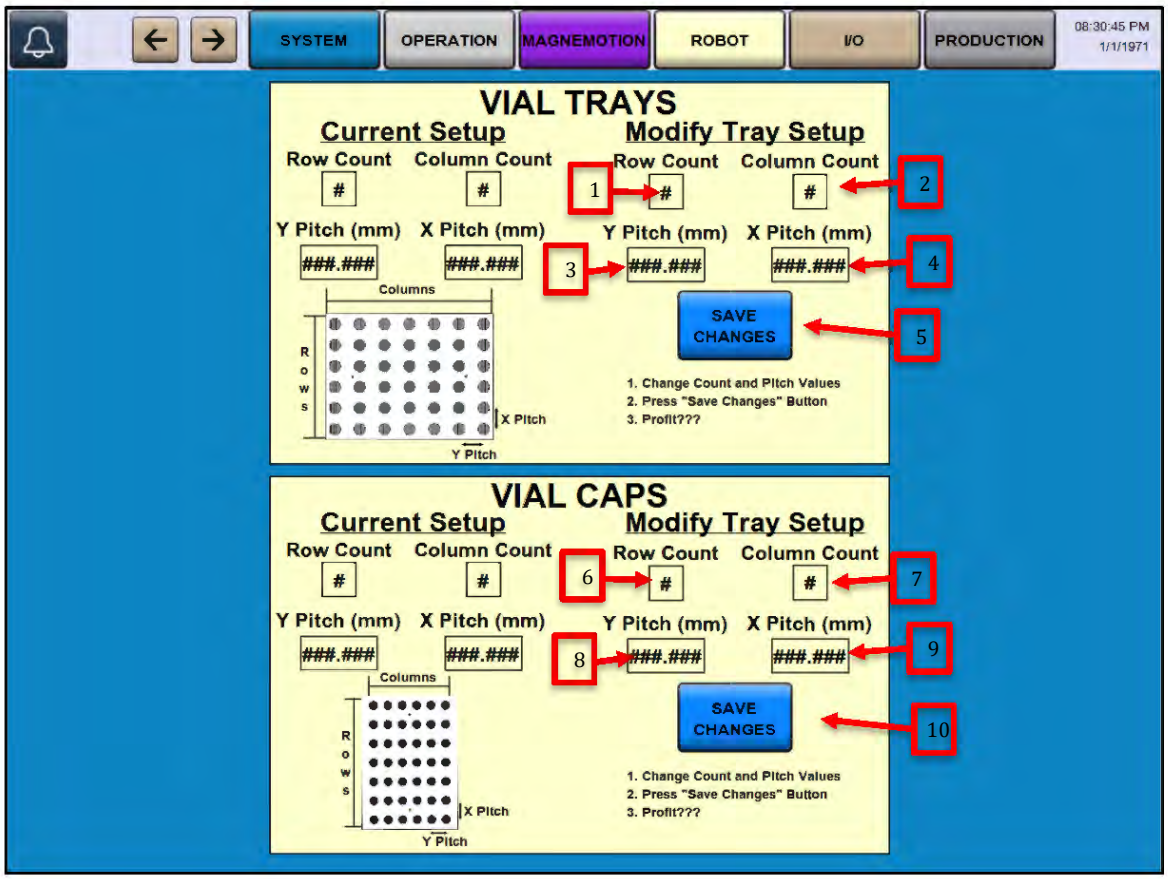


Figure 9-13 Stack Light Setup

1) Adjust Vial Tray Row Count
2) Adjust Vial Tray Column Count
3) Adjust Vial Tray Y Pitch
4) Adjust Vial Tray X Pitch
5) Save Vial Tray Changes
6) Adjust Cap Tray Row Count
7) Adjust Cap Tray Column Count
8) Adjust Cap Tray Y Pitch
9) Adjust Cap Tray X Pitch
10) Save Cap Tray Changes

The image shows a detailed view of an HMI (Human-Machine Interface) screen used for configuring the setup of vial trays and cap trays in a manufacturing or packaging system, which appears to be part of the "Camera Dice Color Limits Setup Screen" section in an operational manual.

The annotated functions are as follows:

Adjust Vial Tray Row Count: Control to set the number of rows in the vial tray for the camera system to recognize. Adjust Vial Tray Column Count: Control to set the number of columns in the vial tray. Adjust Vial Tray Y Pitch: Control to set the vertical distance between vials within the tray. Adjust Vial Tray X Pitch: Control to set the horizontal distance between vials within the tray. Save Vial Tray Changes: Button to save any changes made to the vial tray configuration. Adjust Cap Tray Row Count: Control to set the number of rows in the cap tray. Adjust Cap Tray Column Count: Control to set the number of columns in the cap tray. Adjust Cap Tray Y Pitch: Control to set the vertical distance between caps within the tray. Adjust Cap Tray X Pitch: Control to set the horizontal distance between caps within the tray. Save Cap Tray Changes: Button to save any changes made to the cap tray configuration. These controls are crucial for ensuring that the automated system can accurately handle and inspect vials and caps based on their arrangement in the trays. Correct settings ensure efficient operation and avoid errors in processing or packaging. The screen layout provides a visual representation of the tray setup, allowing operators to understand and adjust the physical configuration of the trays as they correspond to the actual layout in the machinery.

9.6.2 Operations Screen

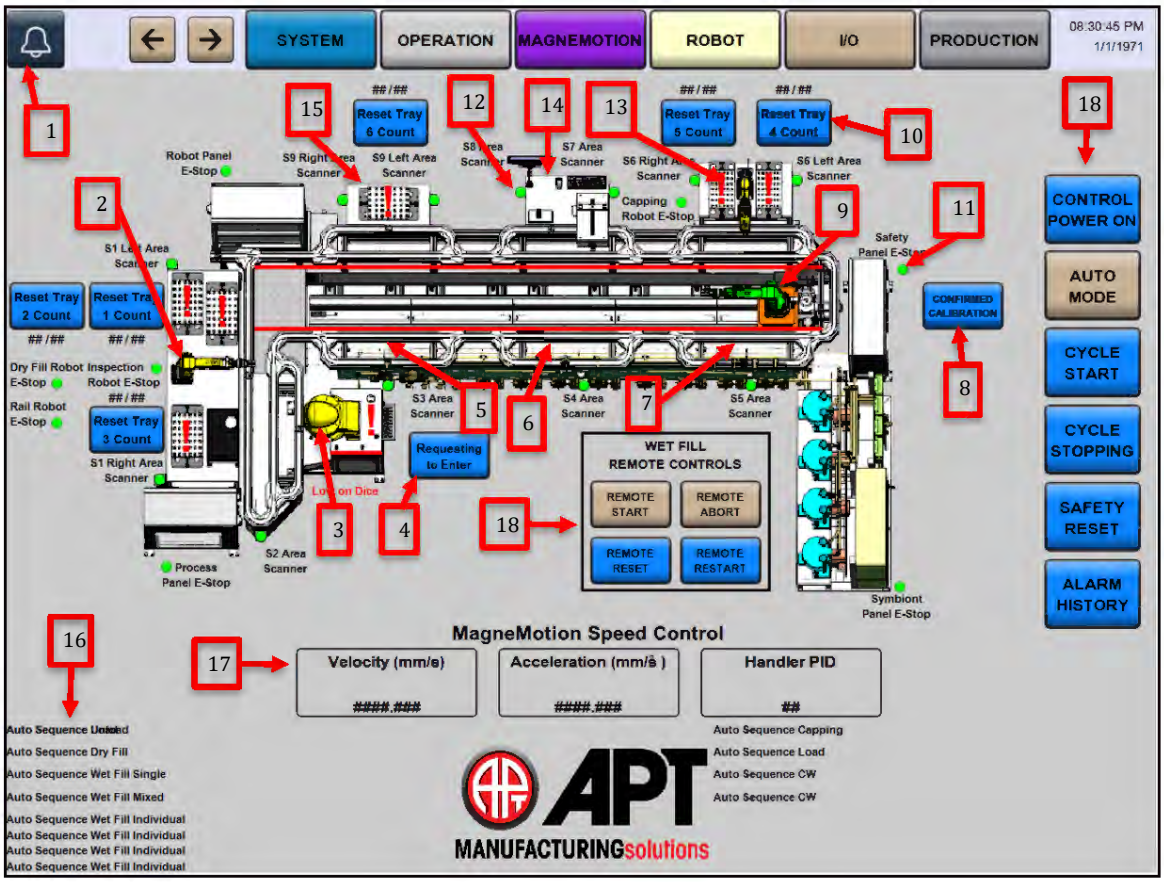


Figure 9-14 Main Operation Screen

1) Display of Current System Fault
2) Navigate to Station 1 Operation Screen
3) Navigate to Station 2 Operation Screen
4) Request to Enter Dice Cell
5) Navigate to Station 3 Operation Screen
6) Navigate to Station 4 Operation Screen
7) Navigate to Station 5 Operation Screen
8) Confirm Collaborative Robot Calibration
9) Navigate to Rail Robot Operation Screen
10) Reset Tray Count
11) Emergency Stop Status
12) Area Scanner Status (Green-Clear; Yellow-Warning Zone; Red-Stop Zone)
13) Navigate to Station 6 Operation Screen
14) Navigate to Station 7 & 8 Operation Screen
15) Navigate to Station 9 Operation Screen
16) Auto Sequence Display and Description for every Station
17) MangeMotion Speed Controls
18) Remote WetFill Controls
19) All Stations Mode Operators

The Figure 9-14, shows an annotated screenshot of the "Main Operation Screen" from an HMI (Human-Machine Interface). This interface is part of a larger control system used to monitor and manage various operational aspects of a manufacturing or production facility. The annotations correspond to specific functions and navigational elements within the HMI:

1. **Display of Current System Fault**: Shows current system issues that may need attention.
2. **Navigate to Station 1 Operation Screen**: Accesses the control interface for station 1.
3. **Navigate to Station 2 Operation Screen**: Accesses the control interface for station 2.
4. **Request to Enter Dice Cell**: May be a command to request access or initiate entry to a specific area within the production line.
5. **Navigate to Station 3 Operation Screen**: Accesses the control interface for station 3.
6. **Navigate to Station 4 Operation Screen**: Accesses the control interface for station 4.
7. **Navigate to Station 5 Operation Screen**: Accesses the control interface for station 5.
8. **Confirm Collaborative Robot Calibration**: Verifies that a collaborative robot has been calibrated correctly.
9. **Navigate to Rail Robot Operation Screen**: Accesses the control interface for a robot that operates on a rail system.
10. **Reset Tray Count**: Resets the count of trays processed or in use.
11. **Emergency Stop Status**: Indicates the status of emergency stop mechanisms throughout the facility.
12. **Area Scanner Status (Green-Clear; Yellow-Warning Zone; Red-Stop Zone)**: Shows the status of safety area scanners, which are used to detect objects or personnel and ensure safety within the facility.
13. **Navigate to Station 6 Operation Screen**: Accesses the control interface for station 6.
14. **Navigate to Station 7 & 8 Operation Screen**: Accesses the control interface for stations 7 and 8.
15. **Navigate to Station 9 Operation Screen**: Accesses the control interface for station 9.
16. **Auto Sequence Display and Description for every Station**: Provides information on the automated sequences set up for each station.
17. **ManageMotion Speed Controls**: Adjusts the speed of the MagneMotion system, likely a conveyor or transport mechanism.
18. **Remote Wet/Fill Controls**: Provides remote control over the wet filling process.
19. **All Stations Mode Operators**: Controls that affect all stations, potentially for global start/stop functions.

The interface provides comprehensive control over each station, with detailed status indicators and control options for emergency stops and area scanners to ensure safety. The "APT MANUFACTURING solutions" logo indicates the company responsible for the HMI or machinery integration, and the layout is designed for ease of navigation and operation by the facility's personnel.

9.6.2.1 Station 1 Operation Screen

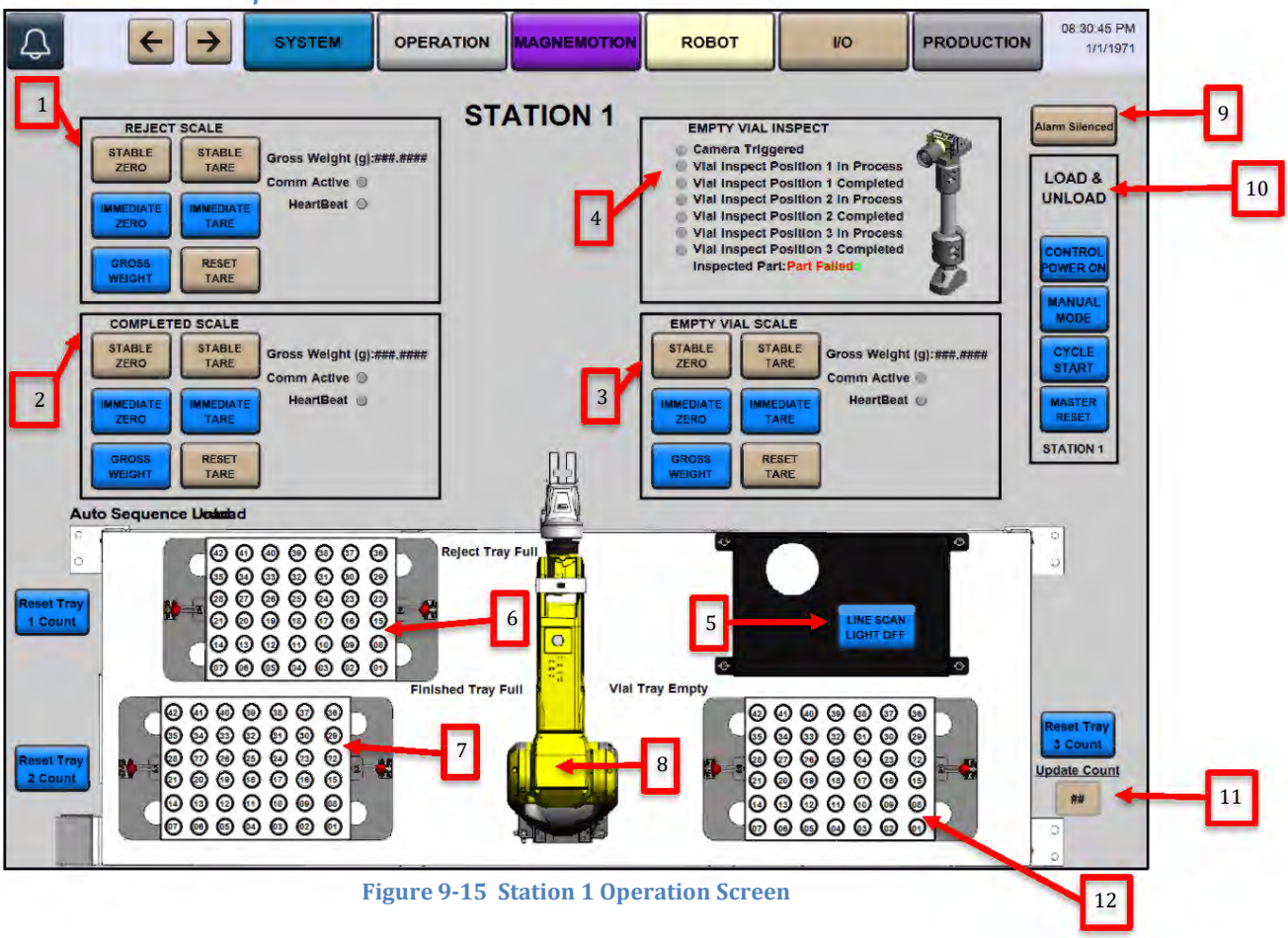


Figure 9-15 Station 1 Operation Screen

1) Tray 1 Scale
2) Tray 2 Scale
3) Tray 3 Scale
4) Current Vial Inspect
5) Toggle Line Scan Light
6) Navigate to Tray 1 Vial Inspect Operation Screen / Current Tray Count
7) Navigate to Tray 2 Vial Inspect Operation Screen / Current Tray Count
8) Navigate to LR-Mate Robot Screen
9) Station Alarm Silence
10) Station Mode Operators
11) Manually Update Tray Count
12) Empty Vial Tray Count

The Figure 9-15, is a detailed screenshot of the "Station 1 Operation Screen" from an HMI (Human-Machine Interface). This screen includes various controls and indicators for managing and monitoring the operations at Station 1.

The annotations correspond to specific features and controls:

Tray 1 Scale: Interface element for monitoring or controlling the scale associated with Tray 1.
Tray 2 Scale: Interface element for monitoring or controlling the scale associated with Tray 2.
Tray 3 Scale: Interface element for monitoring or controlling the scale associated with Tray 3.
Current Vial Inspect: Shows the status or controls related to the current inspection of vials.
Toggle Line Scan Light: A control to turn the line scan light on or off, likely used for visual inspections or to aid camera systems.
Navigate to Tray 1 Vial Inspect Operation Screen / Current Tray Count: Button to navigate to the vial inspection screen for Tray 1 and display the current count of items in the tray.
Navigate to Tray 2 Vial Inspect Operation Screen / Current Tray Count: Button to navigate to the vial inspection screen for Tray 2 and display the current count.
Navigate to LR-Mate Robot Screen: Button to navigate to the control screen for an LR-Mate robot, which is probably a robotic arm or system used at the station.
Station Alarm Silence: Silences the alarm for the station.
Station Mode Operators: Provides access to controls for changing the station's operational mode.
Manually Update Tray Count: Allows manual adjustment of the tray count, possibly for inventory or quality control purposes.
Empty Vial Tray Count: Displays the count of empty vials or allows adjustment of the same.
The interface layout is designed to give operators a comprehensive view and control over the station's operations, ensuring that tasks such as vial inspection, weight measurement, and robot operation can be managed effectively. The detailed design suggests that the system is highly automated, with a focus on precision and accountability.

9.6.2.2 Station 2 Operation Screen

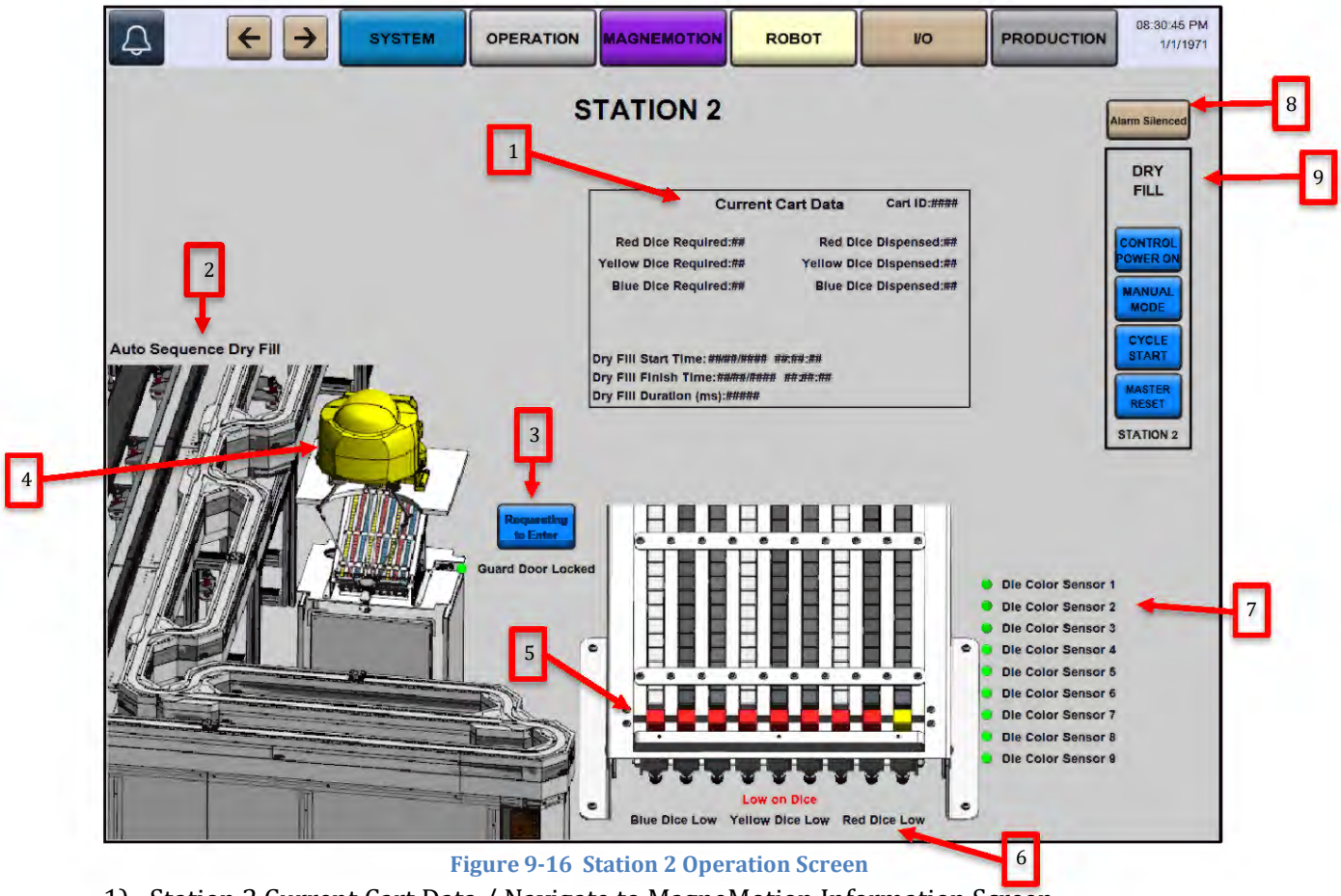


Figure 9-16 Station 2 Operation Screen

1) Station 2 Current Cart Data / Navigate to MagneMotion Information Screen
2) Station 2 Auto Sequence Steps
3) Request to Enter Dice Cell
4) Navigate to M1iA Robot Screen
5) Current Dice Color
6) Dice Tray Low on Dice Indicators
7) Die Sensor Indicators
8) Station Alarm Silence
9) Station Mode Operators

The Figure 9-16 is a detailed screenshot of the "Station 2 Operation Screen" from an HMI (Human-Machine Interface), as part of a comprehensive operational manual. The screen provides various controls and information specific to Station 2 in a manufacturing system.

Here's a summary of the labeled features:

Station 2 Current Cart Data: Shows the current status and requirements for a cart at Station 2, including the need and dispensation of different colored dices.
Station 2 Auto Sequence Steps: Displays the steps involved in the automatic sequence programmed for Station 2.
Request to Enter Dice Cell: A command that may be used by operators to gain access or start operations in a specific area known as the "Dice Cell".
Navigate to M1iA Robot Screen: Directs to the control interface for an M1iA robot, which is likely a specific robotic arm or manipulator used at Station 2.
Current Dice Color: Indicates the current color of dice being used or required for operations.
Dice Tray Low on Dice Indicators: Alerts the operator when the supply of dice in the tray is low, for each color.
Die Sensor Indicators: Reflects the status of sensors dedicated to detecting the dice, which could be for ensuring proper supply levels or correct placement.
Station Alarm Silence: A control to silence alarms for Station 2.
Station Mode Operators: Interface elements for changing the operational mode of Station 2, such as toggling between dry fill, control power, manual mode, cycle start, and master reset.
The interface is designed to provide a visual and interactive means for operators to manage the specific functions of Station 2, ensuring efficiency and responding to the status of materials and operations in real-time. The layout is intuitive, allowing for quick access to important functions and system statuses.

9.6.2.3 Station 3 Operation Screen

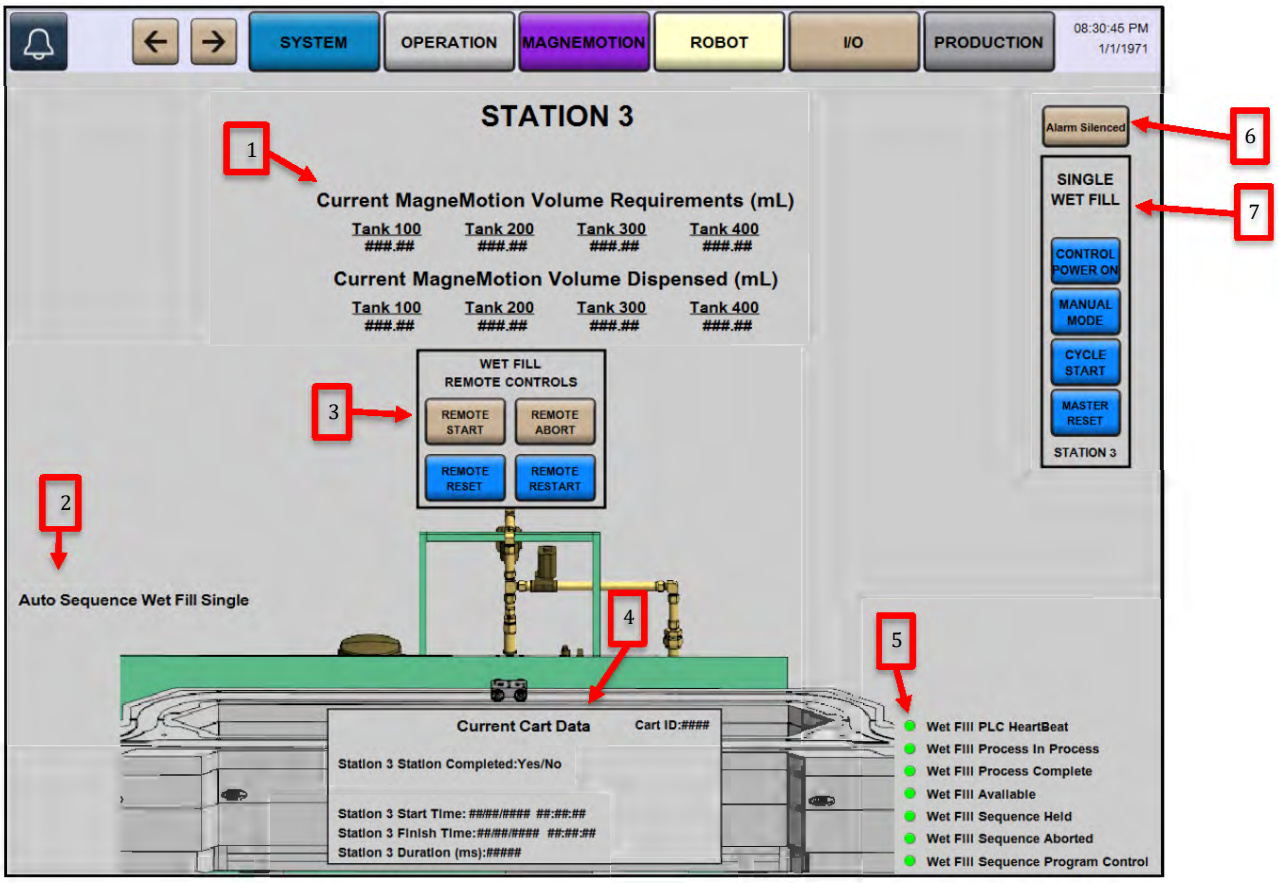


Figure 9-17 Station 3 Operation Screen

1) Station 3 Current Wetfill Volume Required / Dispensed values
2) Station 3 Auto Sequence Steps
3) Remote Wetfill Controls
4) Station 3 Current Cart Data / Navigate to MagneMotion Information Screen
5) Wetfill Station 3 Status Indicators
6) Station Alarm Silence
7) Station Mode Operators

The Figure 9-17 is a screenshot of the "Station 3 Operation Screen" from an HMI (Human-Machine Interface), which is part of a larger operational manual. This particular screen allows operators to monitor and control the wet filling process at Station 3.

Here's a breakdown of the numbered features in the image:

Station 3 Current Wetfill Volume Required / Dispensed values: Displays the volume requirements for the operation and the volume that has been dispensed, likely for quality control and monitoring purposes.

Station 3 Auto Sequence Steps: Shows the steps of the automated sequence programmed for wet filling at Station 3, providing operators with a clear indication of the current step and the next steps in the sequence.

Remote Wetfill Controls: Offers buttons for starting, aborting, resetting, and restarting the wet fill process remotely, allowing operators to manage the process without being at the physical location of the station.

Station 3 Current Cart Data / Navigate to MagneMotion Information Screen: Provides current information on the cart at Station 3 and allows navigation to additional information regarding the MagneMotion system, which could be related to the conveyor or material handling.

Wetfill Station 3 Status Indicators: Shows various status indicators related to the wet fill process at Station 3, such as 'Process in Progress', 'Available', 'Sequence Aborted', and 'Program Control', to give a quick overview of the current state of operations.

Station Alarm Silence: A control feature that allows the operator to silence any active alarms for Station 3.

Station Mode Operators: Interface elements that likely allow for changing the operational mode of Station 3, such as toggling between manual and automatic modes or initiating the start of a cycle.

This interface is designed to provide comprehensive control and status monitoring for the specific operations of Station 3, ensuring that the wet fill process can be managed efficiently and with precision. The annotated controls and indicators facilitate ease of operation and quick decision-making by the system operators.

9.6.2.4 Station 4 Operation Screen

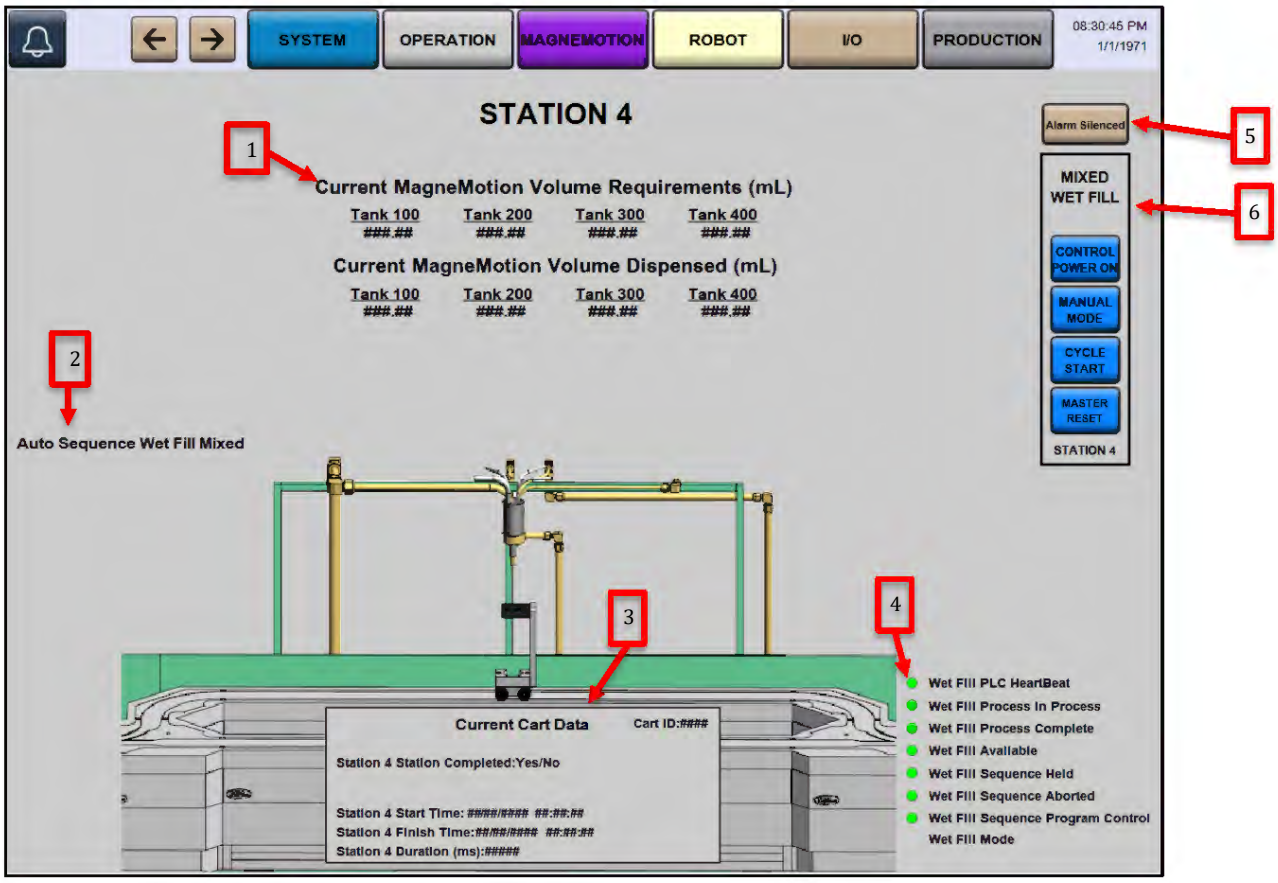


Figure 9-18 Station 4 Operation Screen

1) Station 4 Current Wetfill Volume Required / Dispensed values
2) Station 4 Auto Sequence Steps
3) Station 4 Current Cart Data / Navigate to MagneMotion Information Screen
4) Wetfill Station 4 Status Indicators
5) Station Alarm Silence
6) Station Mode Operators

The image shows a screenshot from an HMI (Human-Machine Interface) titled "Figure 9-18 Station 4 Operation Screen", which is part of a system used to control and monitor the wet fill process at Station 4 of a manufacturing facility.

Here are the details of the numbered features in the image:

Station 4 Current Wetfill Volume Required / Dispensed Values: Displays the volume of material that is required and the amount that has already been dispensed from tanks 100, 200, 300, and 400 at Station 4.

Station 4 Auto Sequence Steps: Outlines the automatic steps that the system will follow for the wet fill process at this station.

Station 4 Current Cart Data / Navigate to MagneMotion Information Screen: Shows the current data of the cart at Station 4, such as the completion status and start/finish times, and allows navigation to more detailed information about the MagneMotion system.

Wetfill Station 4 Status Indicators: Provides visual indicators of the wet fill process status, including whether the fill is in progress, complete, available for the next operation, or if there have been any sequence holds or aborts.

Station Alarm Silence: A feature to silence any active alarms at Station 4.

Station Mode Operators: Controls that allow for changes to the station's operational mode, including toggling between mixed wet fill, control power, manual mode, cycle start, and master reset.

The screen is designed to give operators a comprehensive control and monitoring capability over Station 4, ensuring that the wet fill process can be carried out efficiently, safely, and in accordance with the manufacturing requirements. The interface is user-friendly, providing clear information and straightforward navigation to different system components and statuses.

9.6.2.5 Station 5 Operation Screen

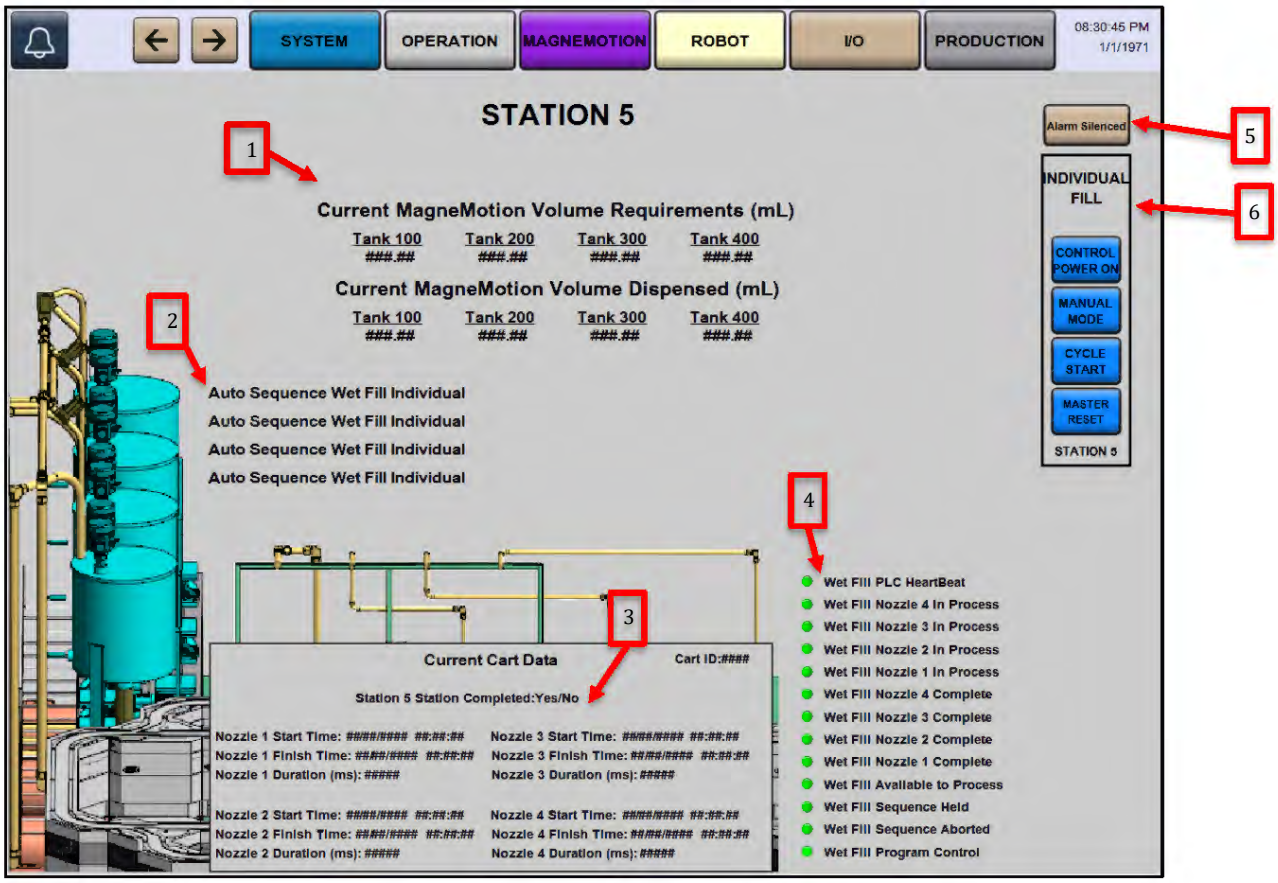


Figure 9-19 Station 5 Operation Screen

1) Station 5 Current Wetfill Volume Required / Dispensed values
2) Station 5 Auto Sequence Steps
3) Station 5 Current Cart Data / Navigate to MagneMotion Information Screen
4) Wetfill Station 5 Status Indicators
5) Station Alarm Silence
6) Station Mode Operators

The Figure 9-19 is a screenshot of the "Station 5 Operation Screen" from an HMI (Human-Machine Interface), part of a detailed operational manual. This screen is designed for controlling and monitoring the operations at Station 5 of a manufacturing or production line.

Outlined are the functionalities as indicated by the annotations:

Station 5 Current Wetfill Volume Required / Dispensed Values: This section shows the required and dispensed volumes of materials for the operations at Station 5, which could be crucial for maintaining proper inventory levels and ensuring quality control during the wet fill process.

Station 5 Auto Sequence Steps: Details the steps of the automatic sequence set up for operations at Station 5, allowing operators to track the progress of the sequence and prepare for subsequent steps.

Station 5 Current Cart Data / Navigate to MagneMotion Information Screen: Displays the current data related to the cart's operation at Station 5, such as completion status, start time, and finish time. This button also allows navigation to detailed information about the MagneMotion system, which is likely involved in materials handling or transportation within the facility.

Wetfill Station 5 Status Indicators: Provides indicators of various statuses related to the wet fill process, such as PLC heartbeat, process completion, and sequence control, giving the operator a quick overview of the station's current operation.

Station Alarm Silence: A control to silence any active alarms at Station 5, allowing for the resolution of issues without continuous auditory alerts.

Station Mode Operators: These are interface elements for changing the operation mode of Station 5, including toggling between individual wet fill, control power, manual mode, cycle start, and master reset.

This interface is designed to give operators comprehensive control and monitoring capabilities for Station 5, ensuring efficient management of the wet fill process and allowing for quick adjustments and responses to changes in operation status. The interface is user-friendly, with clearly defined controls and status indicators to facilitate easy operation.

9.6.2.6 Station 6 Operation Screen

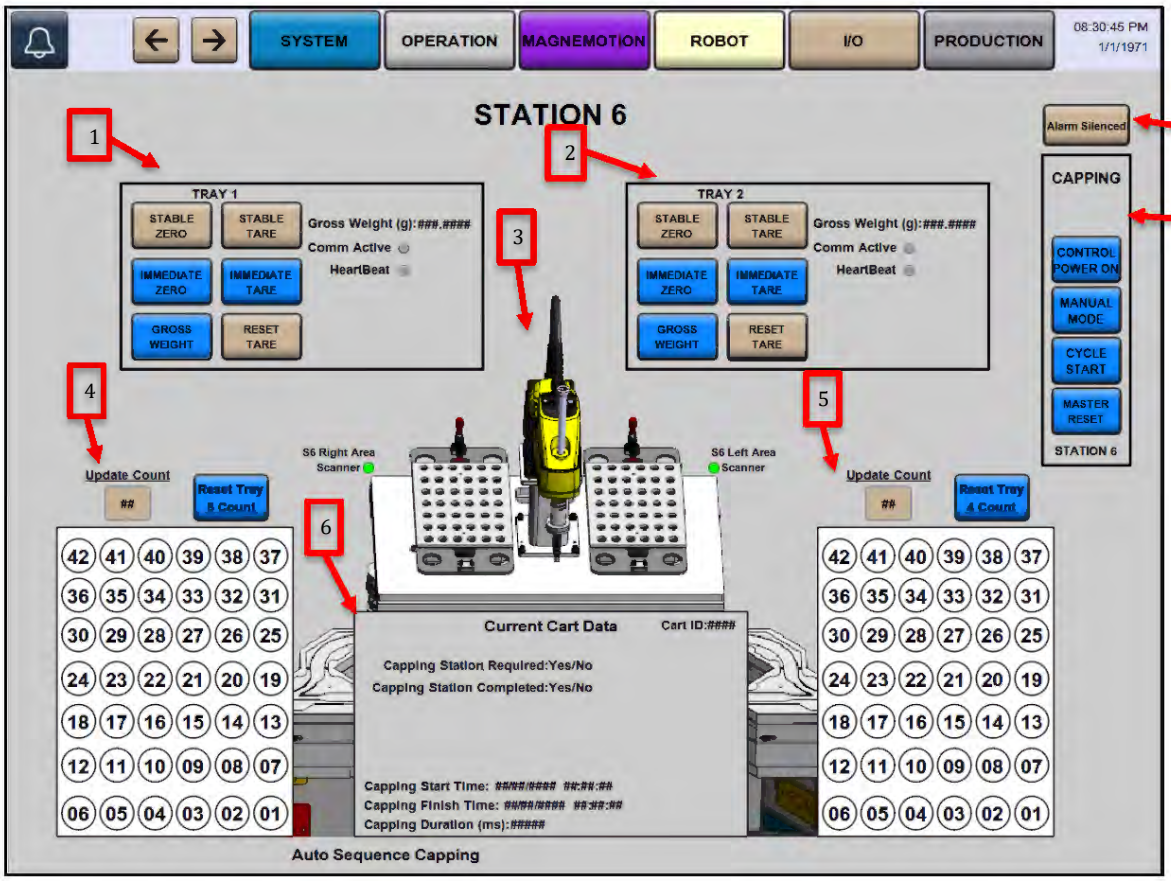


Figure 9-20 Station 6 Operation Screen

1) Station 6 Tray 1 Scale
2) Station 6 Tray 2 Scale
3) Navigate to Scara Robot Screen
4) Manually Update Tray 2 Count
5) Manually Update Tray 1 Count
6) Station 6 Current Cart Data / Navigate to MagneMotion Information Screen
7) Station Alarm Silence
8) Station Mode Operators

The Figure 9-20 is a screenshot of the "Station 6 Operation Screen" from an HMI (Human-Machine Interface), featured in an operational manual. This interface is specifically designed for managing and monitoring activities at Station 6 within a manufacturing setting.

Outlined in the screenshot are various controls and indicators:

Station 6 Tray 1 Scale: This function allows for monitoring or controlling the weight scale associated with Tray 1 at Station 6.

Station 6 Tray 2 Scale: Similar to Tray 1, this control pertains to the weight scale for Tray 2 at Station 6.

Navigate to Scara Robot Screen: A navigational control that likely directs the user to the interface for controlling a SCARA (Selective Compliance Assembly Robot Arm) robot at Station 6.

Manually Update Tray 2 Count: A manual input feature to update or correct the count of items in Tray 2.

Manually Update Tray 1 Count: A manual input feature to update or correct the count of items in Tray 1.

Station 6 Current Cart Data / Navigate to MagneMotion Information Screen: Displays the current data for the cart at Station 6, which may include operational times and completion status. This control also allows navigation to more detailed information about the MagneMotion system, possibly related to the conveyor or transport mechanism.

Station Alarm Silence: A feature to silence alarms specifically for Station 6, allowing for the resolution of issues without continuous auditory disturbance.

Station Mode Operators: Provides access to controls for changing the operational mode of Station 6, such as toggling between different modes like capping, manual operation, cycle start, and master reset.

This screen facilitates precise control over the specific processes at Station 6, allowing operators to adjust operations, monitor real-time data, and manage system alerts effectively. The layout is designed to be intuitive for ease of use in a manufacturing environment.

9.6.2.7 Station 7 & 8 Operation Screen

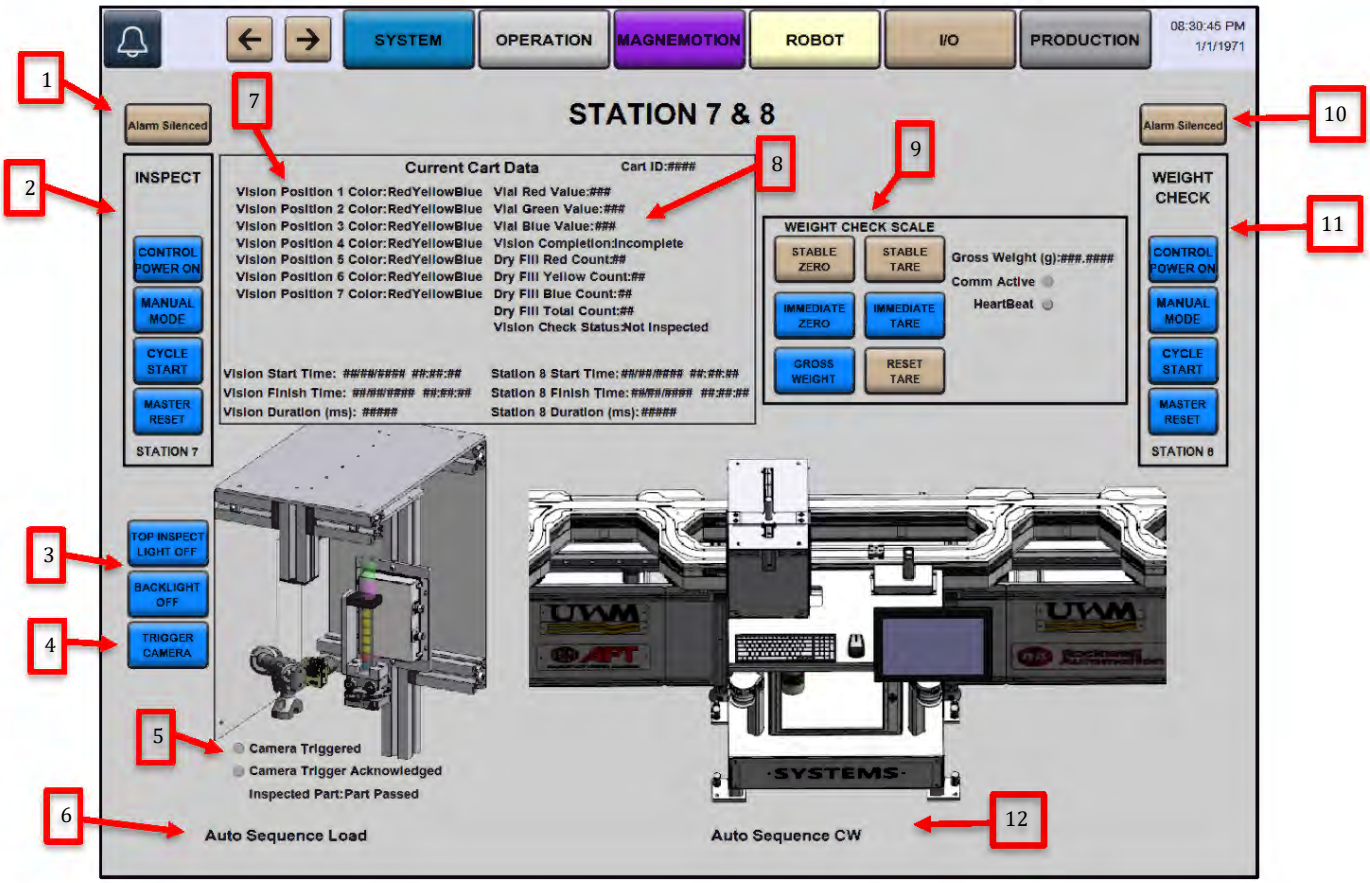


Figure 9-21 Station 7 & 8 Operation Screen

1) Station 7 Alarm Silence
2) Station 7 Mode Operators
3) Toggle Camera Inspect Lights
4) Trigger Camera
5) Camera Result Indicators
6) Station 7 Auto Sequence Steps
7) Station 7 Current Cart Data / Navigate to MagneMotion Information Screen
8) Station 8 Current Cart Data / Navigate to MagneMotion Information Screen
9) Station 8 Scale
10) Station 8 Alarm Silence
11) Station 8 Mode Operators
12) Station 8 Auto Sequence Steps

The Figure 9-21 is a screenshot of the "Station 7 & 8 Operation Screen" from an HMI (Human-Machine Interface), as described in a section of an operational manual. This particular screen is designed for controlling and monitoring the functions and processes at stations 7 and 8 within a manufacturing or production line.

Outlined in the image are various controls and information points:

Station 7 Alarm Silence: A feature for silencing alarms at Station 7.

Station 7 Mode Operators: Controls for changing the operational mode of Station 7, such as toggling between manual and automatic modes or starting and stopping cycles.

Toggle Camera Inspect Lights: This control might be used to turn on or off the lights that assist with camera inspections at Station 7.

Trigger Camera: Button to manually activate the camera for inspection purposes at Station 7.

Camera Result Indicators: Visual indicators that show the results of the camera inspection, such as whether the part has been acknowledged by the system or passed the inspection.

Station 7 Auto Sequence Steps: Displays the steps in the automated process sequence for Station 7, providing a roadmap for the station's operations.

Station 7 Current Cart Data / Navigate to MagneMotion Information Screen: Shows the current data for the operations at Station 7, including start and finish times, and provides a navigation link to the MagneMotion system information.

Station 8 Current Cart Data / Navigate to MagneMotion Information Screen: Similar to Station 7, this displays current cart data for Station 8 and offers navigation to the MagneMotion information screen.

Station 8 Scale: The interface for monitoring or controlling the scale at Station 8, likely for weighing components or products.

Station 8 Alarm Silence: Allows operators to silence alarms specifically for Station 8.

Station 8 Mode Operators: Provides access to controls for changing the operational mode of Station 8, similar to those for Station 7.

Station 8 Auto Sequence Steps: Outlines the steps of the automatic sequence for Station 8, informing operators of the current and next steps in the process.

This interface is intended to provide a centralized control and monitoring station for two adjacent stations in the manufacturing process. It allows for detailed oversight of each station's specific functions and includes capabilities for manual intervention, inspection, and quality control, ensuring that operations are carried out efficiently and in compliance with production standards.

9.6.2.8 Station 9 Operation Screen

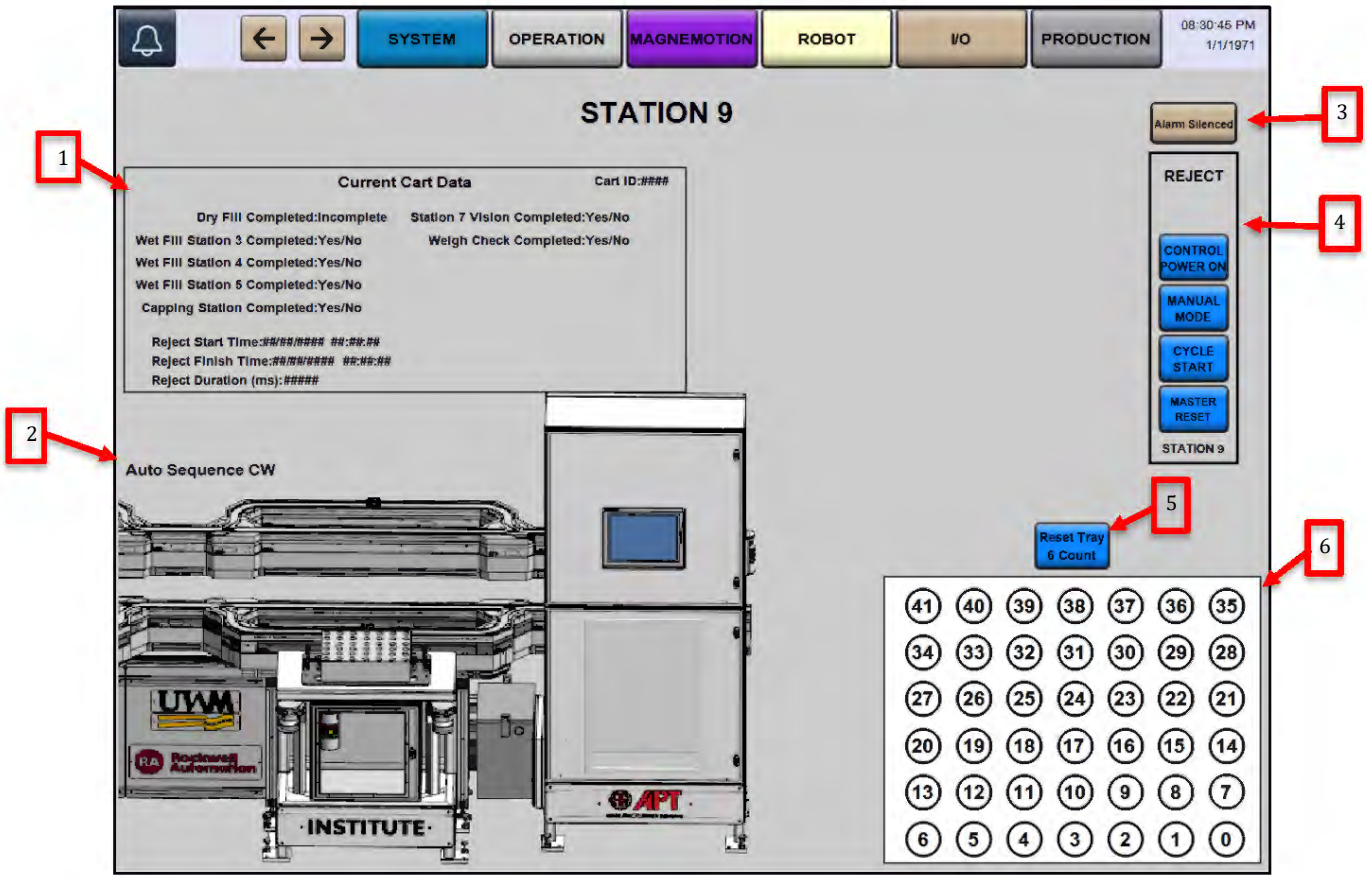


Figure 9-22 Station 9 Operation Screen

1) Station 9 Current Cart Data / Navigate to MagneMotion Information Screen
2) Station 9 Auto Sequence Steps
3) Station 9 Alarm Silence
4) Station 9 Mode Operators
5) Reset Station 9 Tray Count
6) Reject Tray Count Indicators / Navigate to Reject Tray Vial Information

The Figure 9-22 is a screenshot of the "Station 9 Operation Screen" from an HMI (Human-Machine Interface), included in a section of an operational manual. This screen provides the interface for monitoring and controlling the processes at Station 9 of a production system.

Outlined in the screenshot are the following features:

Station 9 Current Cart Data / Navigate to MagneMotion Information Screen: This section displays current operational data for Station 9 and allows navigation to the MagneMotion system information, which may include conveyor or transport system details.

Station 9 Auto Sequence Steps: Lists the steps involved in the automatic sequence of operations at Station 9, providing a structured process flow.

Station 9 Alarm Silence: A feature to silence any active alarms specifically for Station 9, allowing for issue resolution without ongoing audio alerts.

Station 9 Mode Operators: Controls to switch between different operational modes for Station 9, such as control power, manual mode, cycle start, and master reset.

Reset Station 9 Tray Count: Resets the count for trays processed or in use at Station 9.

Reject Tray Count Indicators / Navigate to Reject Tray Vial Information: Shows the count of rejected trays and provides an interface to access more detailed information about the vials in the reject tray.

The interface is designed to give operators a comprehensive overview and control of Station 9's operations, facilitating the management of the production process and enabling quick adjustments and responses to the system's status. It is part of a user-friendly system that ensures efficient operation and quality control within the manufacturing environment.

9.6.2.9 MagneMotion Operation Screen

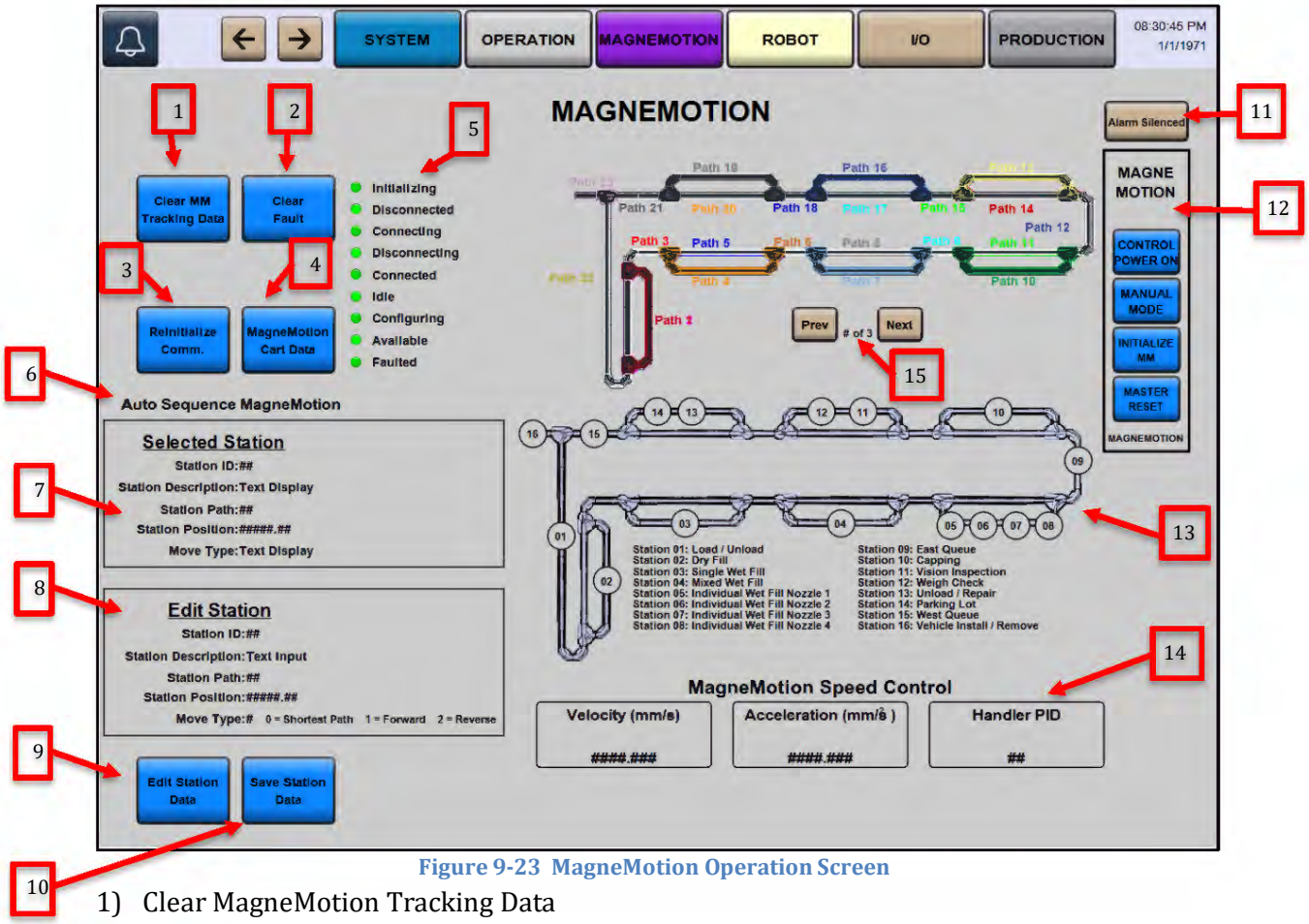


Figure 9-23 MagneMotion Operation Screen

1) Clear MagneMotion Tracking Data
2) Clear MagneMotion Faults
3) Reinitialize MagneMotion Communication
4) Navigate to MagneMotion Information Screen
5) MagneMotion Status Indicators
6) MagneMotion Auto Sequence Steps
7) Current selected MagneMotion station data – Shows MagneMotion data on selected cart station
8) Edit selected MagneMotion station data – edit selected cart station and save to store values
9) Edit Station Data – Allows user to edit the selected station
10) Save Station Data – Stores the Data in the edited station into the current selected station
11) Silence MagneMotion Station Alarm
12) MagneMotion Mode Operators
13) MagneMotion cart at Station Indicators (Green when present) – Tap to show Selected Station Data
14) MagneMotion Speed Controls

The Figure 9-23 is a screenshot of the "MagneMotion Operation Screen" from an HMI (Human-Machine Interface), as seen in a section of an operational manual. The screen is tailored for managing and supervising the MagneMotion system, which is likely a magnetic or automated guided vehicle (AGV) transport system used within a manufacturing setting.

The annotated features on the screen include:

Clear MagneMotion Tracking Data: This control is used to clear the tracking data related to the MagneMotion system.

Clear MagneMotion Faults: Allows the user to clear any faults that have been logged by the MagneMotion system.

Reinitialize MagneMotion Communication: This function may be used to re-establish communication with the MagneMotion system if there has been a disconnect or communication error.

Navigate to MagneMotion Information Screen: Provides access to a more detailed information screen about the MagneMotion system.

MagneMotion Status Indicators: Shows the current status of the MagneMotion system, such as whether it is initializing, connected, or faulted.

MagneMotion Auto Sequence Steps: Displays the steps involved in the automated sequence of the MagneMotion system.

Current Selected MagneMotion Station Data: Presents data for the currently selected station within the MagneMotion system.

Edit Selected MagneMotion Station Data: Allows editing of the selected MagneMotion station's data.

Edit Station Data / Save Station Data: These controls allow the user to edit and save data related to a station within the MagneMotion system.

Silence MagneMotion Station Alarm: A feature to silence alarms specifically for the MagneMotion station.

MagneMotion Mode Operators: Interface elements for changing the operational mode of the MagneMotion system.

MagneMotion Cart at Station Indicators (Green when present): Indicates when a cart is present at a station within the MagneMotion system.

Station Data: This section displays the data related to each station within the MagneMotion system.

MagneMotion Speed Controls: Allows the user to control the velocity, acceleration, and handling parameters of the MagneMotion system.

The screen layout offers comprehensive control over the MagneMotion transport system, providing real-time status information, system controls, and navigation options to ensure efficient flow of materials and products within the facility. The interface is designed for ease of use, allowing operators to quickly access and adjust various aspects of the transport system as needed.

9.6.2.10 Tray Vial Information Operation Screen

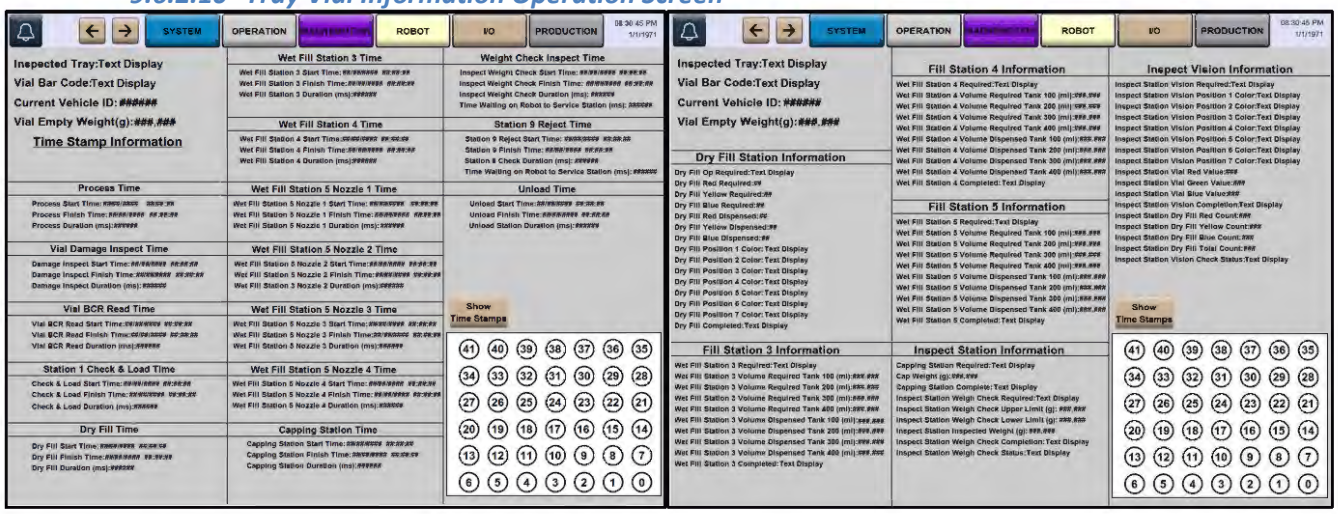


Figure 9-24 Vial Tray Information Operation Screen

This screen shows all the process data that is sent throughout all the stations during Auto Cycle and gets stored into the Inspected Tray's process data. Vial indicators are green when a vial is present and touching a vial indicator displays the vial process data.

9.6.2.11 MagneMotion Cart Information Operation Screen

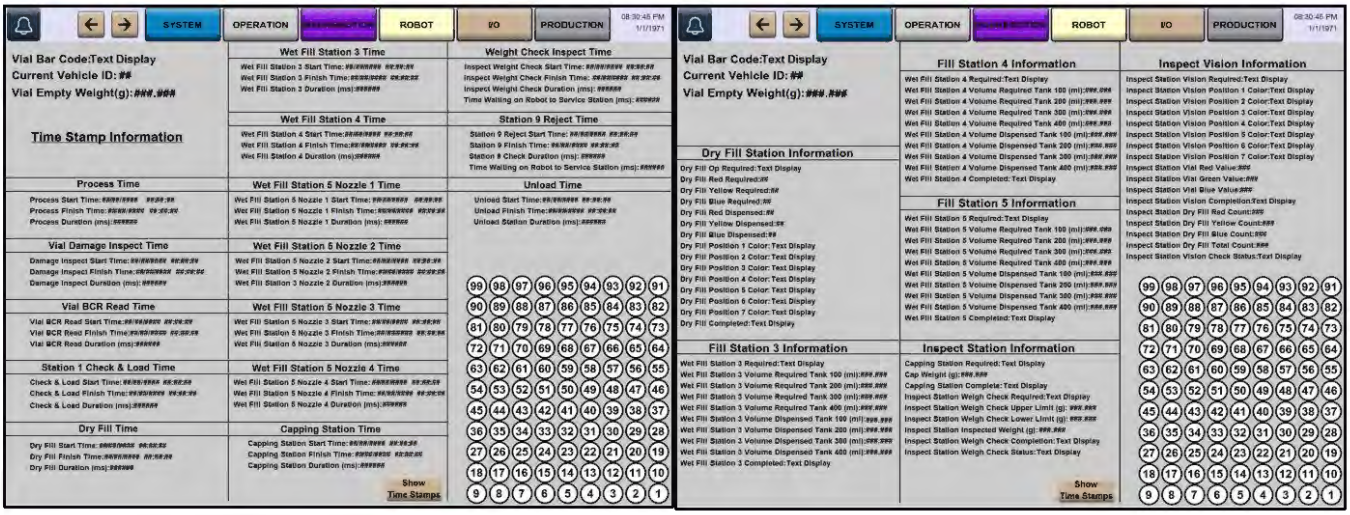


Figure 9-25 MagneMotion Information Operation Screen

This screen shows all the process data that is sent throughout all the stations during Auto Cycle and gets stored into the Inspected MagneMotion cart process data. Cart indicators are green when a cart is active (cart vehicle ID between 1 – 99) and touching a cart indicator displays the process data.

The figure "9-24" shows the Vial Tray Information Operation Screen. This screen is designed to display process data that is sent through all stations during the Auto Cycle and gets stored in the Inspected Tray's process data. It includes various data points such as inspected tray/trolley display, current vehicle ID, empty weighing area, and time stamp information related to process flow, from filling to inspection and rejection.

The figure "9-25" shows the MagneMotion Cart Information Operation Screen. Similar to the previous screen, this one also displays process data that circulates through all stations during the Auto Cycle and is captured in the Inspected MagneMotion cart process data. The screen has indicators that turn green when a cart is present at a station, and touching a cart indicator reveals more detailed process data for that specific cart.

Both screens are part of a system designed to monitor and manage the production process, ensuring efficiency and traceability of products throughout the Auto Cycle. They appear to be part of a larger HMI system that controls and oversees various aspects of a manufacturing or packaging line, with a particular focus on the handling and processing of vials.

9.6.3 Robot Screens

9.6.3.1 LR-Mate Robot Screen

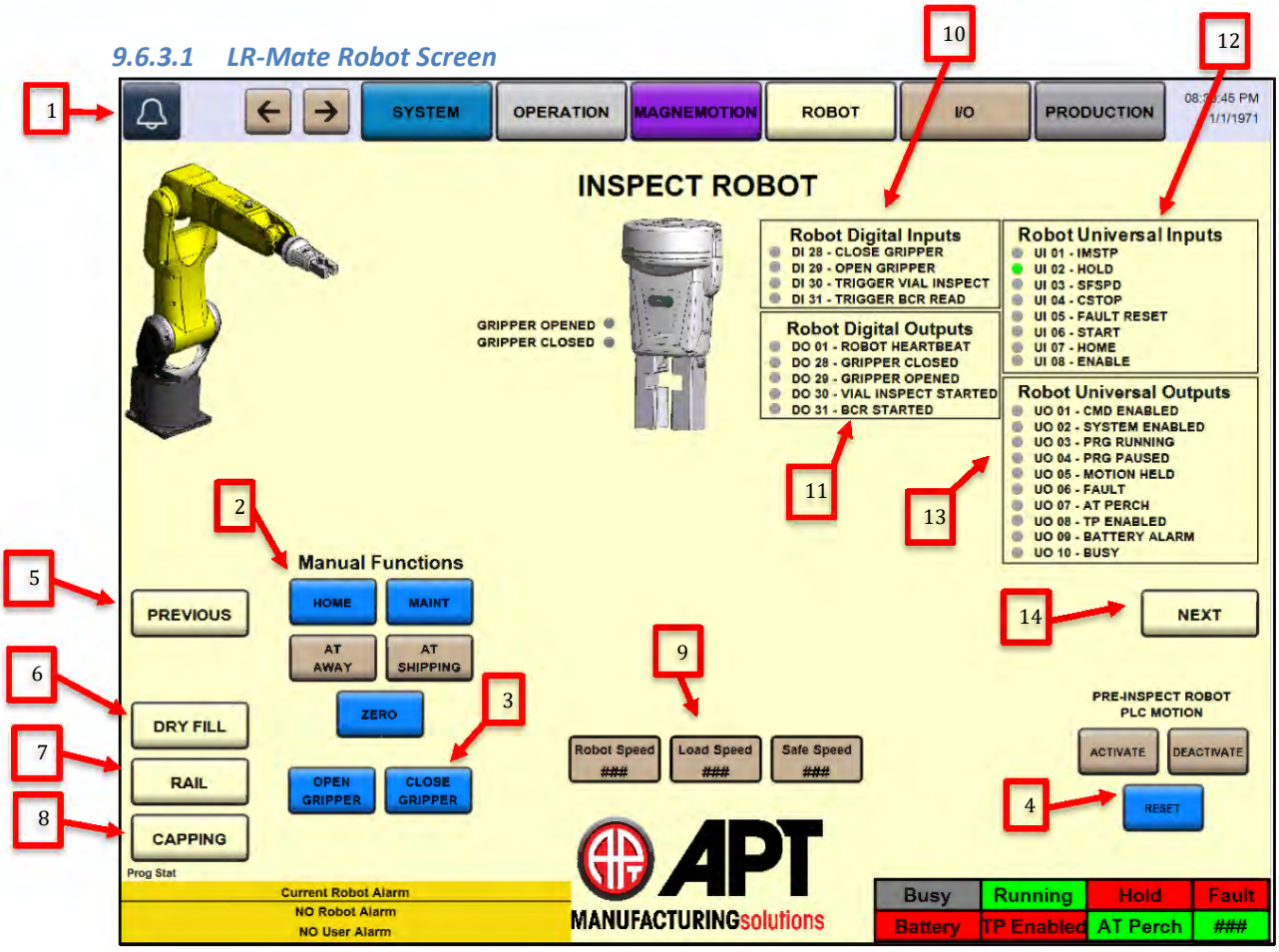


Figure 9-26 LR-Mate Robot Screen

1) Display Current Faults
2) Manual Function Operators and Indication of State; Select Button to Move Robot to the Desired Position.
3) End of Arm Tooling Manual Function and Status Indicators
4) Robot UOP Commands and Indicators
5) Navigate to Previous Robot Screen
6) Navigate to M1iA Robot Screen
7) Navigate to CR7 Robot Screen
8) Navigate to Scara Robot Screen
9) Robot Speed Control
10) Robot Digital Input Signals from Process PLC
11) Robot Digital Output Signals to Process PLC
12) Robot UI Signal Indicators to Process PLC
13) Robot UO Signal Indicators to Process PLC
14) Navigate to Next Robot Screen

The figure "9-26" displays the LR-Mate Robot Screen, which is part of the HMI (Human-Machine Interface) system. The screen provides a user interface for interacting with an LR-Mate robotic arm and includes various features:

Display Current Faults: This area of the screen shows any current faults with the robot system, which could be critical for troubleshooting.

Manual Function Operators and Indication of State: These controls allow the operator to manually control the robot and provide visual feedback on the robot's current state.

End of Arm Tooling Manual Function and Status Indicators: This section provides manual controls for the robot's end-of-arm tooling, with indicators showing the status of these functions.

Robot UOP (User Operation Panel) Commands and Indicators: Displays the robot's operation panel commands and indicators, giving the operator control over the robot's functions.

Navigate to Previous Robot Screen: Button to return to the previous screen within the robot's HMI system.

Navigate to M1iA Robot Screen: Allows the user to switch the display to the interface controlling an M1iA robot, if applicable.

Navigate to CR7 Robot Screen: This button enables navigation to the control screen for a CR7 robot within the system.

Navigate to Scara Robot Screen: Provides the option to navigate to the control interface for a SCARA robot.

Robot Speed Control: The operator can adjust the robot's speed using this control.

Robot Digital Input Signals from Process PLC: Shows the digital input signals coming from the process programmable logic controller (PLC) to the robot.

Robot Digital Output Signals to Process PLC: Displays the digital output signals being sent from the robot to the process PLC.

Robot UI Signal Indicators to Process PLC: Visual indicators for the user interface signals going to the process PLC.

Robot UO Signal Indicators to Process PLC: Shows the user output signal indicators that go to the process PLC.

Navigate to Next Robot Screen: Button to move forward to the next screen within the robot's HMI system.

The interface is designed for comprehensive control and monitoring of the robotic arm's operations, with manual and automatic function capabilities, navigation through different robot control screens, and status indicators to ensure efficient and safe operation within the production environment.

9.6.3.2 M1iA Robot Screen

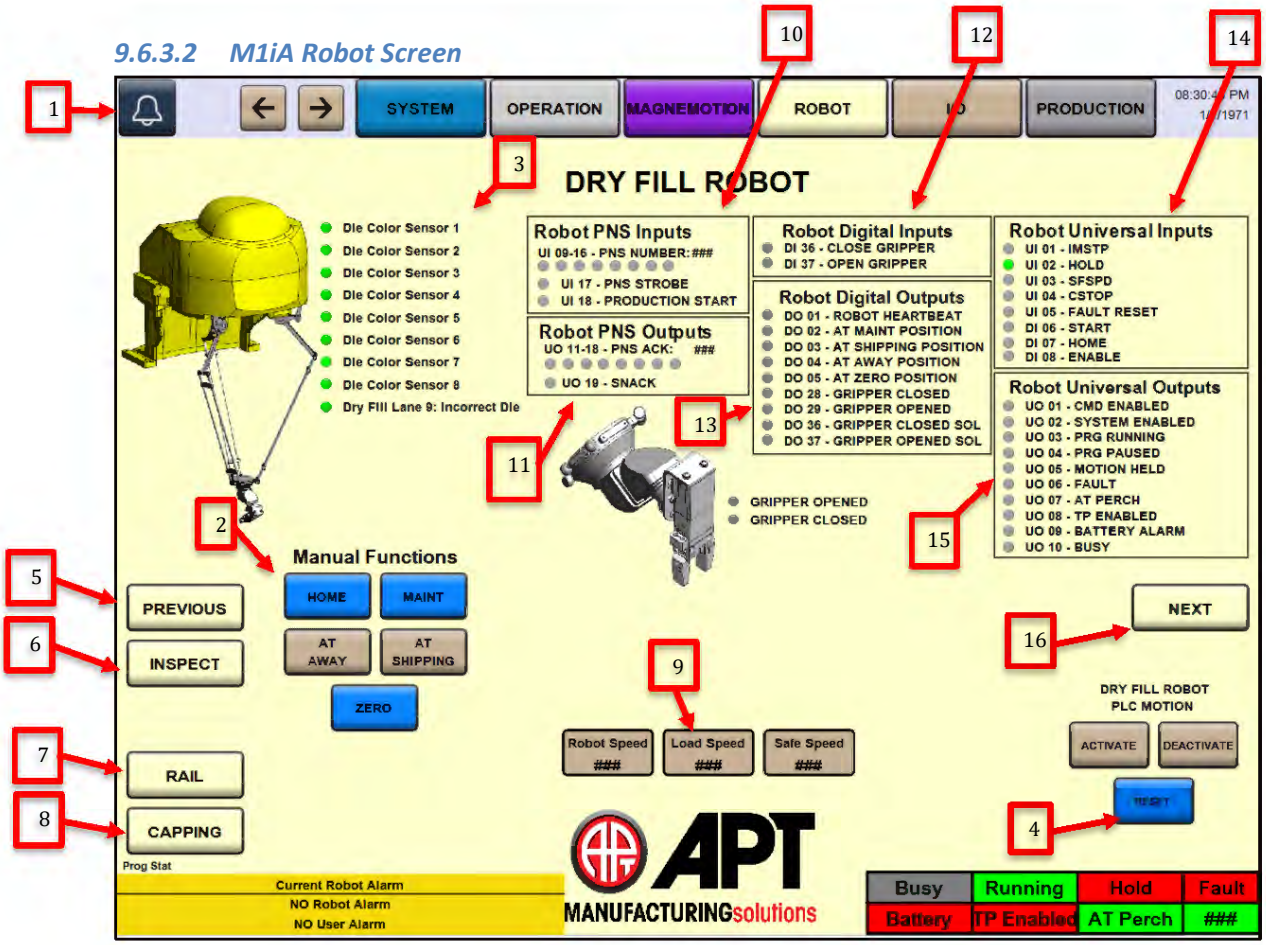


Figure 9-27 M1iA Robot Screen

1) Display Current Faults
2) Manual Function Operators and Indication of State; Select Button to Move Robot to the Desired Position.
3) Dice Tray Color Sensor Status Indicators
4) Robot UOP Commands and Indicators
5) Navigate to Previous Robot Screen
6) Navigate to LR-Mate Robot Screen
7) Navigate to CR7 Robot Screen
8) Navigate to Scara Robot Screen
9) Robot Speed Control
10) PNS Input Data to the Robot from the Process PLC
11) PNS Output Data Echoed Back from Robot to the Process PLC
12) Robot Digital Input Signals from Process PLC
13) Robot Digital Output Signals to Process PLC
14) Robot UI Signal Indicators to Process PLC
15) Robot UO Signal Indicators to Process PLC
16) Navigate to Next Robot Screen

The figure "9-27" shows the M1iA Robot Screen, which is part of the HMI (Human-Machine Interface) system detailed in a CSM Operations Manual. The screen provides a user interface for the M1iA robot, typically a small and versatile robotic arm used in automation processes.

Outlined in the image are various controls and information points:

Display Current Faults: This area of the screen indicates any current issues or errors with the robot system.
Manual Function Operators and Indication of State: These buttons allow the operator to manually control the robot and show the current status or position of the robot.
Dice Tray Color Sensor Status Indicators: Displays the status of color sensors, which are likely used to detect the presence or absence of objects in the robot's working area.
Robot UOP (User Operation Panel) Commands and Indicators: Provides the interface for direct command input to the robot and displays feedback from these commands.
Navigate to Previous Robot Screen: Button to go back to the previously displayed screen within the robot control interface.
Navigate to LR-Mate Robot Screen: Allows the user to switch to the control interface for an LR-Mate robot.
Navigate to CR7 Robot Screen: Button to navigate to the control interface for a CR7 robot.
Navigate to Scara Robot Screen: Provides the option to navigate to the control interface for a SCARA robot.
Robot Speed Control: Control to adjust the operational speed of the robot.
PNS Input Data to the Robot from the Process PLC: Shows the input data coming from the process PLC to the robot's PNS system.
PNS Output Data Echoed Back from Robot to the Process PLC: Indicates the data sent back from the robot to the process PLC, confirming the actions taken.
Robot Digital Input Signals from Process PLC: Displays the digital input signals that the robot receives from the process PLC.
Robot Digital Output Signals to Process PLC: Shows the output signals sent from the robot to the process PLC.
Robot UO Signal Indicators to Process PLC: Indicators for the robot's user output signals sent to the process PLC.
Robot UO Signal Indicators to Process PLC: Similar to the UO indicators, these signals are likely used for interface communication with the process PLC.
Navigate to Next Robot Screen: Button to move forward to the next screen within the robot's HMI system.
The interface is designed to give operators a full range of control over the M1iA robot's functions, allowing for manual intervention, process monitoring, and transition between different robot controls within a comprehensive manufacturing system.

9.6.3.3 CR7 Robot Screen

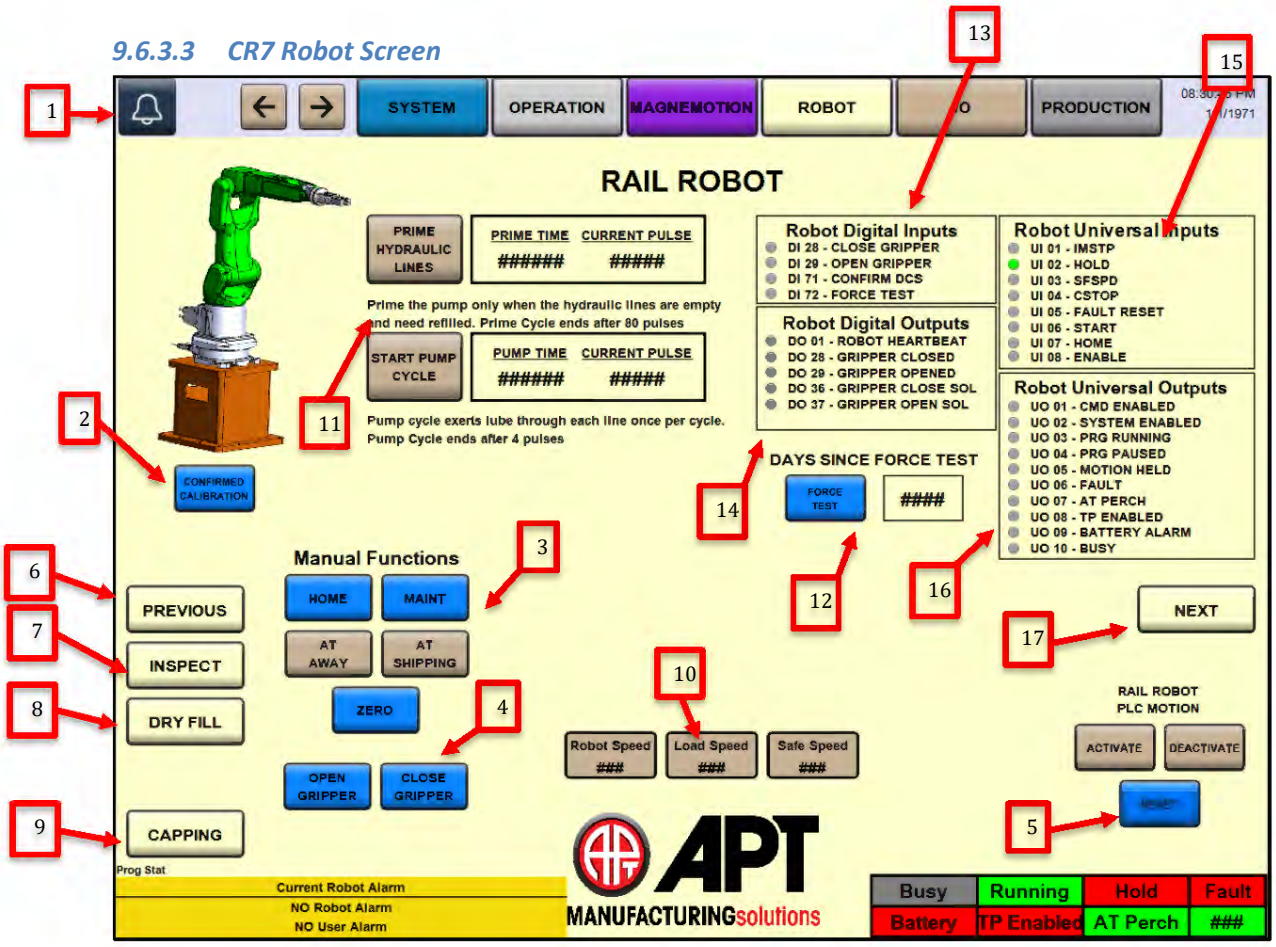


Figure 9-28 CR7 Robot Screen

1) Display Current Faults
2) Confirm CR7 Collaboration – Ensure no one is touching the Robot
3) Manual Function Operators and Indication of State; Select Button to Move Robot to the Desired Position.
4) End of Arm Tooling Manual Function and Status Indicators
5) Robot UOP Commands and Indicators
6) Navigate to Previous Robot Screen
7) Navigate to CR7 Robot Screen
8) Navigate to M1iA Robot Screen
9) Navigate to Scara Robot Screen
10) Robot Speed Control
11) Lube Pump Controls
12) Force Test Controls
13) Robot Digital Input Signals from Process PLC
14) Robot Digital Output Signals to Process PLC
15) Robot UI Signal Indicators to Process PLC
16) Robot UO Signal Indicators to Process PLC
17) Navigate to Next Robot Screen

The figure "9-28" shows the CR7 Robot Screen, which is part of the HMI (Human-Machine Interface) system. The screen provides a user interface for interacting with a CR7 robotic arm, which is part of a rail robot system. The annotated screen includes various control and status indicators:

Display Current Faults: This feature shows any current faults within the robot system, which are important for diagnostics and troubleshooting.
Confirm CR7 Collaboration: This function ensures that the robot is safe to operate and that no one is in danger by touching the robot during its operation.
Manual Function Operators and Indication of State: These controls allow the operator to manually operate the robot and indicate its current state.
End of Arm Tooling Manual Function and Status Indicators: This part of the interface manages the end-of-arm tooling, showing manual functions and their status.
Robot UOP (User Operation Panel) Commands and Indicators: This section provides the operator with commands and indicators for the robot's operation panel.
Navigate to Previous Robot Screen: Button to go back to the previous screen within the robot control interface.
Navigate to CR7 Robot Screen: A button that presumably would refresh or maintain the current screen.
Navigate to M1iA Robot Screen: Allows the user to switch to the control interface for an M1iA robot.
Navigate to Scara Robot Screen: Provides the option to navigate to the control interface for a SCARA robot.
Robot Speed Control: Controls to adjust the speed of the robot's movement.
Lube Pump Controls: Manages the lubrication pump, which is essential for the robot's maintenance and operation.
Force Test Controls: These controls are likely used to conduct a force test, ensuring the robot's force settings are correct for safe and effective operation.
Robot Digital Input Signals from Process PLC: Shows the digital input signals from the process PLC to the robot.
Robot Digital Output Signals to Process PLC: Displays the digital output signals from the robot to the process PLC.
Robot UI Signal Indicators to Process PLC: Indicators for the user interface signals going to the process PLC.
Robot UO Signal Indicators to Process PLC: Indicates the robot's user output signals to the process PLC.
Navigate to Next Robot Screen: Button to move to the next screen within the robot's HMI system.
This interface is designed to offer comprehensive control and monitoring for the CR7 robot's functions, with both manual and automated capabilities. It facilitates the management of the robot's operations within a production environment, enabling precise adjustments to optimize the production process.

9.6.3.4 Scara Robot Screen

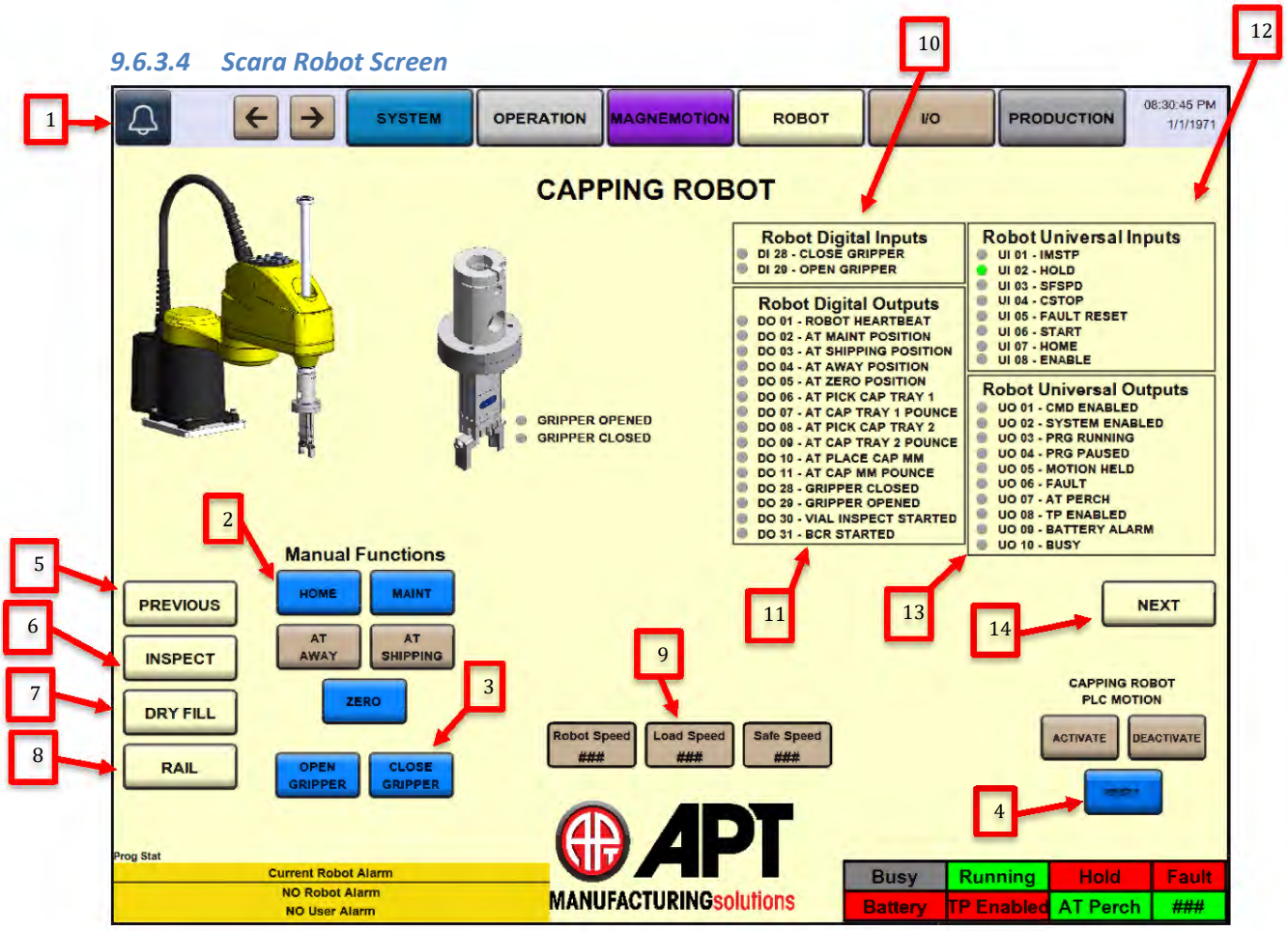


Figure 9-29 Scara Robot Screen

1) Display Current Faults
2) Manual Function Operators and Indication of State; Select Button to Move Robot to the Desired Position.
3) End of Arm Tooling Manual Function and Status Indicators
4) Robot UOP Commands and Indicators
5) Navigate to Previous Robot Screen
6) Navigate to LR-Mate Robot Screen
7) Navigate to M1iA Robot Screen
8) Navigate to CR7 Robot Screen
9) Robot Speed Control
10) Robot Digital Input Signals from Process PLC
11) Robot Digital Output Signals to Process PLC
12) Robot UI Signal Indicators to Process PLC
13) Robot UO Signal Indicators to Process PLC
14) Navigate to Next Robot Screen

The figure "9-29" is a screenshot of the Scara Robot Screen from a CSM Operations Manual. This screen is a part of an HMI (Human-Machine Interface) which facilitates interaction with a SCARA robot used for capping processes in manufacturing. The features include:

Display Current Faults: This part of the interface shows any current faults or errors with the robot system, crucial for immediate troubleshooting.

Manual Function Operators and Indication of State: These controls enable manual operation of the robot, providing visual feedback on the state of the robot.

End of Arm Tooling Manual Function and Status Indicators: This section allows the operator to control the end-of-arm tooling manually and shows the status of these functions.

Robot UOP (User Operation Panel) Commands and Indicators: Here, the operator can issue commands directly to the robot and receive status indicators.

Navigate to Previous Robot Screen: This button allows the user to return to the previous screen in the robot control interface.

Navigate to LR-Mate Robot Screen: Enables the user to switch the display to the control interface for an LR-Mate robot.

Navigate to M1iA Robot Screen: Switches to the control interface for an M1iA robot.

Navigate to CR7 Robot Screen: Allows navigation to the CR7 robot’s control interface.

Robot Speed Control: Controls for adjusting the speed of the robot's movement.

Robot Digital Input Signals from Process PLC: This section shows the digital input signals from the process programmable logic controller (PLC) to the robot.

Robot Digital Output Signals to Process PLC: Displays the digital output signals from the robot to the process PLC.

Robot UI Signal Indicators to Process PLC: Indicators for the robot's user interface signals that are sent to the process PLC.

Robot UO Signal Indicators to Process PLC: Shows the robot's user output signals that are communicated to the process PLC.

Navigate to Next Robot Screen: This button allows the user to proceed to the next screen within the robot's HMI system.

The interface aims to provide comprehensive control and monitoring capabilities for the SCARA robot's capping functions within a manufacturing environment, facilitating both manual and automated operations.

9.6.4 I/O Screens

1) Status Indicator of I/O
2) Navigate to I/O Master Block #1
3) Navigate to I/O Master Block #2

Figure 9-30 Safety I/O Screen Slot 3

Figure 9-32 Safety I/O Screen Slot 4

Figure 9-31 Safety I/O Screen Slot 5

The image displays figures "9-30", "9-31", "9-32", and "9-33", which are screenshots from an operations manual showing the Safety I/O Screen Slots 3, 4, and 5, and the navigational pointers to I/O Master Block #1 and #2. These screens are part of the Human-Machine Interface (HMI) that monitor the status of various safety-related input modules.

Each screen has a grid-like layout displaying the status of different safety parameters across various slots. They have indicators such as "Safety Panel E-Stop Ch. A", "Guard Door Interlock", "Process Panel E-Stop", and "Robot Panel E-Stop", among others, with ON/OFF status lights. These indicators allow an operator to quickly assess the status of each safety measure in place and respond accordingly.

The screens have "PREVIOUS" and "NEXT" navigation buttons, allowing the operator to scroll through different slots of safety inputs. The status indicators provide critical information to ensure the machinery operates within the defined safety parameters, preventing accidents and ensuring the wellbeing of personnel and equipment.

The interface design highlights the modularity and complexity of the safety systems integrated into the machinery, emphasizing the need for clear and immediate communication of safety statuses.

Figure 9-36 Safety I/O Screen Slot 6

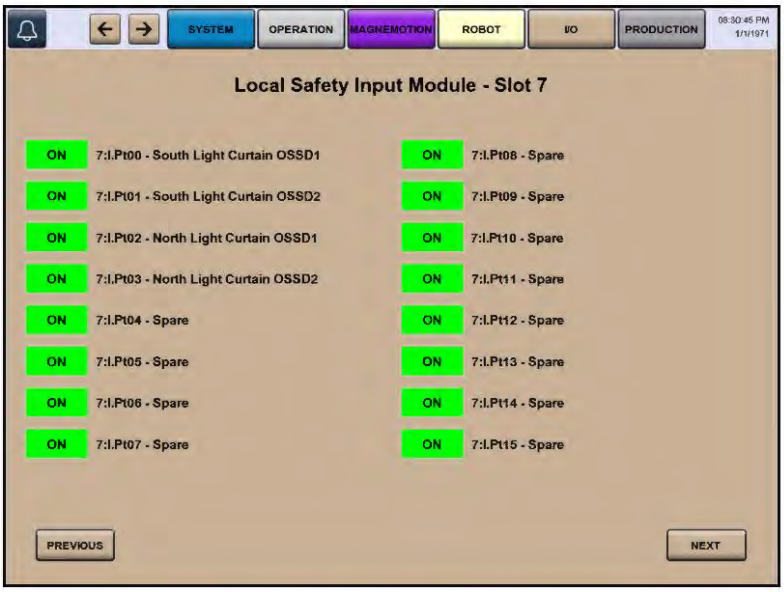


Figure 9-35 Safety I/O Screen Slot 7

Figure 9-34 Safety I/O Screen Slot 11

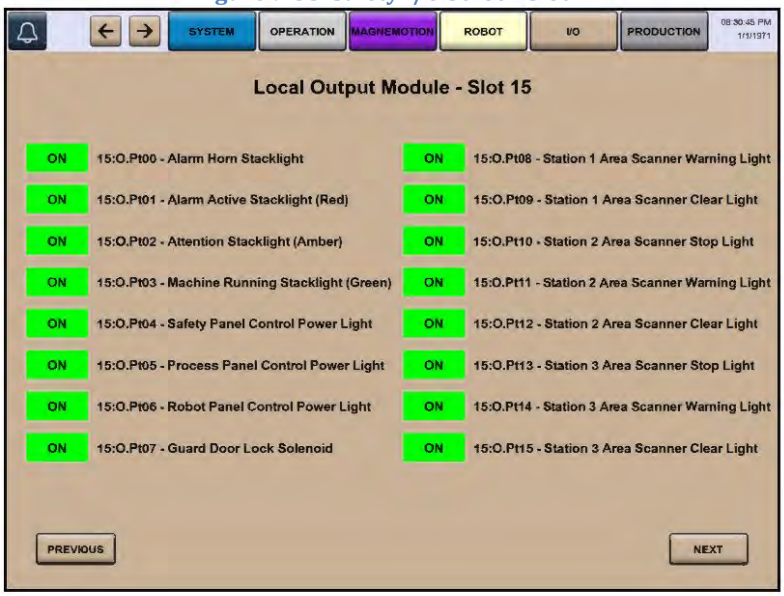


Figure 9-33 I/O Screen Slot 16

The Figure 3-36 shows the status of the Local Safety Input Module at Slot 6. The Figure 3-37 shows the status of the same module at Slot 7. The Figure 3-38 shows the status of the module at Slot 11. Lastly, the Figure 3-39 shows the status of the Local Output Module at Slot 15. The slots are color-coded to indicate their status: green for good condition, yellow for warning condition, and red for error condition. The slots are numbered from 6 to 16.

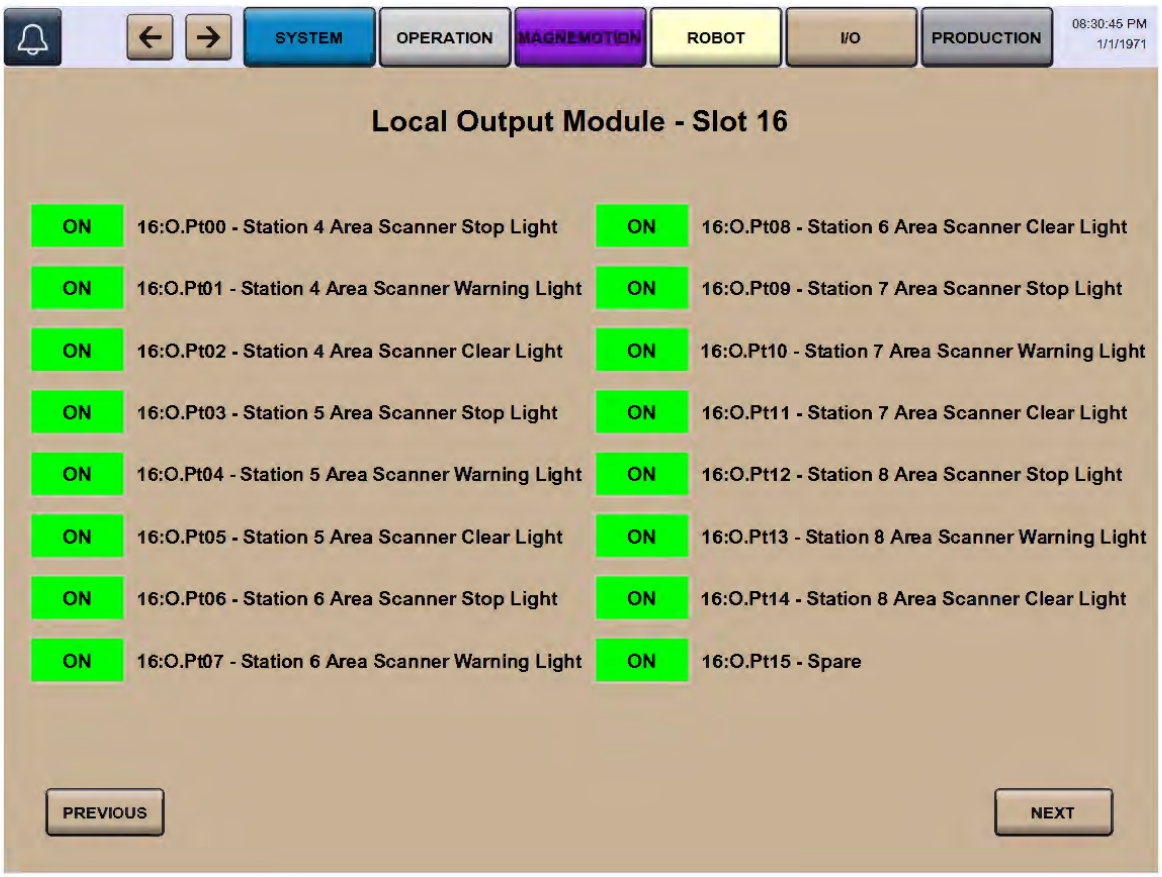


Figure 9-37 I/O Screen Slot 16

The Figure 9-37 shows a screenshot of a control panel for a robot or automated system. The control panel is divided into two sections: the top section is a light grey color and the bottom section is a dark grey color. The top section has a title “Local Output Module - Slot 16” and a timestamp “9/17/19”. The bottom section has a grid of 16 buttons, each with a label and a status indicator. The labels are “P60-Station 4 Area Scanner Stop Light”, “P60-Station 4 Area Scanner Clear Light”, etc. The status indicators are either “ON” or “OFF”. There are “PREVIOUS” and “NEXT” buttons at the bottom of the control panel. This control panel allows for monitoring and controlling various aspects of the robot or automated system.

9.6.5 Production Data Screen

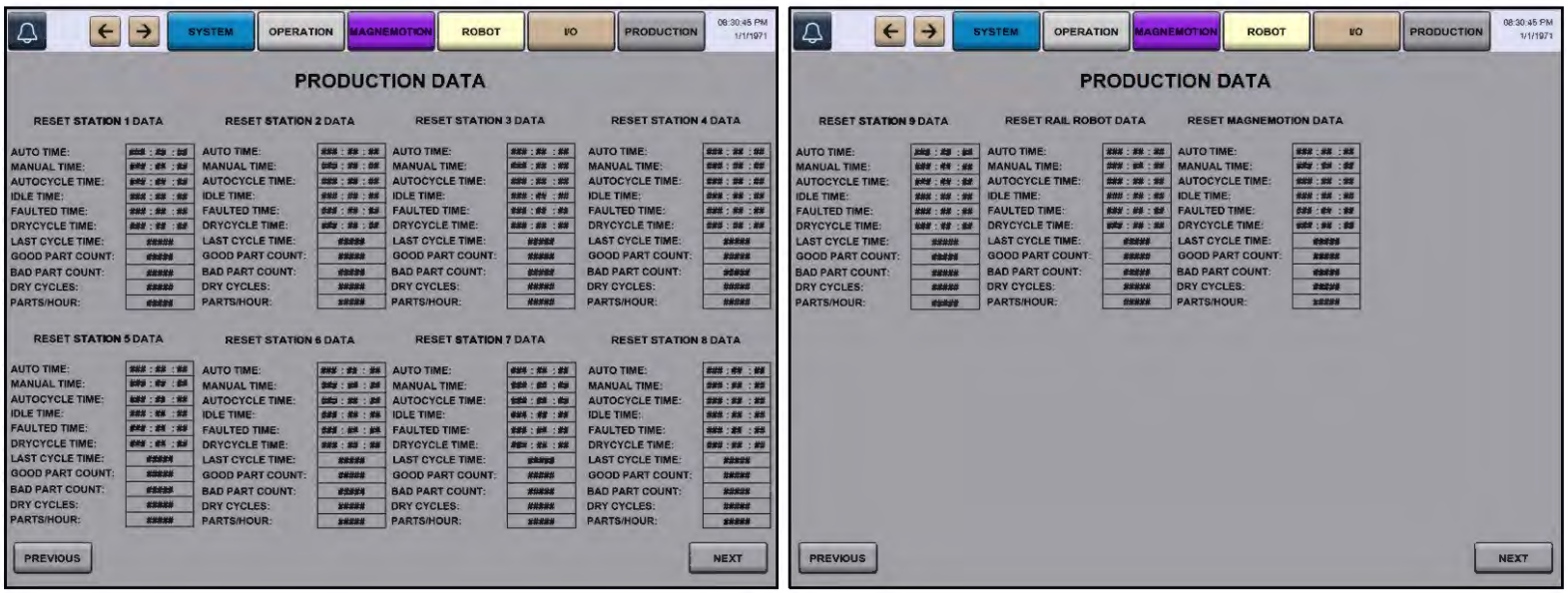


Figure 9-38 Production Data Screen

9.7 Fault Listings

9.7.1 Station 1 Faults

Alarm 01: LRMate7L Robot HeartBeat Fault – Check Robot Controller
Alarm 02: Station 1 Tray 1 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 03: Station 1 Tray 2 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 04: Station 1 Tray 3 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 05: Station 1 Robot Faulted – See Teach Pendent for Details

9.7.2 Station 2 Faults

Alarm 01: Spare
Alarm 02: Spare
Alarm 03: Spare
Alarm 04: Spare
Alarm 05: Station 2 Robot Faulted – See Teach Pendent for Details

9.7.3 Station 3 Faults

Alarm 01: Wet Fill PLC Heartbeat Fault – Check Filler Panel & Controller
Alarm 02: Spare
Alarm 03: Spare
Alarm 04: Spare
Alarm 05: Spare

9.7.4 Station 4 Faults

Alarm 01: Wet Fill PLC Heartbeat Fault – Check Filler Panel & Controller
Alarm 02: Spare
Alarm 03: Spare
Alarm 04: Spare
Alarm 05: Spare

9.7.5 Station 5 Faults

Alarm 01: Wet Fill PLC Heartbeat Fault – Check Filler Panel & Controller
Alarm 02: Spare
Alarm 03: Spare
Alarm 04: Spare
Alarm 05: Spare

9.7.6 Station 6 Faults

Alarm 01: SR3iA SCARA Robot Heartbeat Fault – Check Robot Controller
Alarm 02: Station 6 Tray 1 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 03: Station 6 Tray 2 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 04: Spare
Alarm 05: Scara Robot Faulted – See Teach Pendent for Details

9.7.7 Station 8 Faults

Alarm 01: Spare
Alarm 02: Station 8 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 03: Station 6 Tray 2 Scale Heartbeat Fault – Check Scale ACT350 Controller
Alarm 04: Spare
Alarm 05: Spare

9.7.8 CR7 Faults

Alarm 01: CR7 Rail Robot Heartbeat Fault – Check Robot Controller
Alarm 02: Spare
Alarm 03: Spare
Alarm 04: Spare
Alarm 05: CR7 Rail Robot Faulted – See Teach Pendent for Details

9.7.9 Safety Faults

Alarm 00: Safety Panel Emergency Stop Activated
Alarm 01: Safety Panel Emergency Stop Faulted – Check for Wire Break or Short
Alarm 02: Process Panel Emergency Stop Activated
Alarm 03: Process Panel Emergency Stop Faulted – Check for Wire Break or Short
Alarm 04: Robot Panel Emergency Stop Activated
Alarm 05: Robot Panel Emergency Stop Faulted – Check for Wire Break or Short
Alarm 06: Symbiont Panel Emergency Stop Activated
Alarm 07: Symbiont Panel Emergency Stop Faulted – Check for Wire Break or Short
Alarm 08: Robot Rail North Light Curtain Faulted – Check for Wire Break or Short
Alarm 09: Robot Rail South Light Curtain Faulted – Check for Wire Break or Short
Alarm 10: Station 1 Area Scanner Left Stop Zone Faulted – Check for Wire Break or Short
Alarm 11: Station 1 Area Scanner Left Warning Zone Faulted – Check for Wire Break or Short
Alarm 12: Station 1 Area Scanner Right Stop Zone Faulted – Check for Wire Break or Short
Alarm 13: Station 1 Area Scanner Right Warning Zone Faulted – Check for Wire Break or Short
Alarm 14: Station 2 Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 15: Station 2 Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 16: Station 3 Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 17: Station 3 Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 18: Station 4 Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 19: Station 4 Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 20: Station 5 Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 21: Station 5 Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 22: Station 6 Left Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 23: Station 6 Left Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 24: Station 6 Right Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 25: Station 6 Right Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 26: Station 7 Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 27: Station 7 Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 28: Station 8 Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 29: Station 8 Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 30: Station 9 Left Area Scanner Stop Zone Faulted – Check for Wire Break or Short

Alarm 31: Station 9 Left Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 32: Station 9 Right Area Scanner Stop Zone Faulted – Check for Wire Break or Short
Alarm 33: Station 9 Right Area Scanner Warning Zone Faulted – Check for Wire Break or Short
Alarm 34: Guard Door Lock Faulted – Check for Wire Break or Short
Alarm 35: Safety Relay Output Control Faulted – Check for Wire Break, Short or EDM Feedback
Alarm 36: Safety Relay Output Power Faulted – Check for Wire break, Short or EDM Feedback
Alarm 37: Fanuc LR-Mate 7L Emergency Stop Activated
Alarm 38: Fanuc LR-Mate 7L Emergency Stop Safety Instruction Faulted – Check Robot Communication
Alarm 39: Fanuc CR7 Emergency Stop Activated
Alarm 40: Fanuc CR7 Emergency Stop Safety Instruction Faulted – Check Robot Communication
Alarm 41: Fanuc SR3iA Emergency Stop Activated
Alarm 42: Fanuc SR3iA Emergency Stop Safety Instruction Faulted - Check Robot Communication
Alarm 43: Fanuc M1iA Emergency Stop Activated
Alarm 44: Fanuc M1iA Emergency Stop Safety Instruction Faulted - Check Robot Communication
Alarm 45: Safety Input Card Slot 3 Faulted
Alarm 46: Safety Input Card Slot 4 Faulted
Alarm 47: Safety Input Card Slot 5 Faulted
Alarm 48: Safety Input Card Slot 6 Faulted
Alarm 49: Safety Input Card Slot 7 Faulted
Alarm 50: Safety Output Card Slot 11 Faulted
Alarm 51: Safety Input Connection Faulted Fanuc LR-Mate
Alarm 52: Safety Input Connection Faulted Fanuc CR7
Alarm 53: Safety Input Connection Faulted Fanuc SR39A
Alarm 54: Safety Input Connection Faulted Fanuc M1iA
Alarm 55: System Safety Mismatch, Please Verify System Safety has not been Tampered with

10 Appendix A – Equipment / Process Flow