



Coho Control Overview

Coho Process Overview Screen

The screenshot shows a web-based interface for the Coho process. At the top, a browser window displays the URL `3.82.80.40/floor/`. The interface includes a status bar with the text "Mode: STOPPED - USER_NEEDED: Press SYSTEM START to continue." and the REL logo. The main content area features a "HOME" section with "Travel Position: 0" and "Lift Position: 0", and checkboxes for "Animate" (checked) and "Heatmap". A "Live Lift Position" icon is present. Below this is a row of process icons: LOAD, BRUSH, ALK, ALK_1RNS, ALK_2RNS, DWELL1, DWELL2, ACID, ACID_1RNS, ACID_2RNS, CAUSTIC, and UNLOAD. The ACID_1RNS icon is highlighted with a green box and an arrow pointing to it from the annotation "Carriers can be 'clicked' to open Carrier Detail". At the bottom, there are three buttons: "SYSTEM START" (green), "SYSTEM SHUT DOWN" (grey), and "FAULT RECOVERY" (orange). A "Probe Alarms" section is partially visible at the bottom right.

UI is Ethernet/Internet Based. Allowing for operation via HMI, iPad, or PC.

System Status Readout

Live Lift Position

Carriers can be "clicked" to open Carrier Detail

Probe Alarms

Coho Process Overview Screen Functionality

Travel Position: 0
Lift Position: 0

Animate Heatmap

LOAD BRUSH ALK ALK_1RNS ALK_2RNS DWELL1 DWELL2 ACID ACID_1RNS ACID_2RNS CAUSTIC UNLOAD

Operator Diagnostic Mode Carriers

Probe Alarms

- ALK PH
- Alk Temp
- Caustic Tank Depth
- ACID PH
- Alk2 Conductivity

Operator Tab is for manual intervention, such as loading and unloading

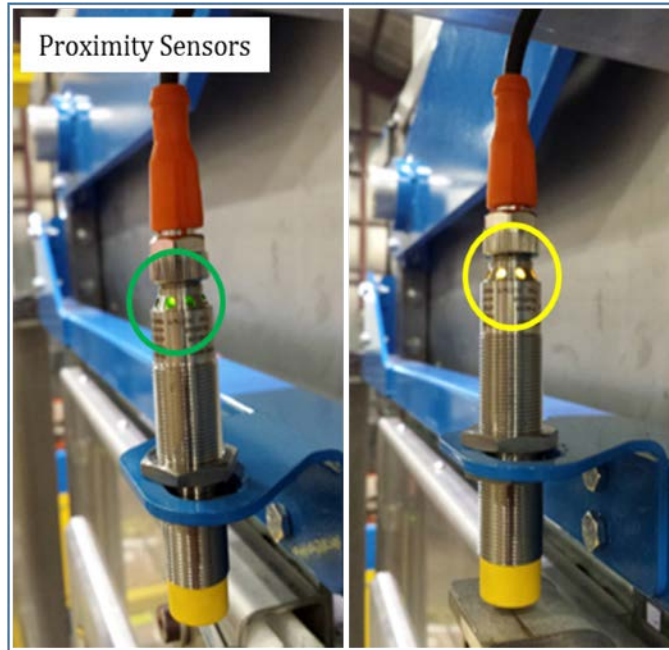
In diagnostic mode, each controllable item in the line can be activated separately

Carrier Menu shows all current carriers, as well as past part data

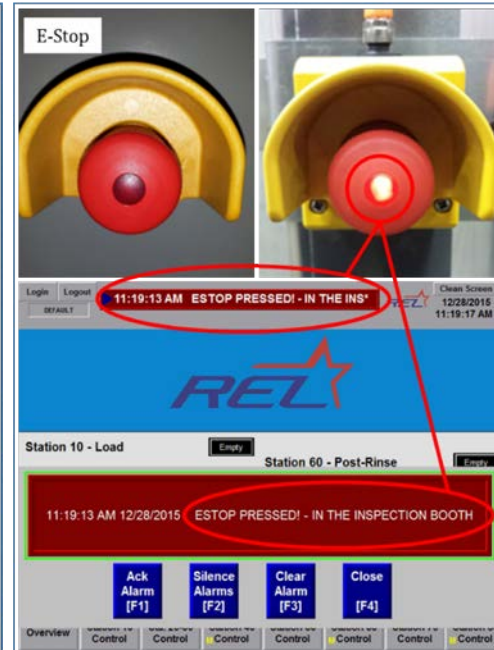
Orange Flashing indicates operator intervention required. Blue Flash indicates the parts need another batch of parts to be moved to complete the recipe.

Probe Alarms indicate if custom parameter are out of specifications

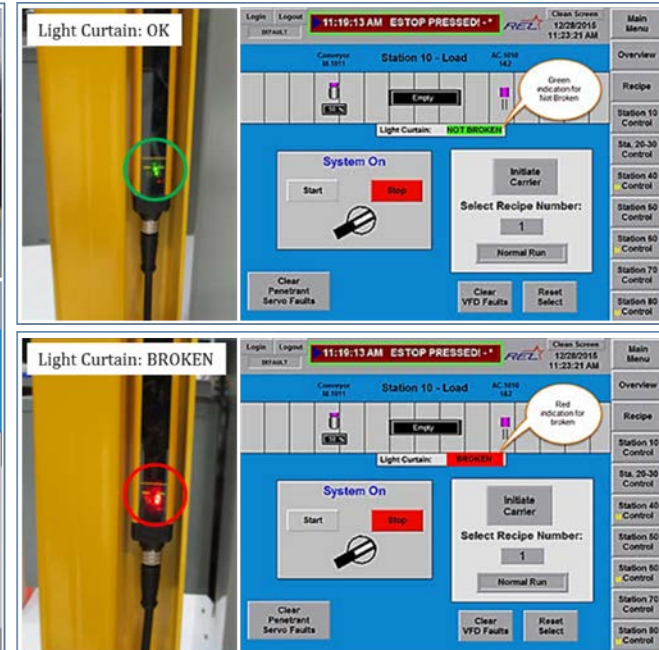
Built-In Safety Features



Safety Proximity Sensors



Emergency Stops



Safety Light Curtains

Coho Features



- **Production Environment Capable!**
 - Change processing hardware behavior ‘on-the-fly’
 - The processing line can take a new recipe at any point in the processing. Limited through security login permissions. Types of recipe changes can be: Rotation on penetrant spray, how many freshwater, recycle passes in rinse tanks, immersion time in tanks due to etch rates, etc.
 - System can function with ‘Random Loading’
 - Operator can choose whatever recipe needs to be run on UI. This is performed by manually selecting the recipe or using a barcode scanner on the part traveler.
- **Modular Control for processing today and future line configurations**
 - Add/remove/Change Stations or Chemicals - Not a new custom control job!
 - Hard coded Station rules are easy to change in a state table so there is no accidental motion! Extremely robust State recovery after unplanned line stop events such as power loss.

Coho Features

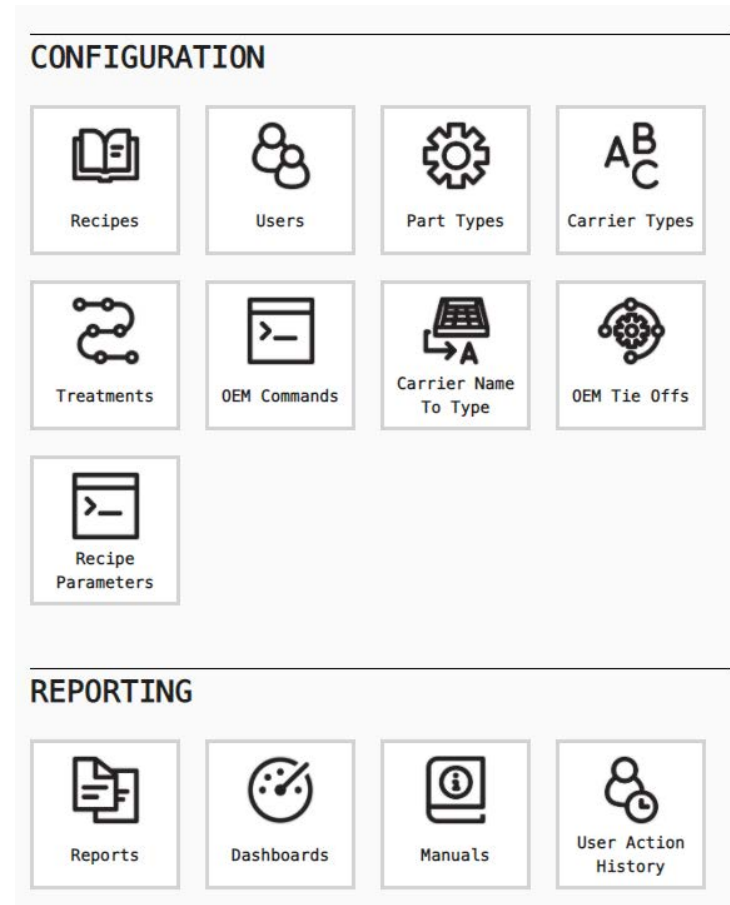
- Program and coordinate multiple controllers
- Code can run on multiple controllers, PLC's, servo controllers, Raspberry pi, etc.
- Customizable user access and privilege levels
- User authentications are managed from customer. i.e. who/what level can change recipes or parameters.
 - Typically there are 4 levels:
 1. Operator
 2. Maintenance
 3. Level 3/Process owner
 4. OEM



Coho Process Overview Screen - User Function Buttons

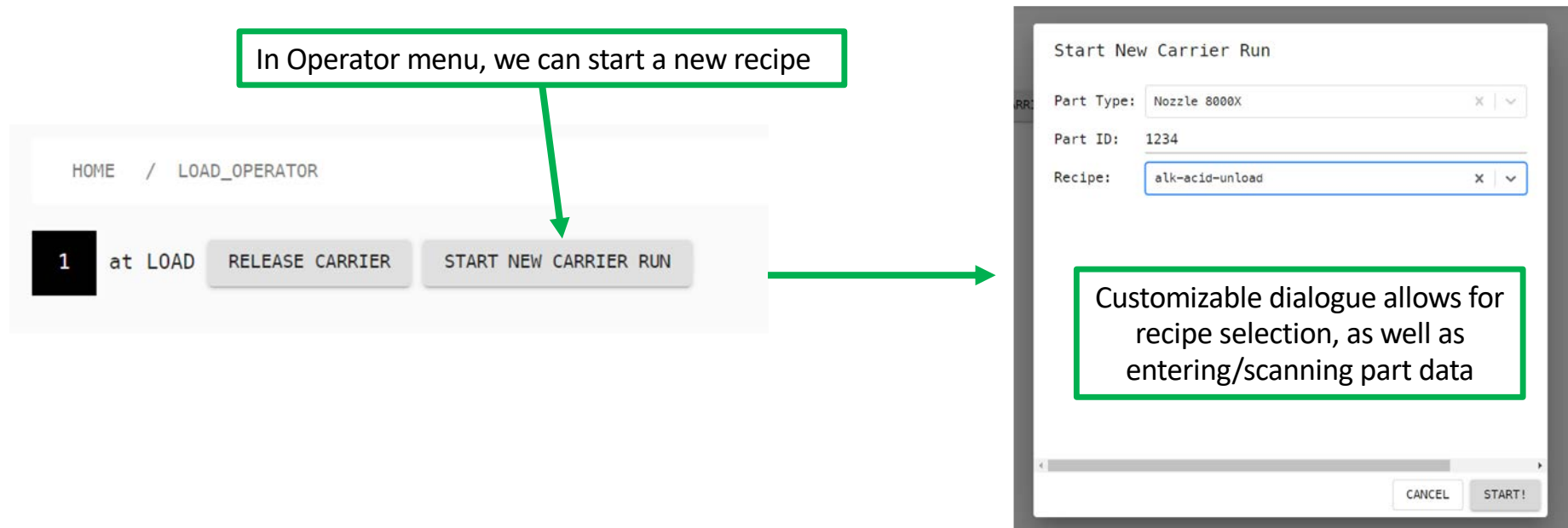
Here is the Main screen on UI, where you can:

- Create a new recipe.
- Load a new carrier to the line
- Add/remove users or access levels.
- Add a new treatment, or probe constraint to a recipe.
- Open your custom quality reports.
- See the dashboard of all probes/sensors/motors on the line, for maintenance.



Coho Operator Screen- Starting and Defining Part Processing

In Operator menu, we can start a new recipe



HOME / LOAD_OPERATOR

1 at LOAD RELEASE CARRIER START NEW CARRIER RUN

Start New Carrier Run

Part Type: Nozzle 8000X

Part ID: 1234

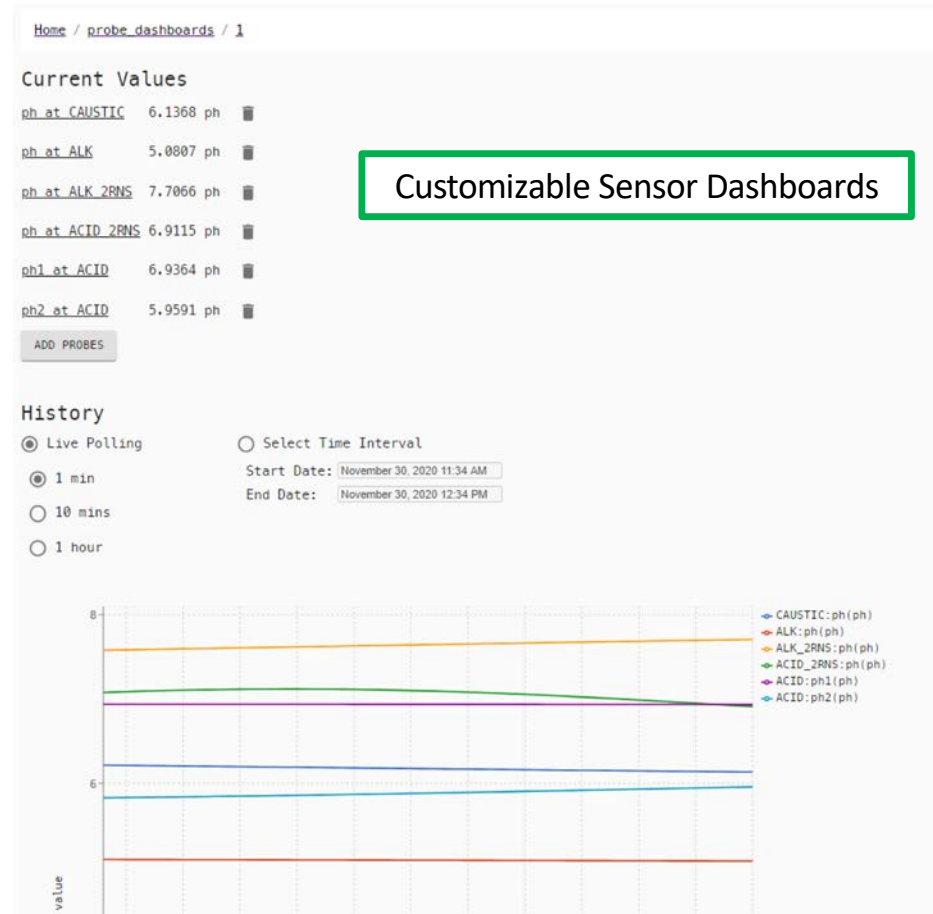
Recipe: alk-acid-unload

Customizable dialogue allows for recipe selection, as well as entering/scanning part data

CANCEL START!

The image shows a sequence of two screenshots. The first screenshot is a web-based operator interface with a breadcrumb trail 'HOME / LOAD_OPERATOR'. Below the breadcrumb, there is a status indicator '1 at LOAD' and two buttons: 'RELEASE CARRIER' and 'START NEW CARRIER RUN'. A green box highlights the text 'In Operator menu, we can start a new recipe' with an arrow pointing to the 'START NEW CARRIER RUN' button. A second green arrow points from this button to a second screenshot. The second screenshot is a modal dialog box titled 'Start New Carrier Run'. It contains three input fields: 'Part Type' with the value 'Nozzle 8000X', 'Part ID' with the value '1234', and 'Recipe' with the value 'alk-acid-unload'. A green box highlights the text 'Customizable dialogue allows for recipe selection, as well as entering/scanning part data' with an arrow pointing to the 'Recipe' field. At the bottom of the dialog are 'CANCEL' and 'START!' buttons.

Coho Sensor Trend/Real-Time Screen









Coho Part Historian Screen

Active


Name	Recipe	Type	Location	Entered	Exited	Actions
1	alk-acid-unload	Reg 87	LOAD	2020-11-30T16:55:25.724759+00:00		 
3	alk-acid-unload	Reg 87	UNLOAD	2020-11-25T19:10:56.808658+00:00		 

Completed

Name	Recipe	Type	Location	Entered	Exited	Actions
1	to-load	Reg 87		2020-11-30T16:51:23.157416+00:00	2020-11-30T16:55:25.66887+00:00	 
3	to-load	Reg 87		2020-11-25T14:17:32.688677+00:00	2020-11-25T19:10:56.752706+00:00	 
2	to-load	Reg 87		2020-11-24T22:57:33.249404+00:00	2020-11-25T14:16:47.108723+00:00	 

Carriers menu shows current parts in line, as well as historical data


Coho Process Historian Screen

Coho Floor Mode: RUN 

HOME / CARRIERS / 38

Name: 2
Type: Reg 87
User Flagged: FALSE
Recipe: ALK-ONLY-TO-UNLOAD
Entered: 24 days ago
Exited: 6 days ago

Specific Carrier data is saved, including parts processed, processing times, key signals (Temp, pH, etc.), errors, and operator interventions



Name	Type	Actions
123	Nozzle 8000X	

Recent Events

Carrier: Carrier ended treatment in UNLOAD (end) at UNLOAD started 6 days ago
Stop: UserActionRequiredError: UNLOAD Please release carrier to continue processing (USER_NEEDED) at UNLOAD occurred 6 days ago
Error: Press SYSTEM START to continue. (USER_NEEDED) at occurred 13 days ago

HISTORIAN

History

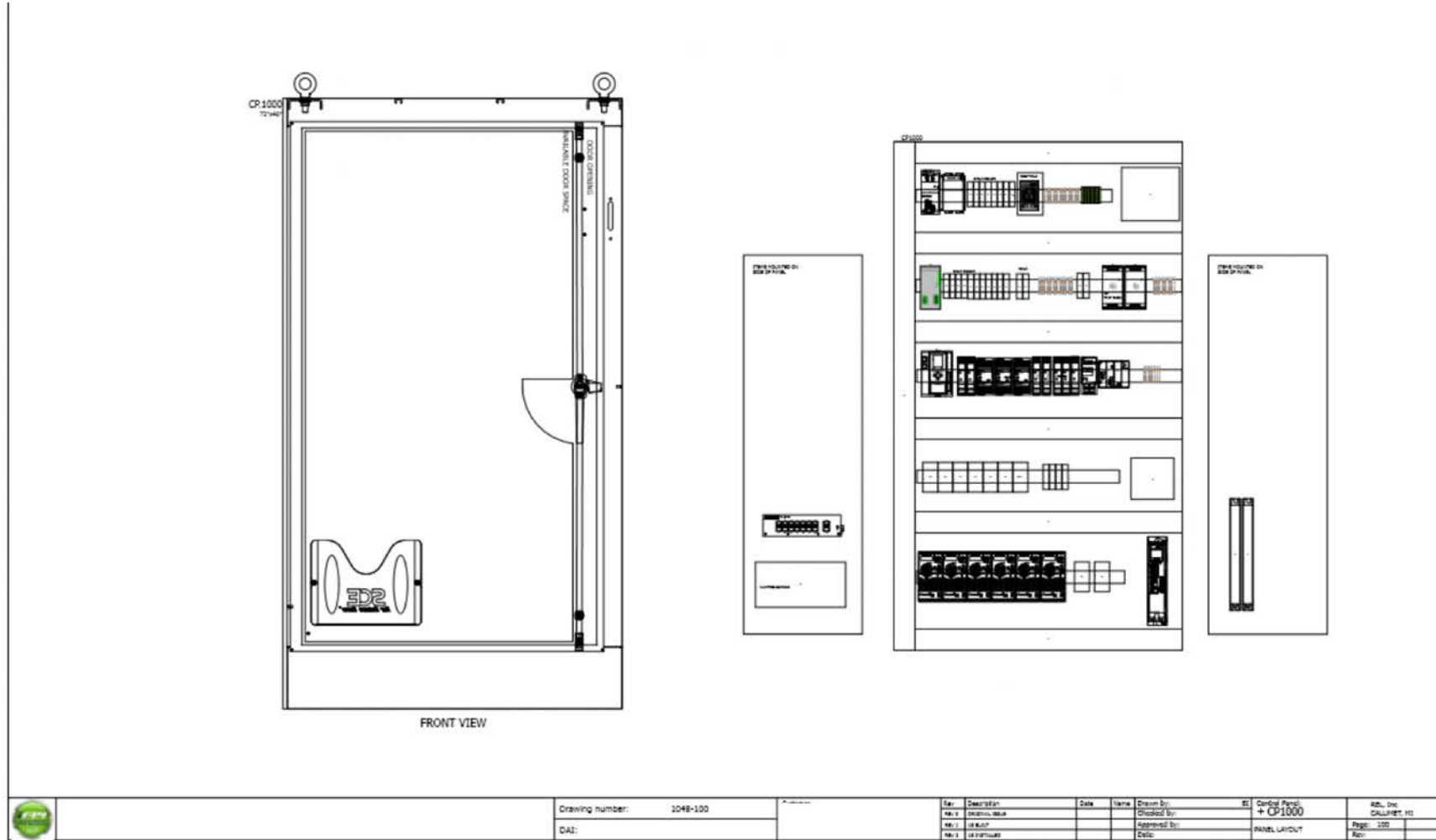
Location	Name	Description	Start	Duration	ID	Action
UNLOAD	end	Carrier ended treatment in UNLOAD	6 days ago	0 seconds	1120	
UNLOAD	begin	Carrier started treatment in UNLOAD	6 days ago	0 seconds	1117	



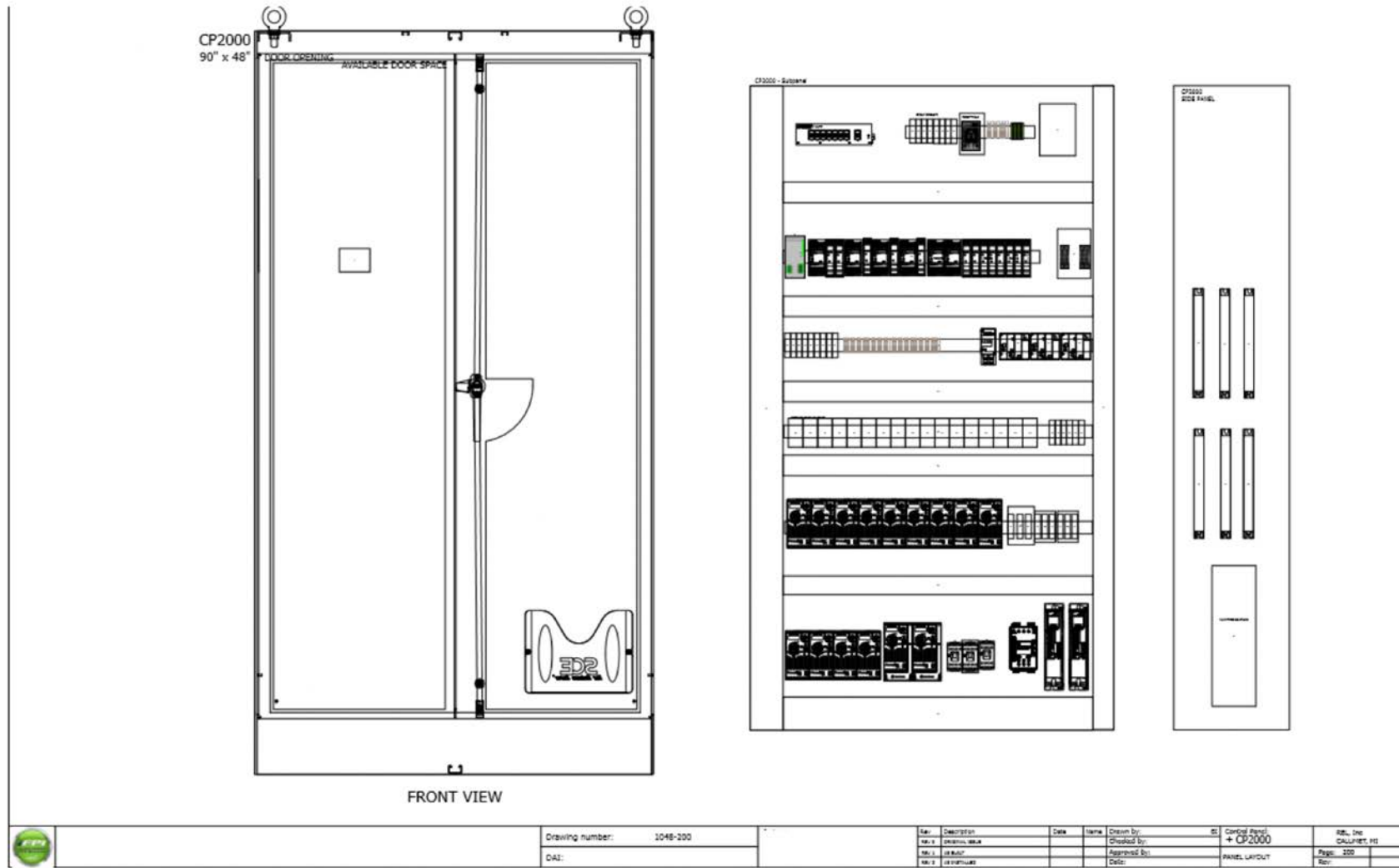
Coho Control from Anywhere

- Controllable/Visible from desktop, or a tablet
 1. Open a web browser and go to the Coho web server, i.e. <http://10.0.0.1>
 2. Login with your user name and password. (permissions established by process administrator or site administrator)
 3. Enjoy. You now have your set permissions and access to historical data logs like you were standing adjacent to the processing line.

Panel Architecture: CP1000



Panel Architecture: CP2000



HMI Control



REL System Controls

**SMART HMI
ROBUST iFPI**



PLC Controls

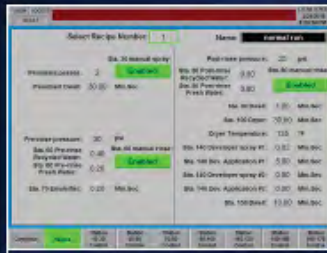
iFPI (intelligent Fluorescent Penetrant Inspection) systems and iREL equipment are provided with the control systems that integrate into the customers control scheme. Whether the plant has a central DCS or the equipment needs to be controlled locally, REL has a control solution for the application. UL Listing of complete panels is also available.



1. Full Operation Controls



2. System Control Panel



3. Touch Screen Interaction

Sample-HMI Controls

Clean Screen

Alarms

Log Out 6/1/2017 3:35:58 PM

User:

Emergency Stop Pressed at Inspection Station 2
Emergency Stop Pressed at Inspection Station 1


iFPI
INTELLIGENT
FPI SYSTEMS

REL

REL, INC.
57640 North Eleventh Street
Calumet, MI 49913
1-906-337-3018

Overview Station 10 - 100
Overview Station 110 - 160
Overview Station 200 - 260
Trends
Recipe
Alarms
User Management

Sample-Recipe Selection Screen

Clean Screen Calibrate Screen

Recipe

5/30/2017 2:41:10 PM
MT

Station 60 Fresh Water Rinse Tank Low Temperature.
Station 60 Fresh Water Rinse Tank Low Level. Verify Fill Valve is in auto. Wait for tank to fill.

Select Recipe: **1** ¹ Name: **Testing** ¹⁷

Station 30 Penetrant: Penetrant Dip Time: 01.00 mm.ss ²	Station 60 Spray Rinse: Recycle Rinse Pressure: 30.00 PSI ⁶ Recycle Rinse Passes: 03 Passes ⁷ Fresh Rinse Pressure: 25.00 PSI ⁸ Fresh Rinse Passes: 01 Passes ⁹	Station 90 Dry Developer: D.D. Shoot Time: 00.02 mm.ss ¹⁵ D.D. Dwell Time: 10.00 mm.ss ¹⁶
Station 40 Penetrant Drip/Dwell: Pos 1 Drip Time: 05.00 mm.ss ³ Pos 2 Drip Time: 05.00 mm.ss ⁴	Station 70 Drip/Dwell: Pos 1 Drip Time: 05.00 mm.ss ¹⁰ Pos 2 Drip Time: 05.00 mm.ss ¹¹	
Station 50 Dip Rinse: Dip Time: 04.30 mm.ss ⁵	Station 80 Dryer: Pos 1 Drying Time: 05.00 mm.ss ¹² Pos 2 Drying Time: 05.00 mm.ss ¹³ Pos 3 Drying Time: 05.00 mm.ss ¹⁴	

- Overview Station 10 - 100
- Overview Station 110 - 160
- Overview Station 200 - 260
- Trends
- Recipe
- Alarms
- User Management
-
-

Sample-Recipe Selection Screen-Keys

Recipe 1

5/30/2017 2:41:10 PM
MT

Station 60 Fresh Water Rinse Tank Low Temperature.
Station 60 Fresh Water Rinse Tank Low Level. Verify Fill Valve is in auto. Wait for tank to fill.

Select Recipe: 1 1 Name: Testing 17

Station 30 Penetrant:
Penetrant Dip Time: 01.00 mm.ss 2

Station 40 Penetrant Drip/Dwell:
Pos 1 Drip Time: 05.00 mm.ss 3
Pos 2 Drip Time: 05.00 mm.ss 4

Station 50 Dip Rinse:
Dip Time: 04.30 mm.ss 5

Station 60 Spray Rinse:
Recycle Rinse Pressure: 30.00 PSI 6
Recycle Rinse Passes: 03 Passes 7
Fresh Rinse Pressure: 25.00 PSI 8
Fresh Rinse Passes: 01 Passes 9

Station 70 Drip/Dwell:
Pos 1 Drip Time: 05.00 mm.ss 10
Pos 2 Drip Time: 05.00 mm.ss 11

Station 80 Dryer:
Pos 1 Drying Time: 05.00 mm.ss 12
Drying Time: 05.00 mm.ss 13
Drying Time: 05.00 mm.ss 14

Station 90 Dry Developer:
D.D. Shoot Time: 00.02 mm.ss 15
D.D. Dwell Time: 10.00 mm.ss 16

Overview Station 10 - 100
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Sample-Key #1

Recipe 1

5/30/2017 2:41:10 PM
MT

Station 60 Fresh Water Rinse Tank Low Temperature.
Station 60 Fresh Water Rinse Tank Low Level. Verify Fill Valve is in auto. Wait for tank to fill.

Select Recipe: 1 1 Name: Testing 17

1. Recipe Number - Select the Recipe you wish to edit or verify.

....

17. Recipe Name - Each recipe can be given a unique name.

Sample-Key #2

Station 30 Penetrant:
Penetrant Dip Time: **01.00** mm.ss **2**

Station 40 Penetrant Drip/Dwell:
Pos 1 Drip Time: **05.00** mm.ss **3**
Pos 2 Drip Time: **05.00** mm.ss **4**

Station 50 Dip Rinse:
Dip Time: **04.30** mm.ss **5**

2

2. Penetrant Dip Time - Sets the time the tray will be dipped.

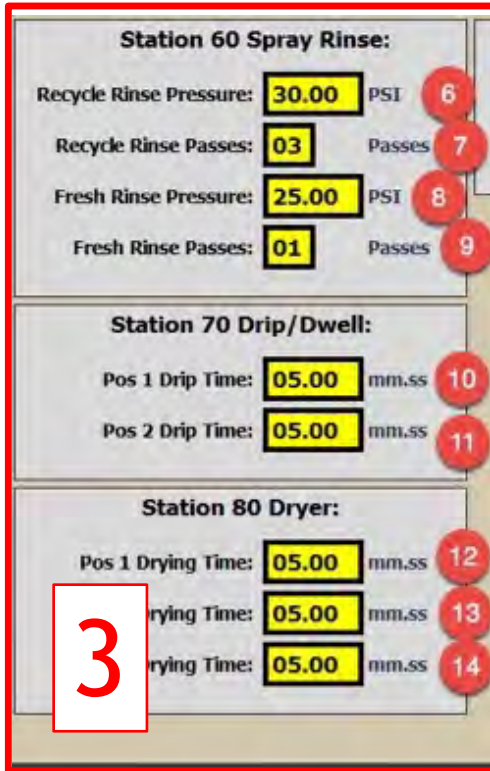
3. Penetrant Drip Position 1 Time - Sets the time the tray will dwell in Position 1.

4. Penetrant Drip Position 2 Time - Sets the time the tray will dwell in position 2.

5. Dip Rinse Time - Sets the time the tray will be dipped.

Sample-Key #3

- 6. Recycle Rinse Pressure - Sets the pressure of the recycle rinse.
- 7. Recycle Rinse Passes - Sets how many passes of recycled water to spray on tray.
- 8. Fresh Rinse Pressure - Sets the pressure of the fresh water rinse.
- 9. Fresh Rinse Passes - Sets how many passes of fresh water to spray on tray.



- 10. Rinse Drip Position 1 Time - Sets the time the tray will dwell in position 1.
- 11. Rinse Drip Position 2 Time - Sets the time the tray will dwell in position 2.
- 12. Dryer Position 1 Time - Sets the time the tray will dry in position 1.
- 13. Dryer Position 2 Time - Sets the time the tray will dry in position 2.
- 14. Dryer Position 3 Time - Sets the time the tray will dry in position 3.

Sample-Key #4

- 15. Dry Developer Shoot Time - Sets the time the dry developer air valve is open.
- 16. Dry Developer Dwell Time - Sets the time the dry developer must dwell on parts before inspection.



Sample Overview Screen

Note: Process Time in Station Display

Overview Station 10 - 100

5/30/2017 2:34:51 PM

Station 60 Fresh Water Rinse Tank Low Temperature.
Station 60 Fresh Water Rinse Tank Low Level. Verify Fill Valve is in auto. Wait for tank to fill.

Station	Station	Station	Station	Station	Station	Station	Station	Station	Station
10 Expansion Load	20 Load	30 Penetrant	40 Drip Pos 1	50 Drip Rinse	60 Drip Pos 1	70 Tilt Pos 1	80 Dryer Pos 1	80 Dryer Pos 3	100 Drive Pos 1
Recipe: 0	Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00
Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000
Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00
Station 40 Drip Pos 2	Station 80 Dryer Pos 2	Station 90 Dry Developer	Station 100 Drive Pos 2						
Recipe: 00	Recipe: 00	Recipe: 00	Recipe: 00						
Basket ID: 00000	Basket ID: 00000	Basket ID: 00000	Basket ID: 00000						
Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00	Time Remain.: 00.00						

System On/Off: Off (Red) / On (Green)

Recipe #: 1

VFD Fault Reset: Resets all VFD Faults

Safety Reset: Resets the safety circuit. Required after an Estop.

Reset: Clears all Carriers in the Program.

Sample HMI Alarm Log

Clean Screen

Alarm Log

5/30/2017 2:44:55 PM

Emergency Stop Pressed near Rinse Station.
 Emergency Stop Pressed at CP1000.

No.	Time	Date	Status	Text	Acknowledge group
\$ 240001	2:44:19 PM	5/30/2017	I	Too many tags (Powertags) have been configured.	0
! 62	2:44:03 PM	5/30/2017	I	Emergency Stop Pressed near Rinse Station.	0
! 59	2:44:03 PM	5/30/2017	I	Emergency Stop Pressed at CP1000.	0
! 44	2:44:03 PM	5/30/2017	I	Station 160 Elevator Motor Faulted. Cycle motor off and back to auto o...	0
! 19	2:44:03 PM	5/30/2017	I	Station 80 Dryer High Temperature.	0
! 12	2:44:03 PM	5/30/2017	I	Station 60 Fresh Water Rinse Tank Low Temperature.	0
! 11	2:44:03 PM	5/30/2017	I	Station 60 Fresh Water Rinse Tank Low Level. Verify Fill Valve is in aut...	0
! 9	2:44:03 PM	5/30/2017	I	Station 50 Rinse Water Low Temperature. Run spray rinse to warm up...	0
! 8	2:44:03 PM	5/30/2017	I	Station 50 Rinse Water Low Level Alarm. Run Spray Rinse until Full.	0
! 2	2:44:03 PM	5/30/2017	I	Station 10 Conveyor Motor Fault. Cycle Motor off and back to auto on...	0
\$ 140000	2:44:03 PM	5/30/2017	I	Connection established: HMI_Connection_1, Station 192.168.1.10, Rack...	0
\$ 70018	2:44:02 PM	5/30/2017	I	User administration imported successfully.	0
\$ 110001	2:44:01 PM	5/30/2017	I	Change to operating mode 'online'.	0
\$ 70022	2:44:01 PM	5/30/2017	I	User administration import started.	0
\$ 80026	2:44:01 PM	5/30/2017	I	Log initialization ended. All logs OK.	0
\$ 80028	2:44:01 PM	5/30/2017	I	Log initialization started.	0

Close

Overview Station 10 - 100

Overview Station 110 - 160

Overview Station 200 - 260

Trends

Redpe

Alarms

User Management

Sample Load Station HMI Screen

Clean Screen

Calibrate Screen

Control Station 10 - 20

5/30/2017 2:49:48 PM

MT

Station 10 Conveyor Motor Fault. Cycle Motor off and back to auto on HMI.
Emergency Stop Pressed near Rinse Station.

Station 10 Load Queue

Station 10 Conveyor
(MTR1011)

Station 10 Stop Fence
(AC1011)

Station Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Sensors

- Station Loaded (PRX1011)

Station 20 Load Conveyor

Station 20 Conveyor
(MTR1021)

Station 20 Stop Fence
(AC1021)

Station Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Sensors

- Station Loaded (PRX1021)
- Stop Fence Down (PRX1022)
- Stop Fence Up (PRX1023)

Overview Station 10 - 100

Overview Station 110 - 160

Overview Station 200 - 260

Trends

Recipe

Alarms

User Management

Control Station 10 - 20

Control Station 30 - 40

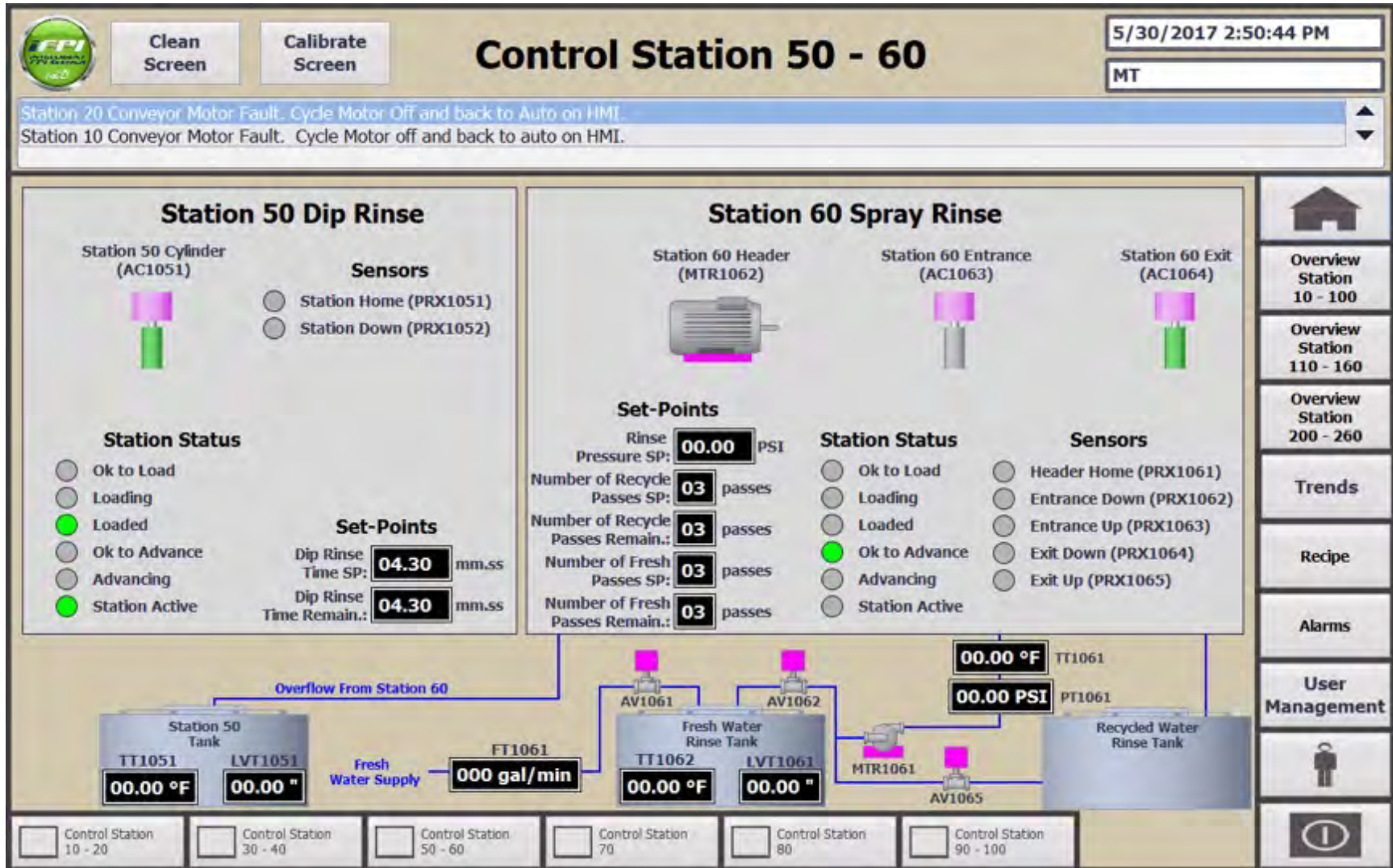
Control Station 50 - 60

Control Station 70

Control Station 80

Control Station 90 - 100

Sample Wash HMI Screen



Sample Dryer HMI Screen

Clean Screen

Calibrate Screen

Control Station 80

5/30/2017 2:51:26 PM

MT

Station 20 Conveyor Motor Fault. Cycle Motor Off and back to Auto on HMI.

Station 10 Conveyor Motor Fault. Cycle Motor off and back to auto on HMI.

Dryer Enable

Off On

0.00 °F

Station 80 Dryer

Dryer Temperature Setpoint:

0.00 °F

Set-Points

Drying Time Pos 1 SP:	05.00	mm.ss
Drying Time Remain. Pos 1 SP:	05.00	mm.ss
Drying Time Pos 2 SP:	05.00	mm.ss
Drying Time Remain. Pos 2 SP:	05.00	mm.ss
Drying Time Pos 3 SP:	05.00	mm.ss
Drying Time Remain. Pos 3 SP:	05.00	mm.ss

Pos 1 Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Pos 2 Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Pos 3 Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Control Station 10 - 20

Control Station 30 - 40

Control Station 50 - 60

Control Station 70

Control Station 80

Control Station 90 - 100

Overview Station 10 - 100

Overview Station 110 - 160

Overview Station 200 - 260

Trends

Recipe

Alarms

User Management

Sample HMI Screen

Clean Screen

Calibrate Screen

Control Station 90 - 100

5/30/2017 2:51:53 PM

Station 20 Conveyor Motor Fault. Cycle Motor Off and back to Auto on HMI.
 Station 10 Conveyor Motor Fault. Cycle Motor off and back to auto on HMI.

Station 90 Dry Developer

Station 90 Entrance (AC1091)

Station 90 Exit (AC1092)

Station 90 Air (AV1093)

Station 90 Dust Collector (MTR1091)

Set-Points

Developer Dwell Time SP: mm.ss

Dust Shoot Time SP: mm.ss

Dwell Time Remaining: mm.ss

Station Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Sensors

- Entrance Down (PRX1091)
- Entrance Up (PRX1092)
- Exit Down (PRX1093)
- Exit Up (PRX1094)

Station 100 Dive Conveyor

Station 100 Front Line Servo (SVR1101)

Station 100 Conveyor (MTR1102)

Servo Manual Control

Set-Points

Dev. Dwell Pos 1 Time Remain.: mm.ss

Dev. Dwell Pos 2 Time Remain.: mm.ss

Pos 1 Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Pos 2 Status

- Ok to Load
- Loading
- Loaded
- Ok to Advance
- Advancing
- Station Active

Sensors

- Station Motor Loaded (PRX1102)

Overview Station 10 - 100

Overview Station 110 - 160

Overview Station 200 - 260

Trends

Recipe

Alarms

User Management

Control Station 10 - 20

Control Station 30 - 40

Control Station 50 - 60

Control Station 70

Control Station 80

Control Station 90 - 100

HMI Control

Temperature Trend

Waiting for Alarm Events...

Current Operator
Operator

3:56:52 PM
5/9/2017

System On/Off

Station 1 On/Off

Station 2 On/Off

Station 3 On/Off

Station 4 On/Off

Station 5 On/Off

Station 6 On/Off

Run Log

End of Day

Trend Tuesday, May 09, 2017

2:56:51 PM 3:08:51 3:20:51 3:32:51 3:44:51 3:56:51 PM

Caption	3:56:51 PM	Min	Max	Units
[REL]AI_TT0100	180.0	0.0	250.0	???
[REL]AI_TT0200	195.0	0.0	250.0	???
[REL]AI_TT0201	193.0	0.0	250.0	???

Overview

Station 1 Hot Rinse

Station 2 Alkaline

Station 3 Acid Descaler

Station 4 Rinse

Station 5 Permanganate

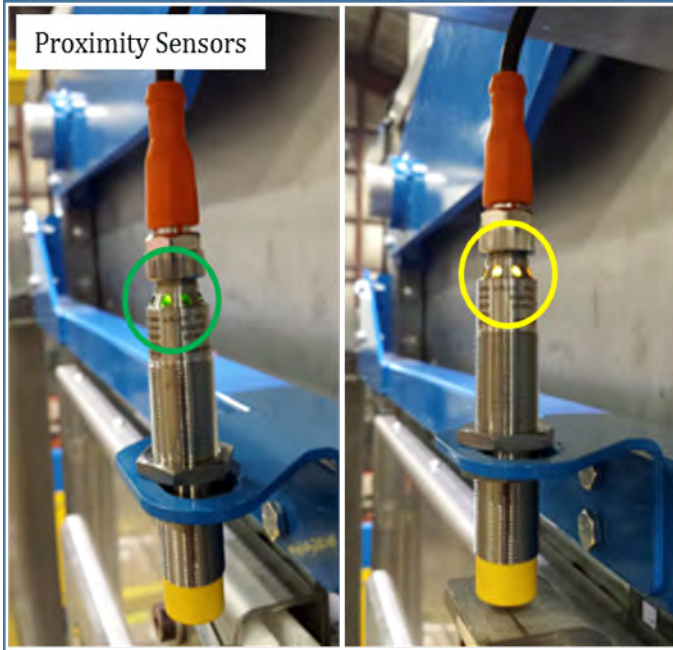
Station 6 Wash

Recipe

Trend

Alarms

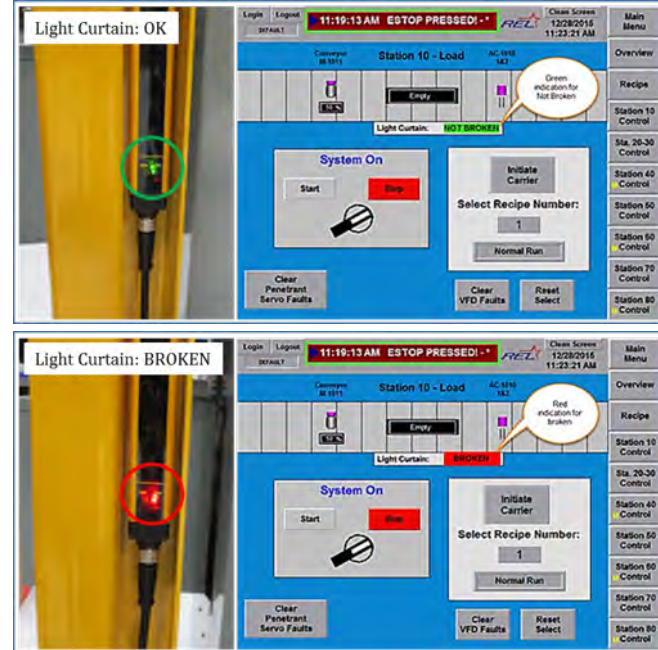
Separate Safety Control Network



Safety Proximity Sensors



Emergency Stops



Safety Light Curtains

Device Appearance on UI

Purple: Auto Mode
Yellow: Manual Mode

Green: Device is On
Red: Device Fault

Gray: Device is Off



Figure 1-1, NC Shutoff Valve in Auto On Mode



Figure 1-2, NC Shutoff Valve in Manual On Mode



Figure 1-3, NC Shutoff Valve in Manual Off Mode



Figure 1-4, NC Shutoff Valve Faulted

MOA Toggle for Device on UI



Figure 1-5, MOA pop-up screen - Auto On



Figure 1-7, MOA pop-up screen - Manual On Forward



Figure 1-6, MOA pop-up screen - Manual Off



Figure 1-8, MOA pop-up screen - Manual On Reverse

Sample Overview Screen



← → 📺 👤 Process Unacked (28) REL 03:11:27 PM 12/27/2018 Basket Auto Start... System On...

C/E Transporter #1 Destination Station: 0	C/E Transporter #2 Destination Station: 0						
Sta 10 Load	M Sta 20 Alkaline Clean Tank Temp: 70.9 °F Dip Time Remaining: 0.00	Sta 30 Alkaline Prelim Rinse Dip Time Remaining: 0.00	M Sta 40 Alkaline Final Rinse Dip Time Remaining: 0.00	M Sta 50 Cold Acid Etch Tank Temp: 69.4 °F Dip Time Remaining: 0.00	M Sta 60 Acid Prelim Rinse Dip Time Remaining: 0.00		
C/E Transporter #3 Destination Station: 0							
M Sta 70 Acid Final Rinse Dip Time Remaining: 0.00	M Sta 80 DI Spray Rinse FW Rinse Time Remaining: 0.00 Rec. Rinse Tank Remaining: 0.00	Sta 90 Oven Dryer 1 Oven Temp: 69.6 °F Dry Time Remaining: 0.00	Sta 100 Oven Dryer 2 Oven Temp: 70.2 °F Dry Time Remaining: 0.00	Sta 110 C/E Transfer	Sta 115 Unload		
Sta 120 Transfer #1	Sta 130 Transfer #2	Sta 140 Transfer #3	Sta 150 Transfer #4	Sta 160 FPI Transfer			

Sample Recipe Editing



← → 📺 👤 Process 01:20:09 PM 12/27/2018 Basket Auto Start... System On...

Recipe Name: Select Recipe Number:

Station 20 Alkaline Clean

Tank Dip Time: mm.ss

Tank Drip Time: mm.ss

Tank Temp SP: °F

Station 60 Acid Preliminary Rinse

Tank Dip Time: mm.ss

Tank Drip Time: mm.ss

Station 30 Alkaline Preliminary Rinse

Tank Dip Time: mm.ss

Tank Drip Time: mm.ss

Station 70 Acid Final Rinse

Tank Dip Time: mm.ss

Tank Drip Time: mm.ss

Station 40 Alkaline Final Rinse

Tank Dip Time: mm.ss

Tank Drip Time: mm.ss

Station 80 DI Water Spray Rinse

Fresh Water Spray Time: mm.ss

Fresh Water Pressure: PSI

Station 50 Cold Acid Etch

Tank Dip Time: mm.ss

Tank Drip Time: mm.ss

Rinse Time: mm.ss

Tank Temp SP: °F

Station 90 - 100 Oven Dryer

Dry Time: mm.ss

Cool Down Time: mm.ss

Dryer Temp SP: °F

Sample FPI Recipe



← → 📺 👤 Process 03:19:57 PM 12/27/2018 **Basket Auto Start...** **System On...**

Recipe Name: **Complete Process** Select Recipe Number: **1**

Station 220 Penetrant Spray

Spray Time: **0.30** mm.ss **Manual Inspect Enabled**
20 Seconds/Revolution

Station 260 - 270 Oven Dryer

Dry Time: **15.00** mm.ss
Dry Temp: **140.00** °F

Station 230 - 240 Penetrant Dwell

Dwell Time: **1.00** mm.ss

Station 280 Dry Developer

Spray Time: **0.05** mm.ss
Dust Collector On Delay: **0.20** mm.ss
Dwell Time: **5.00** mm.ss
Air Knife Time: **0.15** mm.ss

Station 250 Spray Rinse

Recycled Water Spray Time: **1.00** mm.ss
Recycled Water Pressure: **25.00** PSI **Manual Inspect Enabled**
Fresh Water Spray Time: **0.00** mm.ss
Fresh Water Pressure: **0.00** PSI
Fresh Water Temperature: **90.00** °F
20 Seconds/Revolution

Sample Transporter #1 Control Screen

Transfer #1 Control Screen

Horizontal Position: 0.00 Jog Speed (In/Sec): 2.00 Vertical Position: 0.50 0.00

Station	Position (Inches)	Carrier Up Position (Inches)	Carrier Drip Position (Inches)	Carrier Hook Position (Inches)	Carrier Down Position (Inches)
Station 5	-73.50	0.00	26.00	73.62	75.67
Station 10	0.00				
Station 20	65.75				
Station 30	133.95				

Positions For Station: 5

Horizontal Servo: Horizontal Safety Feedback Reset, Horizontal Safety Position Reset, Horizontal Safety Stop Reset

Vertical Servo: Vertical Safety Feedback Reset, Vertical Safety Stop Reset

Clear Servo Faults

Station 5, Station 10, Station 20, Station 30

Grab Basket: Press to Shift Horizontally

Drop Basket: Press to Drop to the Hook Position

Move Horizontal Servo Home, Move Vertical Servo Home, Move Horizontal Servo To Station, Vertical Rehome Enable, Vertical Home Redefine

Sample Water Usage



← → 📺 👤 Maint Unacked (28) 03:28:08 PM 12/27/2018 **Basket Auto Start...** **System On...**

DI Water Usage

Current Flow: **-0.03** Gal

Current Machine Usage:

Lifetime Total: **1378.79** Gal

Trip Total: **1378.79** Gal **Trip Reset** 8/28/2018 15:8

Current Week Total: **1.61** Gal

Current Month Total: **0.00** Gal

The Next Sunday will be on the: **30**

Last Week Total: **196.41** Gal

Last Month Total: **198.03** Gal

Past Monthly Water Usage

January Month Total: 0.00 Gal	July Month Total: 0.00 Gal
February Month Total: 0.00 Gal	August Month Total: 0.00 Gal
March Month Total: 0.00 Gal	September Month Total: 0.00 Gal
April Month Total: 0.00 Gal	October Month Total: 0.00 Gal
May Month Total: 0.00 Gal	November Month Total: 0.00 Gal
June Month Total: 0.00 Gal	December Month Total: 198.03 Gal

Sample Maintenance Screen



← → 📺 👤 Maint Unacked (28) REL 03:34:13 PM 12/27/2018 Basket Auto Start... System On...

Maintenance Screen

Current PLC Date and Time

Month	Day	Year
12	27	2018
Hour	Minute	Second
15	34	2
Month	Day	Year
12	27	2018
Hour	Minute	Second
15	34	0

Set PLC Date and Time

PLC Calibration Timer

Time Remaining: 0.15

Timer SP: 0.15

Press to Start Timer

Analog Sensor Calibration

	Value	Offset
Alkaline Clean Tank Temp AI_TT2001	70.91 °F	0.00
Cold Acid Etch Tank Temp AI_TT5001	69.40 °F	0.00
DI Spray Rinse Spray Pressure AI_PT8001	-0.07 °F	0.00
Oven Dryer #1 Oven Temp AI_TT9001	69.58 °F	0.00
Oven Dryer #2 Oven Temp AI_TT10001	70.21 °F	0.00

Clean Screen Reset Screen Safety Ok Clear VFD Faults Clear Servo Faults

Sample Load Station



← → 📺 👤 Log on

Unacked (28)
03:58:39 PM
12/27/2018

Basket Auto Start...

System On...

Cleaning Line Load Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: 0

Empty

Light Curtain OK

Transfer #1	Transfer #2	Transfer #3
<input type="checkbox"/> Ok to Load	<input checked="" type="checkbox"/> Ok to Load	<input checked="" type="checkbox"/> Ok to Load
<input checked="" type="checkbox"/> Loading	<input type="checkbox"/> Loading	<input type="checkbox"/> Loading
<input type="checkbox"/> Loaded	<input type="checkbox"/> Loaded	<input type="checkbox"/> Loaded
<input type="checkbox"/> Ok to Advance	<input type="checkbox"/> Ok to Advance	<input type="checkbox"/> Ok to Advance
<input type="checkbox"/> Advancing	<input type="checkbox"/> Advancing	<input type="checkbox"/> Advancing
<input checked="" type="checkbox"/> Station Active	<input type="checkbox"/> Station Active	<input type="checkbox"/> Station Active

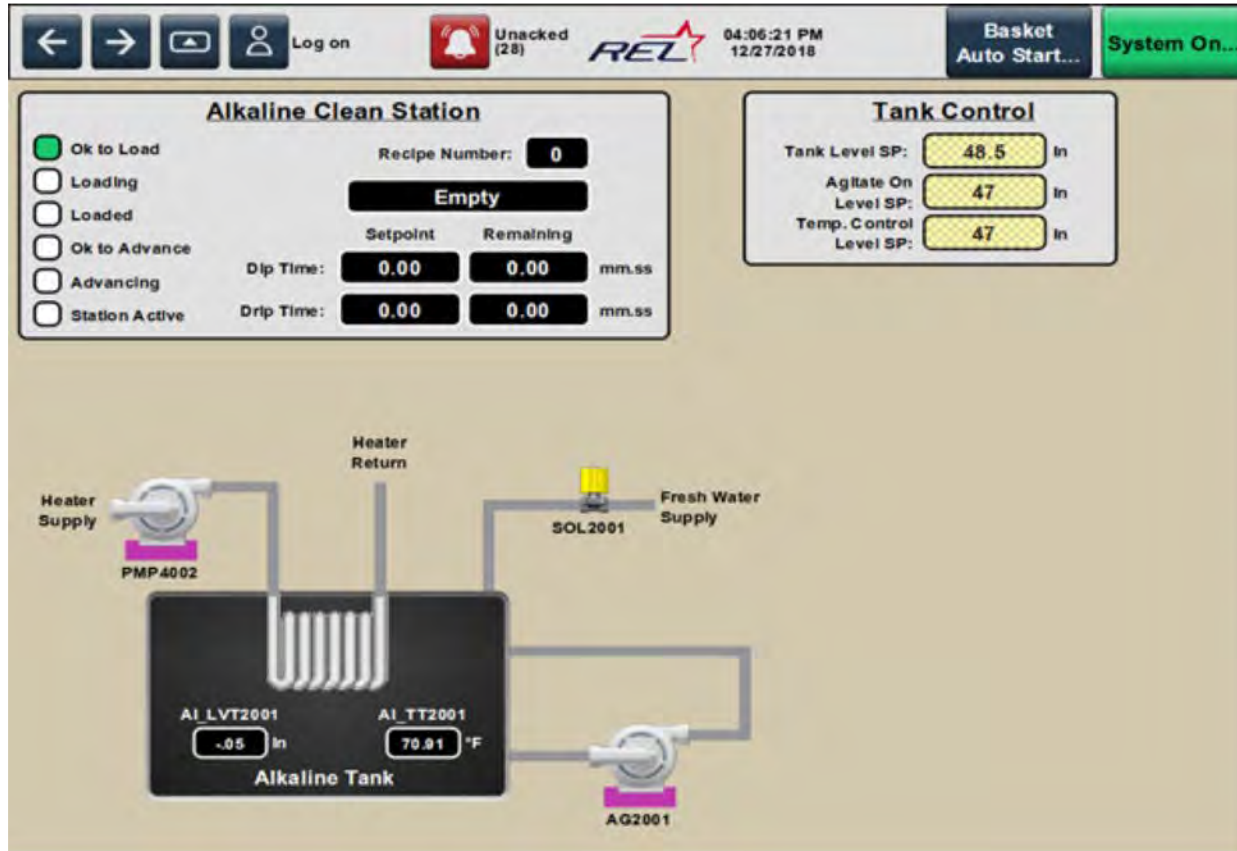
Lift Motor	Transfer #1	Transfer #2	Transfer #3
<div style="background-color: black; color: white; padding: 2px; display: inline-block;">25</div> % MTR1007	<div style="background-color: black; color: white; padding: 2px; display: inline-block;">100</div> % MTR1008	<div style="background-color: black; color: white; padding: 2px; display: inline-block;">100</div> % MTR1009	<div style="background-color: black; color: white; padding: 2px; display: inline-block;">100</div> % MTR1010
	SOL1001	SOL1002	SOL1003

<input type="checkbox"/> (DI_PRX1001) Loaded <input type="checkbox"/> (DI_PRX1002) Transfer #1 Loaded Front <input type="checkbox"/> (DI_PRX1004) Transfer #2 Loaded Front <input type="checkbox"/> (DI_PRX1006) Transfer #3 Loaded Front <input type="checkbox"/> (DI_PRX1008) Lift Up Position <input type="checkbox"/> (DI_PRX1009) Lift Up Pos. Slow Down	<input checked="" type="checkbox"/> (DI_PRX1010) Lift Down Position <input type="checkbox"/> (DI_PRX1011) Transfer #1 Cylinder Extend <input checked="" type="checkbox"/> (DI_PRX1012) Transfer #1 Cylinder Retract <input type="checkbox"/> (DI_PRX1013) Transfer #2 Cylinder Extend <input checked="" type="checkbox"/> (DI_PRX1014) Transfer #2 Cylinder Retract <input type="checkbox"/> (DI_PRX1015) Transfer #3 Cylinder Extend <input checked="" type="checkbox"/> (DI_PRX1016) Transfer #3 Cylinder Retract <input type="checkbox"/> (DI_PRX1017) Lift Down Pos. Slow Down
--	---

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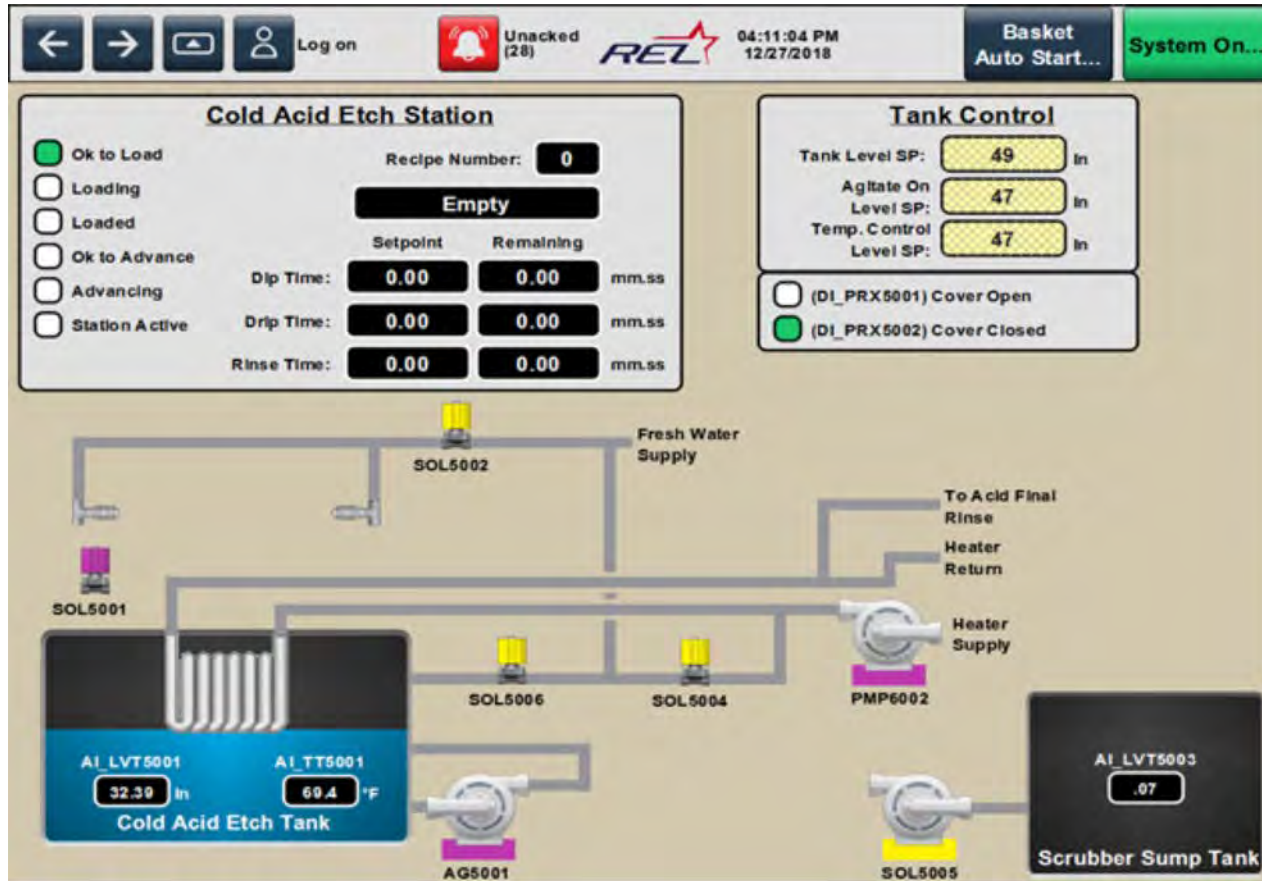
Sample Alkaline Clean Station



Sample Alkaline Rinse Station



Sample Cold Acid Etch Screen



Sample Acid Rinse Station



← → 📺 👤 Log on 🚨 Unacked (28) REL 04:14:11 PM 12/27/2018 📦 Basket Auto Start... 🟢 System On...

Acid Prelim Rinse Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**

Empty

	Setpoint	Remaining	
Dip Time:	0.00	0.00	mm.ss
Drip Time:	0.00	0.00	mm.ss

Tank Control

Acid Prelim Rinse		Acid Final Rinse	
Tank Level SP:	49 In	Tank Level SP:	49 In
Agitate On Level SP:	47 In	Agitate On Level SP:	47 In

Acid Final Rinse Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**

Empty

	Setpoint	Remaining	
Dip Time:	0.00	0.00	mm.ss
Drip Time:	0.00	0.00	mm.ss

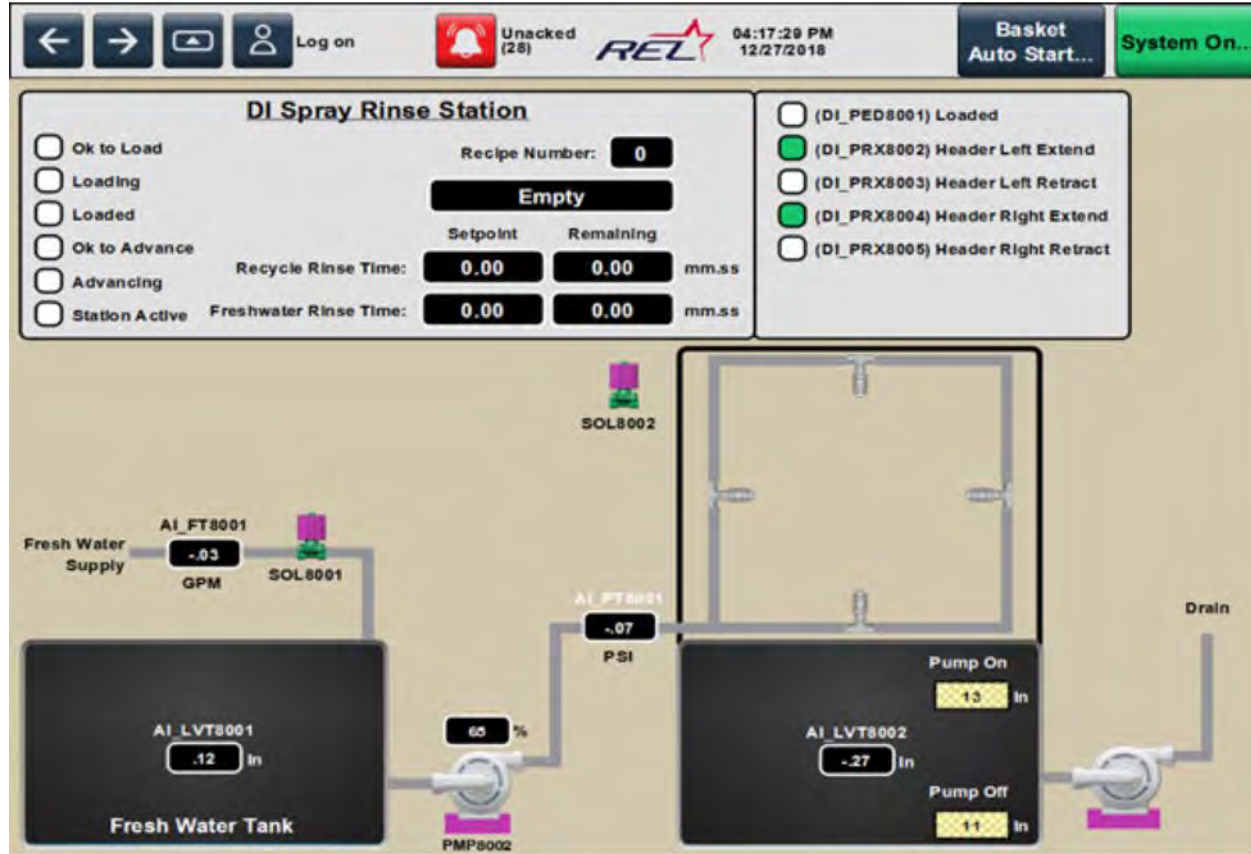
AI_LVT5002
.11
Acid Sump Tank
Waste Treatment
SOL5003

AI_LVT6001
1.57 In
Acid Prelim Rinse Tank
AG6001

AI_FT1002
-.01 GPM
SOL7002
Fresh Water Supply
Cooling Water From Cold Acid Etch

AI_LVT7001
-.07 In
Acid Final Rinse Tank
AG7001

Sample DI Spray Rinse Station



Sample Oven Dryers Screen



← → 📺 👤 Log on Unacked (28) REL 04:20:07 PM 12/27/2018 Basket Auto Start... System On...

Oven Dryer #1

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: 0
Empty
Setpoint Remaining
Drying Time: 0.00 0.00 mm:ss

Oven Enable

100% 50%
MTR9001 MTR9004 SOL9001

Oven Dryer #1

(DI_PRX9001) Loaded
 (DI_PRX9002) Cover Closed
 (DI_PRX9003) Cover Open
 (DI_PRX9006) Cover Cylinder Extend
 (DI_PRX9007) Cover Cylinder Retract

Oven Dryer #2

(DI_PRX10001) Loaded
 (DI_PRX10002) Cover Closed
 (DI_PRX10003) Cover Open
 (DI_PRX10006) Cover Cyl. Extend
 (DI_PRX10007) Cover Cyl. Retract

Oven Dryer #2

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: 0
Empty
Setpoint Remaining
Drying Time: 0.00 0.00 mm:ss

Oven Enable

100% 50%
MTR10001 MTR10004 SOL10001

FAN9002 HTR9003 AI_TT9001 69.58 °F

FAN10002 HTR10003 AI_TT10001 70.21 °F

Cleaning Line Transfer & Unload



← → 📺 👤 Log on 🔔 Unacked (28) REL 04:20:56 PM 12/27/2018 📦 Basket Auto Start... 🟢 System On...

Cleaning Line Transfer Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**
Empty

Setpoint Remaining
Cool Down Time: **0.00** **0.00** mm.ss

(DI_PRX11001) Entry
 (DI_PRX11002) Middle
 (DI_PRX11003) Loaded

50 %

MTR 11001

Cleaning Line Unload Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**
Empty

(DI_PRX11501) Loaded
 (DI_PRX11502) Lift Up Position
 (DI_PRX11503) Lift Up Pos. Slow Down
 (DI_PRX11504) Lift Down Position
 (DI_PRX11505) Lift Down Pos. Slow Down

Light Curtain OK

25 %

MTR 11501

Sample Transfer Conveyors Screen



← → 📺 👤 Log on Unacked (28) REL 04:22:43 PM 12/27/2018 Basket Auto Start... System On...

Transfer Conveyor #1 Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**
Empty

Setpoint	Remaining
0.00	0.00

Cool Down Time: **0.00** mm:ss

(DI_PRX12001) Entry
 (DI_PRX12002) Loaded

50 %

MTR12001 FAN12002

Transfer Conveyor #2 Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**
Empty

Setpoint	Remaining
0.00	0.00

Cool Down Time: **0.00** mm:ss

(DI_PRX13001) Entry
 (DI_PRX13002) Loaded

50 %

MTR13001 FAN13002

Transfer Conveyor #3 Station

Ok to Load
 Loading
 Loaded
 Ok to Advance
 Advancing
 Station Active

Recipe Number: **0**
Empty

Setpoint	Remaining
0.00	0.00

Cool Down Time: **0.00** mm:ss

(DI_PRX14001) Entry
 (DI_PRX14002) Loaded

50 %

MTR14001 **Light Curtain OK**