



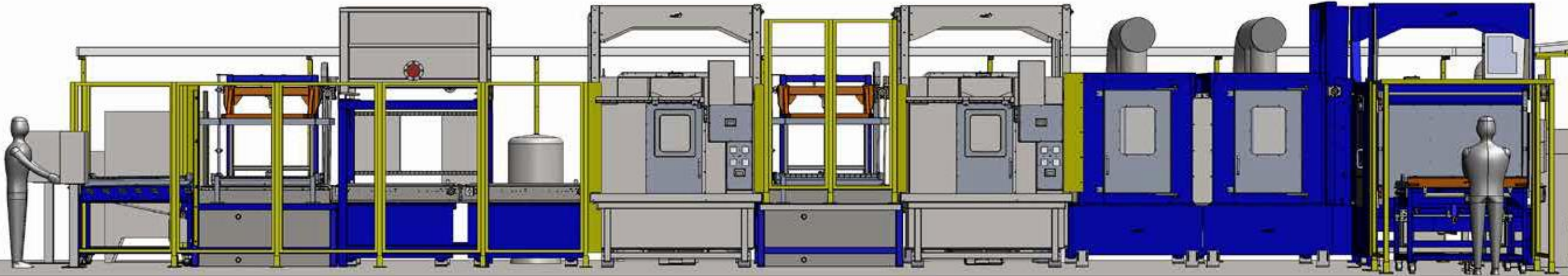
Automated Fluorescent Penetrant Inspection Line



**MADE IN
THE USA**

relinc.com

PARTS PROCESSING



LOAD

PENETRANT

DWELL 1

DWELL 2

PRE-RINSE

EMULSIFIER

POST-RINSE

DRYER
POSITION 1

DRYER
POSITION 2

90° TURN

DEVELOPER

UNLOAD



LINE OPERATION

- HMI controls part basket through line
- Track, record, and process data
- Run, motion control according to recipe input from operator
- Infrastructure PLC



LOCKTIME PRO+



Scan necessary information, and track data for auditing purposes



LOCKTIME PRO+

- Scan part baskets into system
- LOCKTIME PRO+ keeps track of baskets in process, and all process specific data

LOCKTIME PRO+

Chromium
LockTime
127.0.0.1:2000/setting/report

LOCKTIME PRO+

INSPECTION
REPORTS
SETUP
PREVENTIVE MAINTENANCE
LOGOUT
VER 0.3.4

Report Name: Detailed Production Report Pro+		Report Range: Start Date: 1/10/2024 Stop Date: 1/11/2024		Process: OKM Process				
Notes: Maintenance sensor values taken at the end of a maintenance check out of the time production was run								
Batch ID	217							
Part	Tronair	BLT 1	Tronair					
Basket	BSK1005							
Start	1/10/2024, 11:09:16 AM							
End	1/10/2024, 12:01:07 PM							
Recipe	Test							
User	Station	Station	Start	Stop	Sensors	Min	Max	Pass/Fail
admin\jacobn	Level	0	1/10/2024, 11:09:16 AM	1/10/2024, 11:11:16 AM				100%
admin\jacobn	Leaf Dwell	1	1/10/2024, 11:11:16 AM	1/10/2024, 11:21:09 AM				100%
admin\jacobn	Penetrant Dip	2	1/10/2024, 11:21:09 AM	1/10/2024, 11:22:10 AM				100%
admin\jacobn	Penetrant Dwell	3	1/10/2024, 11:22:10 AM	1/10/2024, 11:23:24 AM				100%
Duration								
admin\jacobn	Penetrant		1/10/2024, 11:22:24 AM	1/10/2024, 11:22:42 AM				100%
admin\jacobn	Line Dwell 1	4	1/10/2024, 11:22:42 AM	1/10/2024, 11:23:00 AM				100%
admin\jacobn	Line Dwell 2	5	1/10/2024, 11:23:00 AM	1/10/2024, 11:23:00 AM				100%
admin\jacobn	PreRinse Access1	6	1/10/2024, 11:23:07 AM	1/10/2024, 11:25:17 AM				100%
admin\jacobn	PreRinse Recipe	7	1/10/2024, 11:25:17 AM	1/10/2024, 11:25:58 AM	Recipe PreRinse TMP sensor: 85°F			100%
					Recipe PreRinse PMS sensor: 0.000			100%
admin\jacobn	PreRinse Fresh	8	1/10/2024, 11:25:58 AM	1/10/2024, 11:26:38 AM	Fresh PreRinse TMP sensor: 85°F			100%
					Recipe PreRinse PMS sensor: 0.000			100%
admin\jacobn	PreRinse Access2	9	1/10/2024, 11:26:38 AM	1/10/2024, 11:27:22 AM				100%
Duration								
admin\jacobn	PreRinse		1/10/2024, 11:27:22 AM	1/10/2024, 11:28:37 AM				100%
admin\jacobn	Etch/Offset	10	1/10/2024, 11:28:37 AM	1/10/2024, 11:28:37 AM				100%
admin\jacobn	PreRinse Access1	11	1/10/2024, 11:28:37 AM	1/10/2024, 11:28:41 AM				100%
admin\jacobn	PreRinse Fresh	12	1/10/2024, 11:28:41 AM	1/10/2024, 11:29:31 AM	Fresh PreRinse TMP sensor: 84°F			100%
					Recipe PreRinse PMS sensor: 0.000			100%
admin\jacobn	PreRinse Access2	13	1/10/2024, 11:29:31 AM	1/10/2024, 11:30:38 AM				100%
Duration								
admin\jacobn	PreRinse/Flush/Up		1/10/2024, 11:30:38 AM	1/10/2024, 11:31:07 AM	Dryer IN TMP sensor: 142°F			100%
admin\jacobn	Dryer 1	14	1/10/2024, 11:31:07 AM	1/10/2024, 11:43:09 AM	Dryer FO TMP sensor: 142°F			100%
admin\jacobn	Dryer 2	15	1/10/2024, 11:43:09 AM	1/10/2024, 11:43:09 AM				100%
admin\jacobn	90° Turn	16	1/10/2024, 11:43:09 AM	1/10/2024, 11:43:32 AM				100%
admin\jacobn	Developer Access1	17	1/10/2024, 11:43:32 AM	1/10/2024, 11:50:48 AM				100%
admin\jacobn	Developer	18	1/10/2024, 11:50:48 AM	1/10/2024, 11:50:44 AM				100%
admin\jacobn	Developer Access2	19	1/10/2024, 11:50:44 AM	1/10/2024, 12:01:07 PM				100%
Duration								
admin\jacobn	Developer							100%
Total Duration								
Batch ID	218							
Part	Tronair							

Back Print Export csv

- Recipe scanning collects data for all processes
- LOCKTIME PRO+ logs data for review at a later date
- Produce detailed reports on any previous basket run
- Green indicates a healthy process
- Red indicates process failure

SYSTEM START-UP

Infrastructure Home

Key

- 1) Penetrant Tank (Station 200)
- 2) Freshwater Tank
- 3) Emulsifier Tank (Station 500)
- 4) Sump Tank (Station 600)
- 5) Dryer (Station 800)
- 6) Panel CP_INF, Infrastructure HMI and Dryer Controller

System Overview

Infrastructure Maintenance

System Lockout/Tagout

Press System ON button on Infrastructure Panel



PanelView 5510

RECIPE

- With LOCKTIME PRO+ screen up, scan parts into system (Scanner is setup to connect with LOCKTIME PRO+ unit)
- Scan multiple parts, recipes are verified
- Scan basket, press Initiate Basket on HMI screen



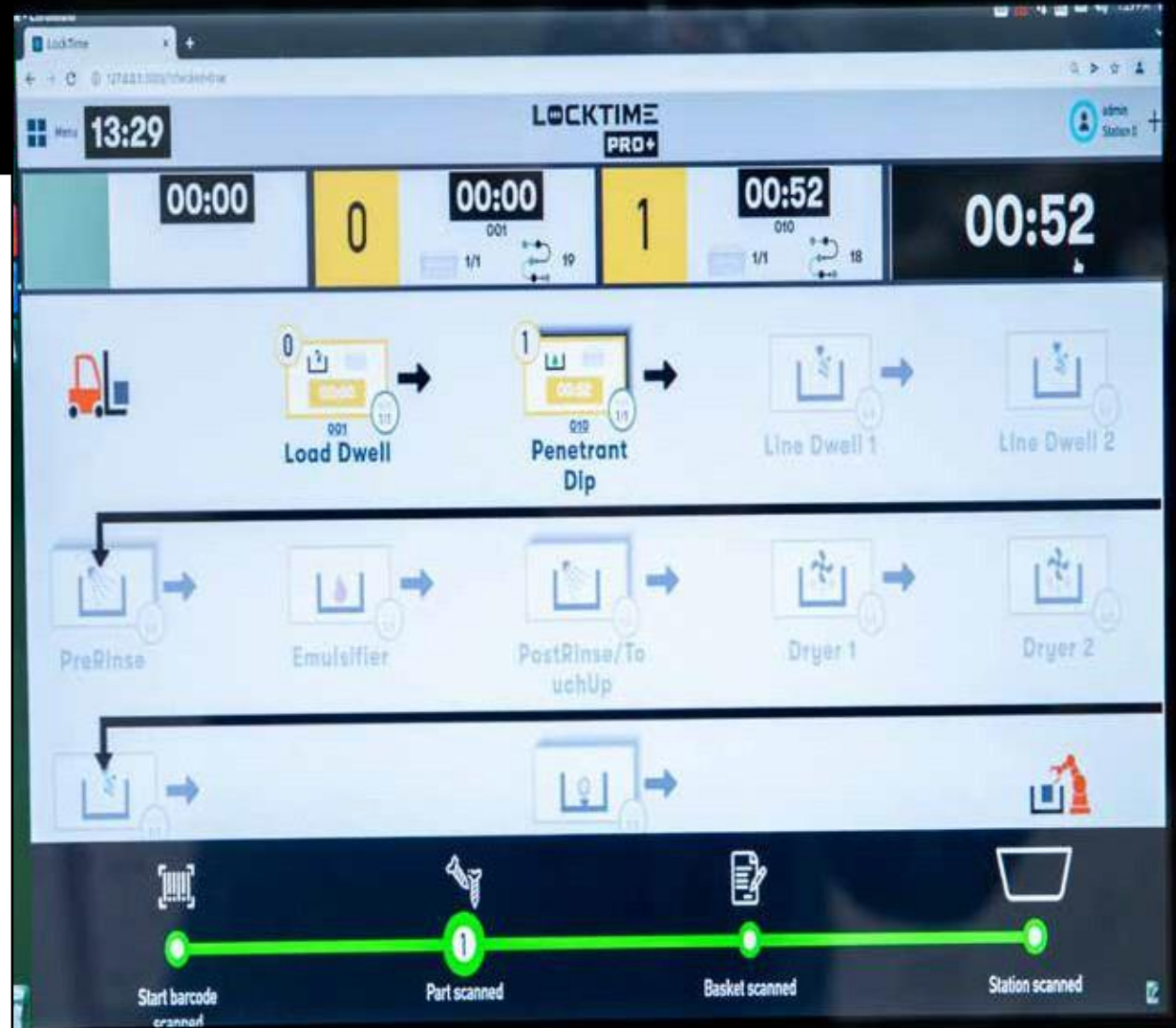
RECIPE

- Initiate LOCKTIME PRO+
- Scan multiple parts, recipes are verified
- In operator mode, the whole process can be performed
- Edit recipes in admin mode to change: penetrant dip time, penetrant dwell time, recycle rinse passes, freshwater rinse passes, emulsifier dip time etc.
- Operator intervention stations allow for the necessary process inspections



RECIPE TRACKING

- Initiate LOCKTIME PRO+
- Scan Recipe #, Serial #, Service Order #
- Scan basket, press Initiate Basket



LOAD STATION



Push cart to engage sensor, release basket locks to initiate conveying

LOAD

- Adjustable basket features accommodate a variety of parts
- Physically push basket into Penetrant Dip Station to engage processing (an alarm will sound if basket is not properly engaged)
- Remove empty cart, and bring to Unload Station
- Operator safety ensured with area light curtain

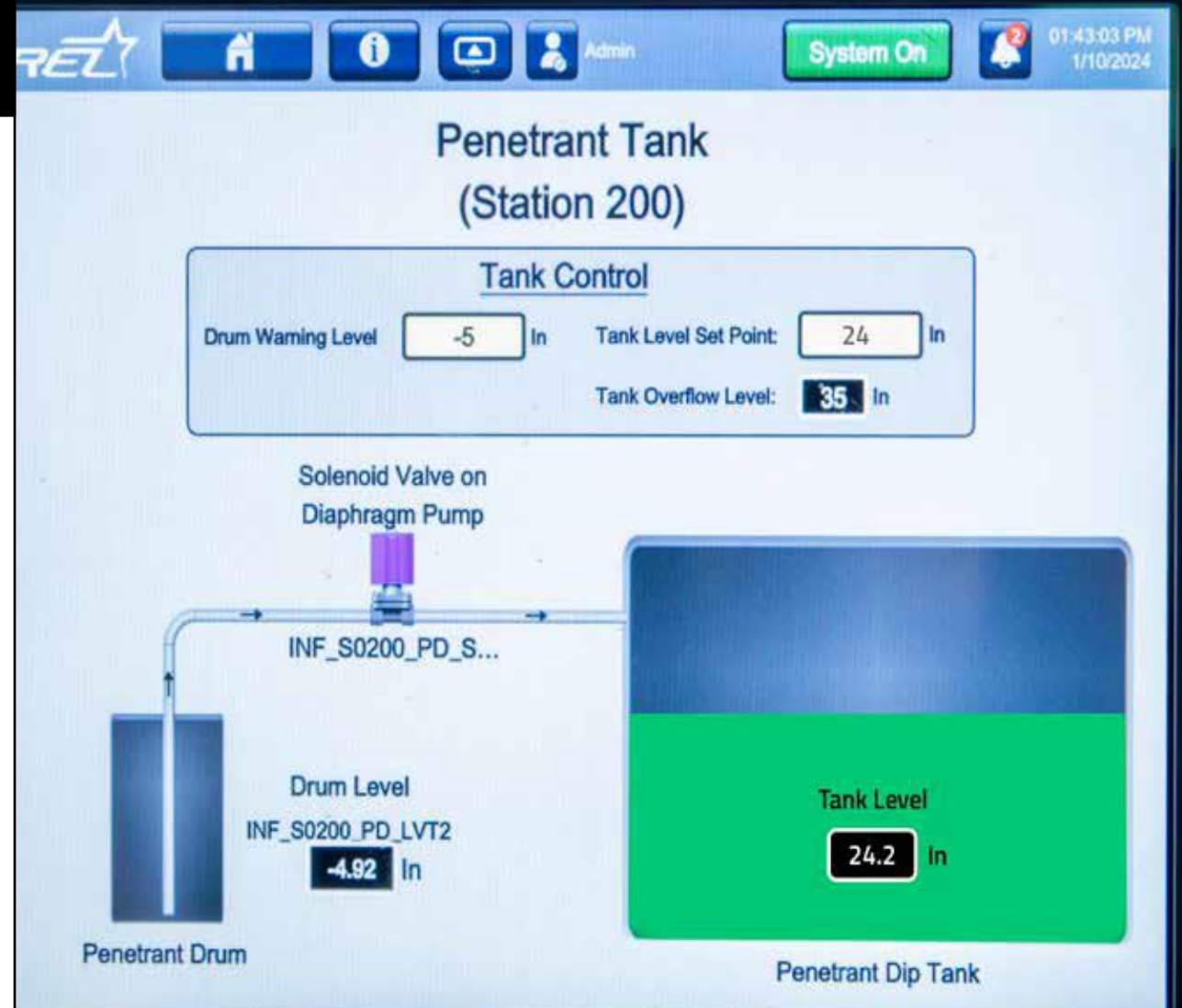


PENETRANT DIP

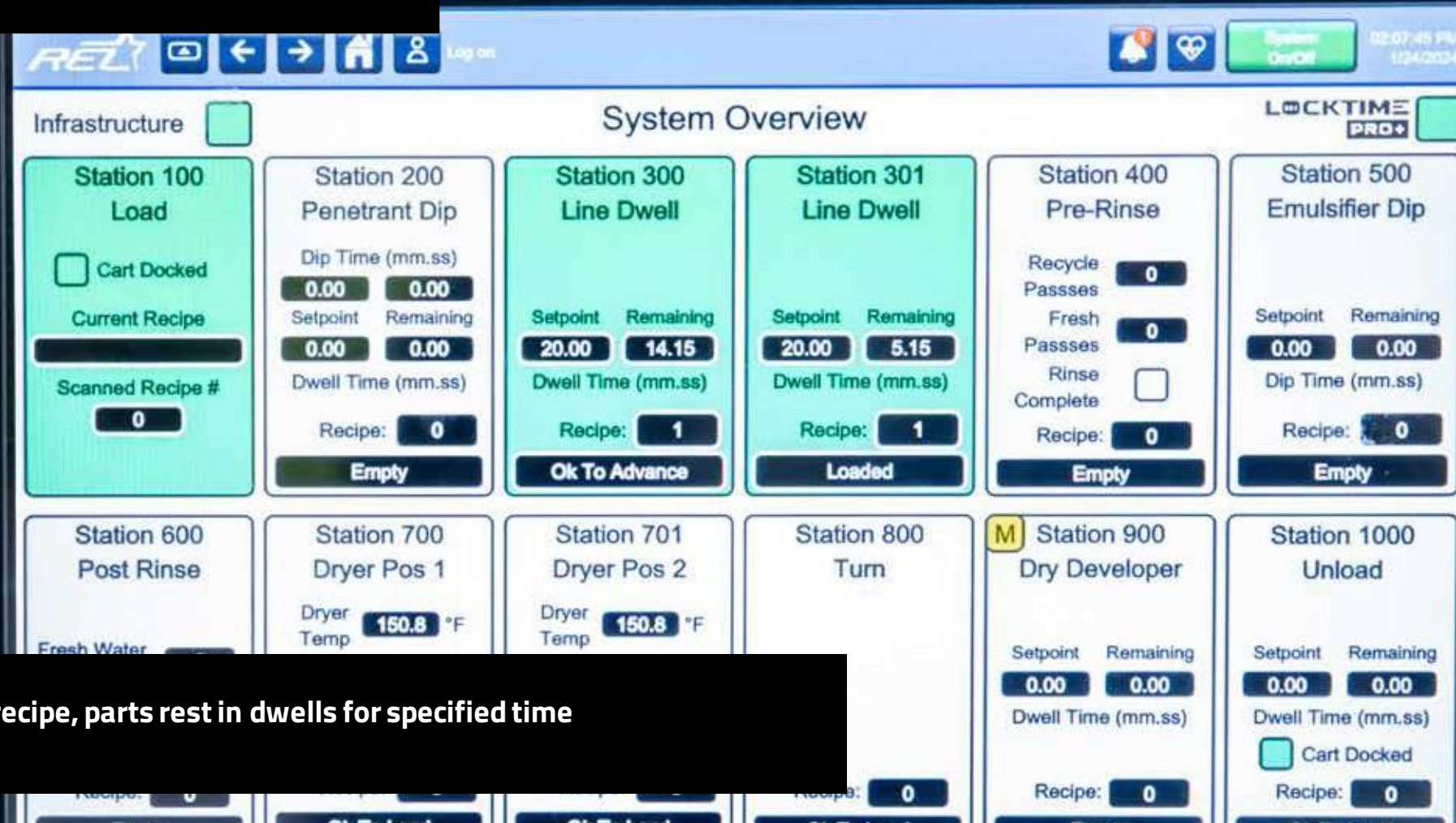
According to selected recipe, parts are dipped in penetrant for a specified time

PENETRANT DIP

- Use Infrastructure Panel to monitor and edit penetrant levels
- Tank high level alarm and pump will prevent any unwanted spills and cleanup



LINE DWELL



According to selected recipe, parts rest in dwells for specified time

PRE-RINSE



of Rinse Passes set according to recipe

PRE-RINSE

- Set up recipe for operator intervention, or hit Request Access button for manual access when program permits
- Pre-Rinse cycle consists of turntable that spins 360° for thorough rinsing
- Depending on part complexity, recipe can be modified to include one or more rinse cycles
- Calibrated NIST certified gauges conveniently shown on front of station



PRE-RINSE

- Request Access button allows operator to manually inspect parts before continuing through process
- UV-A and Visible Light switch allows operator to control Profusion UV-A lamp with white light, and/or station mounted Magnum-GO allows for additional inspection
- To inspect parts in basket 360°, manually use Jog Table switch. When manual inspection is complete, close door, hit Inspection Complete switch, the table will automatically rehome before further conveyance



PRE-RINSE

- Calibrated NIST certified gauges make monitoring temperature and pressure of water in spray header and hand sprayer painless
- Easily removable front panel gives access to certified gauges. Quick connect couplings allow for gauges to be effortlessly removed and replaced



PRE-RINSE



EMULSIFIER



Dip tank filled with emulsifier soap solution to clean oil base penetrant off parts

EMULSIFIER

- Emulsifier solution aids in the removal process of oil based penetrant
- To meet the maximum 2-minute dwell time of ASTM-E1417, the control system does not allow the emulsifier treatment until the Post-Rinse Station is empty



EMULSIFIER



POST-RINSE



Rinsing time automatically set according to recipe

POST-RINSE

- Set up recipe to have operator intervention, or hit Request Access button for manual access when the recipe permits
- Post-Rinse Cycle consists of turntable that spins 360° for thorough rinsing
- Depending on part complexity, recipe can be modified to include one or more rinse cycles
- Rinse Cycle ensures thorough rinse with actuated 4-sided spray header and servo controlled turntable



POST-RINSE

- Calibrated NIST certified gauges make monitoring temperature and pressure of water in spray header and hand sprayer painless
- Easily removable front panel gives access to certified gauges. Quick connect couplings allow for gauges to be effortlessly removed and replaced

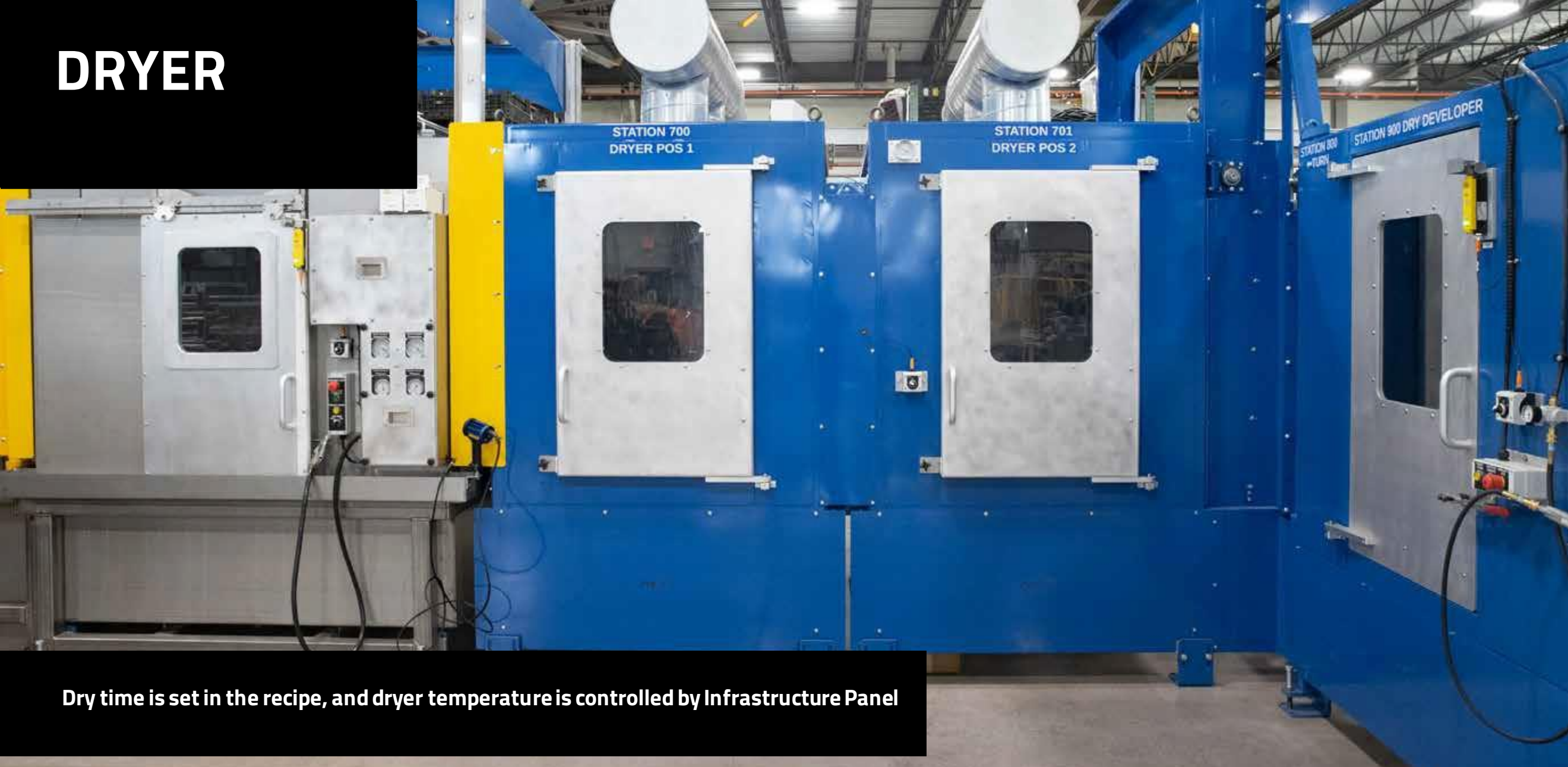


POST-RINSE



Water wash is recycled for Rinse Stations, or to a waste water treatment facility, or drained according to customer needs

DRYER



Dry time is set in the recipe, and dryer temperature is controlled by Infrastructure Panel

DRYER

- Infrastructure HMI to turn ON/ Enable Dryer

REL

System On 01:55:36 PM 1/10/2024

Dryer (Station 700)

Dryer Temp
INF_S0700_DRY_TT1
150.58 °F



Heaters On
 Fans On

Enable Dryer

.....
Dryer temperature is controlled by the Tempco Temperature controller mounted on panel CP_INF
.....

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DRYER

- Set temperature on Infrastructure Panel Controller
- Thermocouple on Dryer Station



DRYER

- Thermocouple attached to back of Dryer Station with probe inserted through top of dryer into station



DRYER

- Temperature gauge on front of Dryer Station



CALIBRATION

- System sensors are able to be offset/calibrated to a corrected output on the HMI



DRYER



90° Corner Turn



Corner Turn utilized for system footprint design needs

90° Corner Turn



DRY DEVELOPER



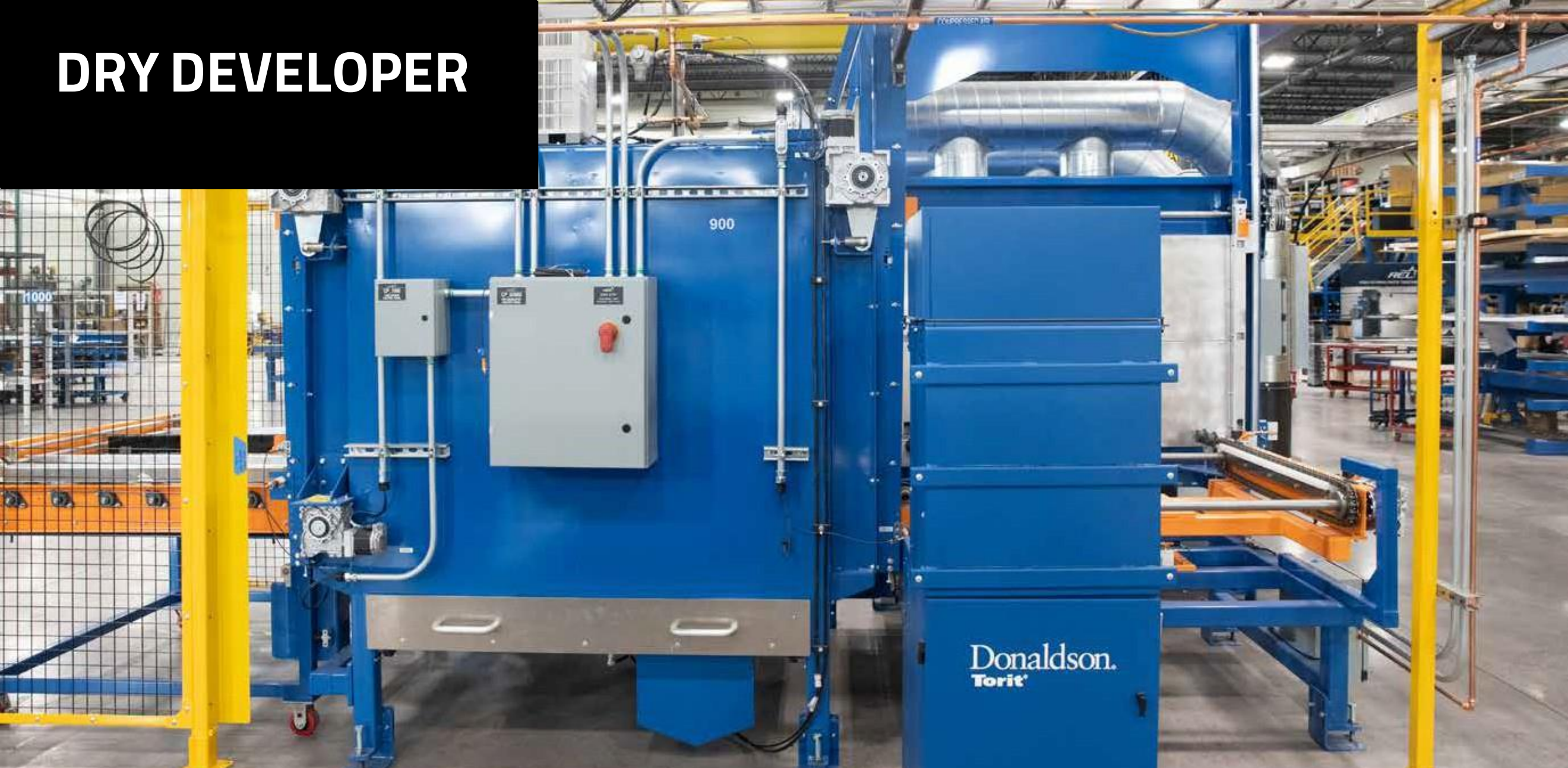
Dry developer operator access for process refinement

DRY DEVELOPER

- Recipe can automatically allow access for operator intervention for process verification
- Recipe parameters apply developer for allotted time depending on application demands
- Dust collector is engaged to clear station
- Inspect parts for adequate developer coverage
- Use manual air gun set to 5 PSI max to remove excess developer
- UV-A and Visible lights mounted on booth ceiling
- Recipe set dwell time used within Developer Station



DRY DEVELOPER



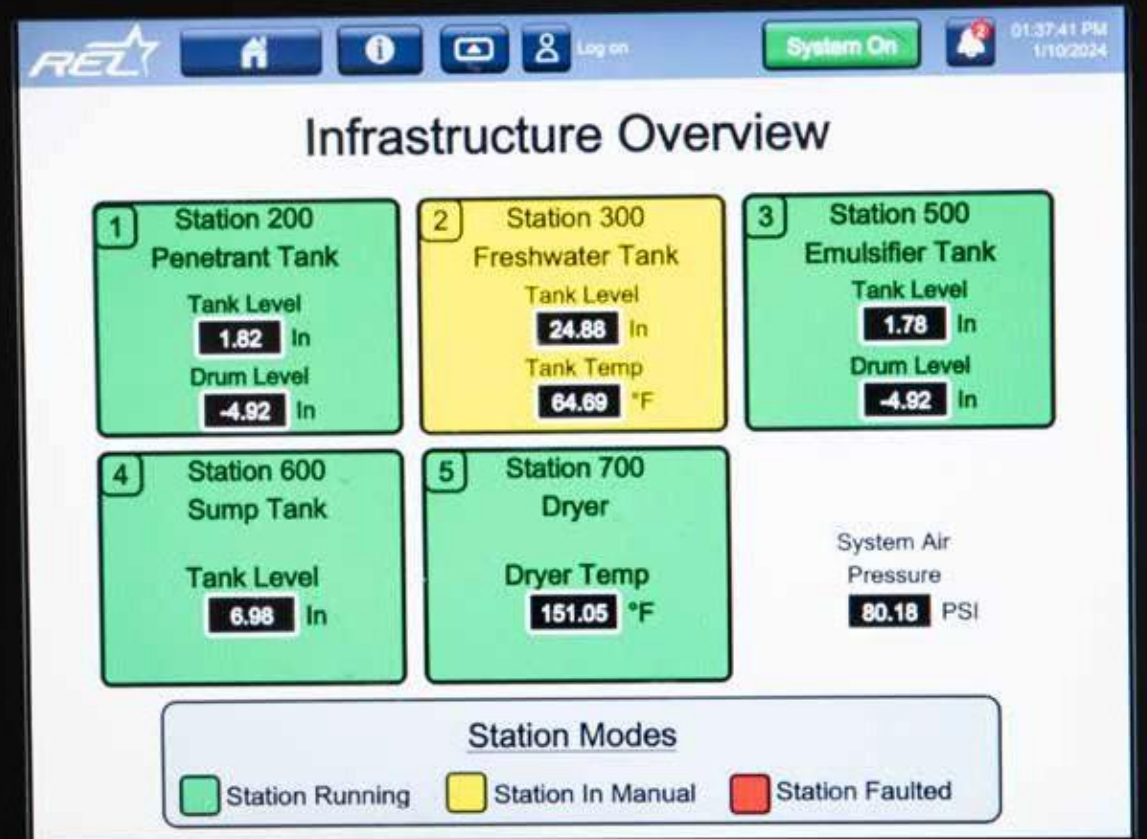
UNLOAD/DWELL



Baskets exit system onto empty carts to be transferred to inspection area

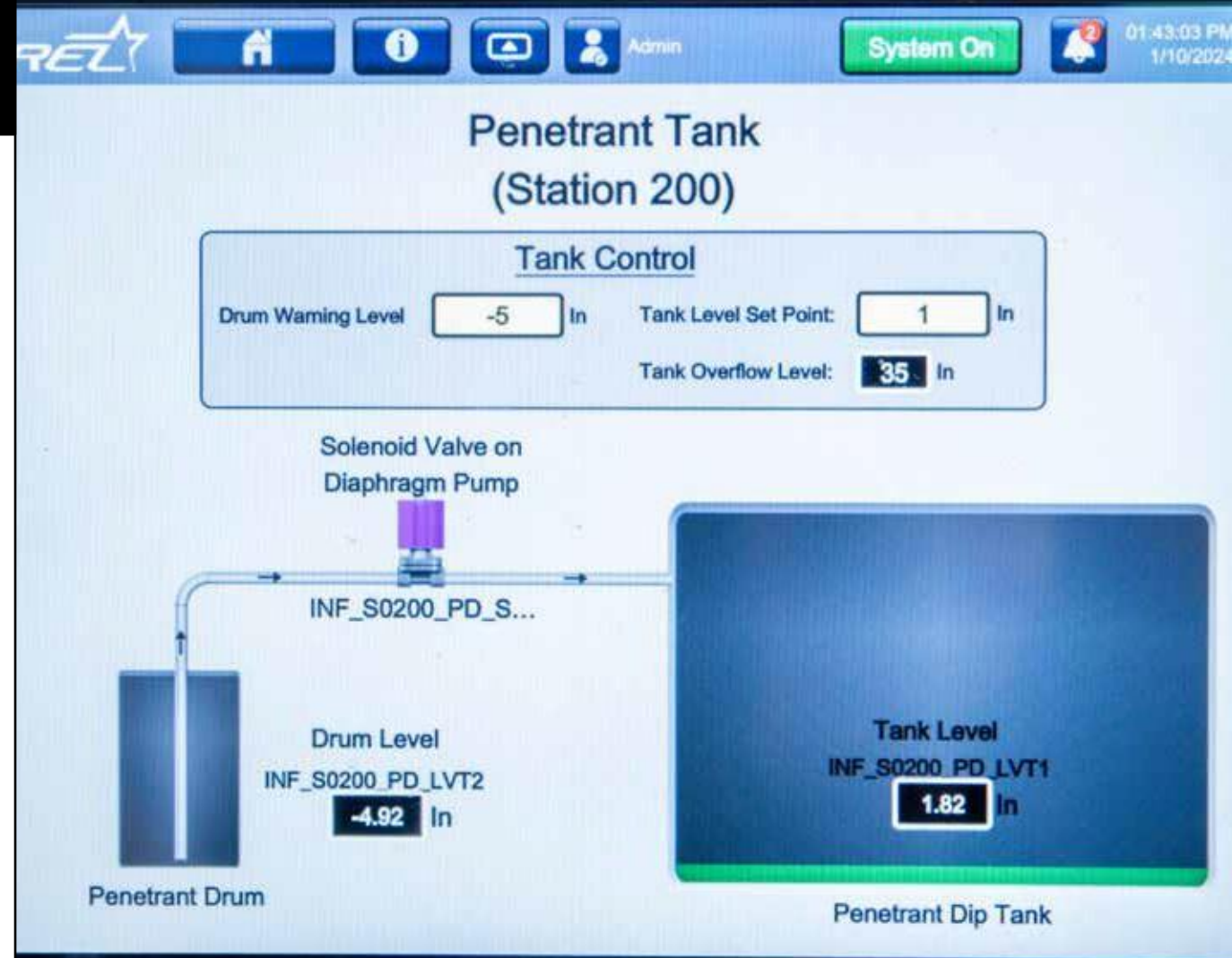
INFRASTRUCTURE OVERVIEW

- Penetrant Tank, Freshwater Tank, Emulsifier Tank, Sump Tank, Dryer, quick overview to show tank levels etc.



PENETRANT TANK

- Admin access required to set Penetrant Tank level and maintenance parameters
- Diaphragm Pump transfers penetrant from 50 gallon drum into Penetrant Dip Tank as needed to meet tank level settings



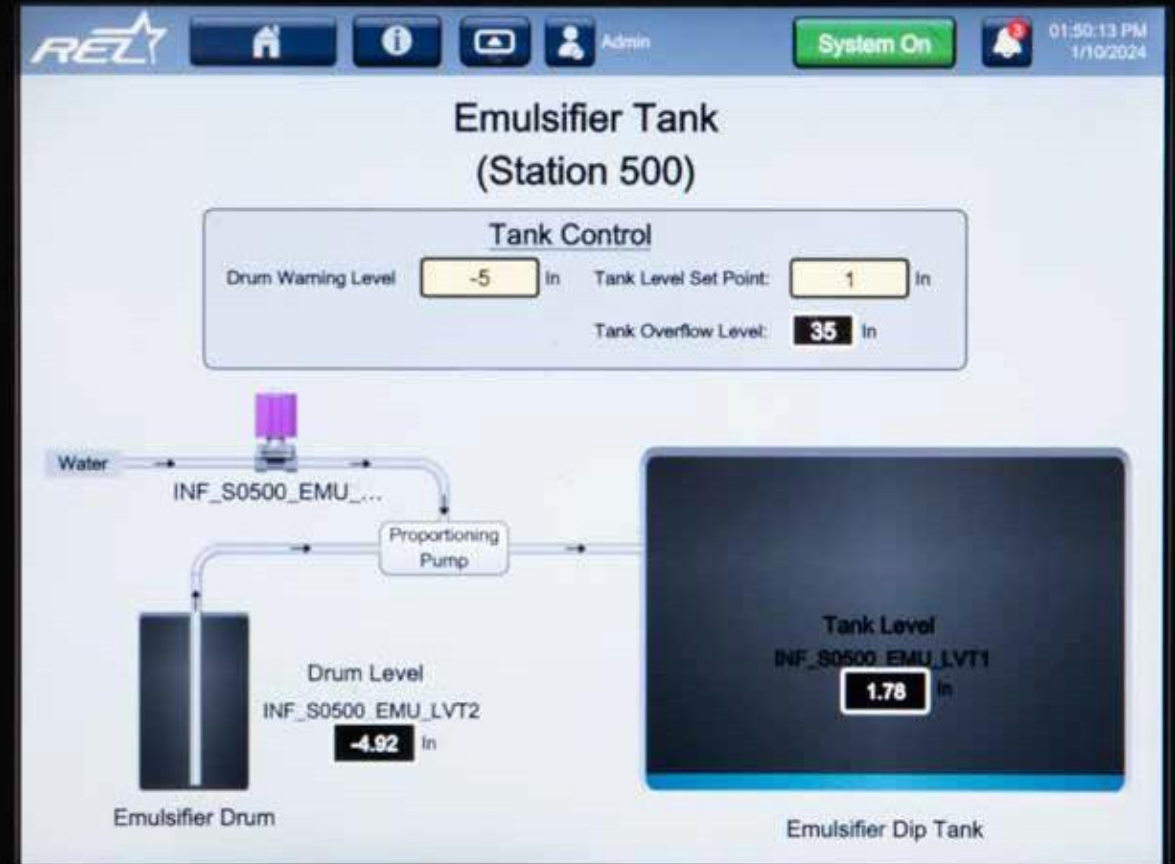
FRESH WATER TANK

- Freshwater Tank Heaters are controlled by the Infrastructure HMI
- Tank Fill Solenoid Valve maintains the tank level
- Fresh Water Tank feeds the fresh water cycles of the Pre-Rinse and Post-Rinse stations
- Water temperature for rinse process is settable here
- Air agitation ensures consistent temperature reading



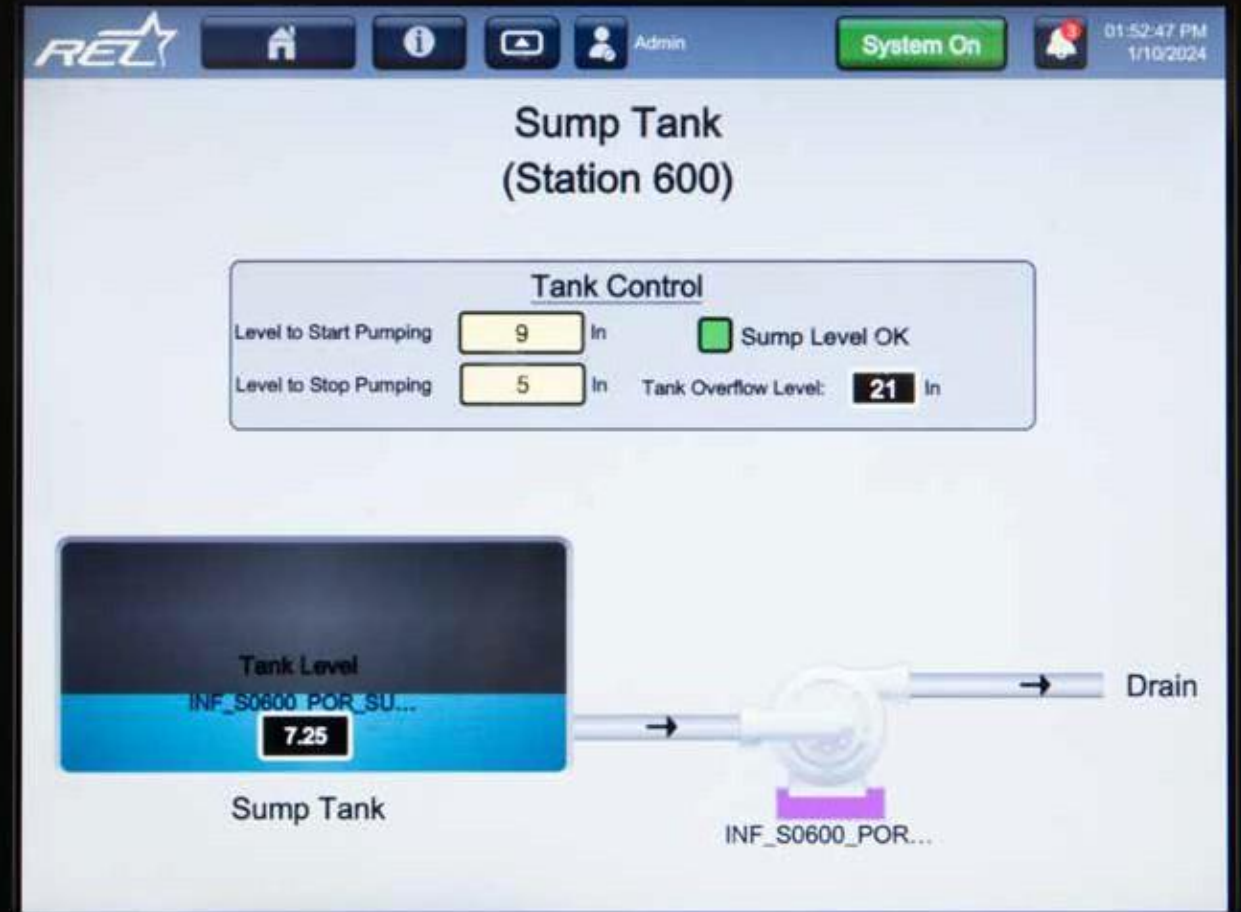
EMULSIFIER TANK

- Admin access required to set tank level and maintenance parameters
- Proportioning Pump mixes defined concentration



SUMP TANK

- Admin access required to set tank level and maintenance parameters
- Sump Pump



DRYER

- Enable Dryer
- Set temperature with control unit integrated into infrastructure panel

REL

Home Info Camera Admin

System On 01:55:36 PM 1/10/2024

Dryer (Station 700)

Dryer Temp
INF_S0700_DRY_TT1
150.56 °F

Enable Dryer

Heaters On
 Fans On

.....
Dryer temperature is controlled by the Tempco Temperature controller mounted on panel CP_INF
.....

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MAINTENANCE

- Flow Meter on freshwater tank used to record water usage history

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Home Info Camera Admin

System On 01:49:54 PM 1/10/2024

Infrastructure Maintenance

Current PLC Date and Time

Month	Day	Year
1	10	2024
Hour	Minute	Second
13	49	55
Month	Day	Year
12	13	2023
Hour	Minute	Second
16	7	0

Set PLC Date and Time

Total System Water History, Usage In Gallons

Lifetime	3257	Current Month	1227.6		
Jan	0	Feb	0	March	0
April	0	May	0	June	0
July	0	Aug	0	Sept	0
Oct	0	Nov	0	Dec	2012.6

Analog Sensor Calibration

LOCKOUT / TAGOUT

- Lockout / Tagout locations

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System On 01:57:40 PM 1/10/2024

Lockout/Tagout Locations

1 2 3 4 5

Key for Lockout/Tagout Locations

- 1) Compressed Air
- 2) Water In
- 3) Infrastructure Electrical (CP_INF)
- 4) FPI Main Electrical (CP_MDP)
- 5) Inspection booth electrical

Infrastructure Maintenance

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SAFETY

- Area guarding and safety light curtains for operator safety throughout process





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