

2009 Regional Seminar Series Presents: Using PI for Reliability Centered Maintenance



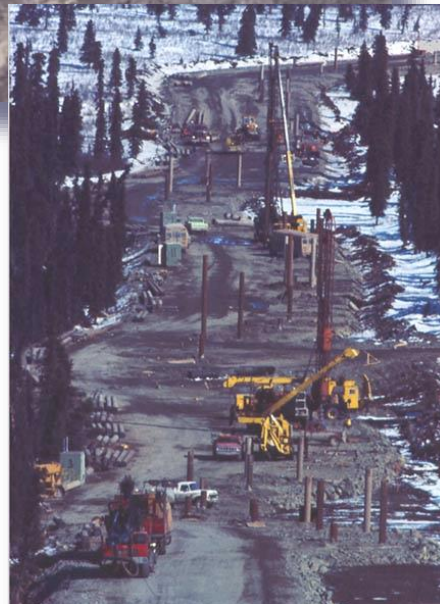
Darryl Hammond, Maintenance Program Development Lead,
Alyeska Pipeline Service Company

Nick Wiley, Technology Services Director, Casne Engineering

October 28, 2009

Presentation Overview

- About Alyeska Pipeline
- Maintenance Strategies: Mission, Goals and Challenges
- Alyeska's PI System
- Maintenance Diagnostics and Resource Center
- Development Roadmap



Alyeska History

- 1968 Oil discovered, Prudhoe Bay
- 1970 Alyeska Pipeline Service Company formed
- Joint venture between ARCO, BP and Humble Oil
- 1975-1977 Pipeline Construction
- largest privately financed construction project ever attempted (\$8 billion)
- Consortium of BP (47%), ConocoPhillips (28%), ExxonMobile (20%) & others



Alyeska Pipeline 2009

- 800 miles long
- 48" diameter pipe
- 5 Pump Stations
- Marine Terminal
- 1.4 Million bpd operating capacity
- Logistics & Operations centers in Valdez, Anchorage, and Fairbanks



Prudhoe Bay



Brooks Range



Tanana River Bridge Crossing



Valdez Terminal












Operation Control Center

Maintenance Strategies

- Mission
- Goals
- Challenges
- Strategies
 - Reliability Centered Maintenance 2
 - Alarm Management D&R
 - Continuous Monitoring



Solution Stack

System Need	Solution	
Real-time Data Storage	PI Enterprise Server	
Relational/Transaction Data Storage	Microsoft SQL Server 2007	
System Modeling	Analysis Framework 2.0 (AF)	
Computations	Advanced Computing Engine .NET Code	 
Alarm & Event Notifications	Analysis Framework 2.0, AF Notifications Outlook & Microsoft Exchange Server	 
User Interaction	RtWebParts , Custom WebParts & Microsoft Office SharePoint Server 2007 (MOSS)	 

PI Server

Operations

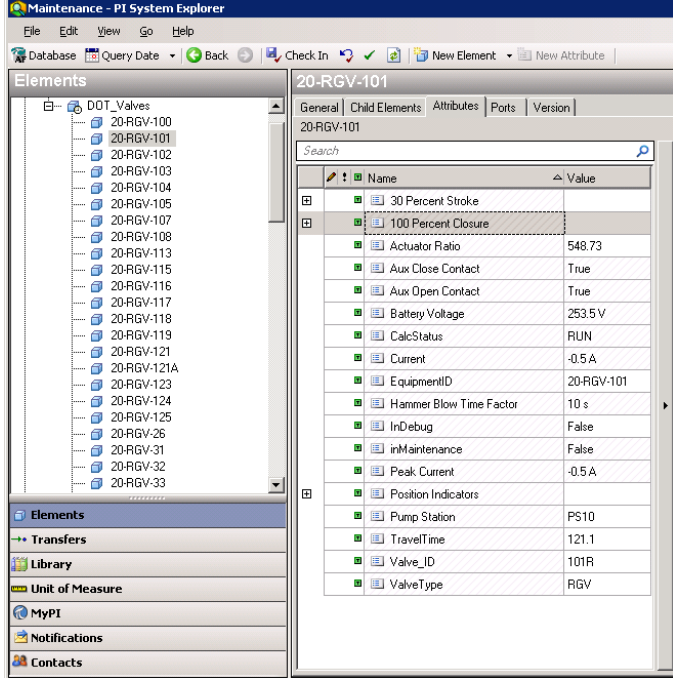
- Two Operations PI Servers in HA Configuration
- Test/Dev Server for prototyping
- OPC Interfaces to all data sources
- 150k tags

Enterprise

- 150k Tag PI Server
- PI-PI with Operations PI Servers

Analysis Framework & Advanced Computing Engine

- Foundational elements of our architecture
 - Model assets according to Alyska standards for system / subsystem / component hierarchy
 - Develop re-usable structured logic around asset model
 - Integration of disparate data
 - Notifications architecture
 - Platform for continuous monitoring of like equipment



The screenshot shows the 'Maintenance - PI System Explorer' application. The left pane displays a tree view of elements under 'DOT_Valves', including various RGV (Regulating Valve) units. The right pane shows the 'General' tab for the selected element '20-RGV-101'. It lists various attributes and their values, such as 'Name', 'Actuator Ratio', 'Aux Close Contact', 'Battery Voltage', 'Current', 'EquipmentID', 'Hammer Blow Time Factor', 'InDebug', 'InMaintenance', 'Peak Current', 'Position Indicators', 'Pump Station', 'TravelTime', 'Valve_ID', and 'ValveType'.

Below the screenshot, a code snippet is shown, likely representing the logic for monitoring the valve's position:

```

Try
' Set time period for Debug purposes
' Position_InFullOpen.ExeTime = New AFTi

goLog.Log("Execution Time: " & Format(Ne

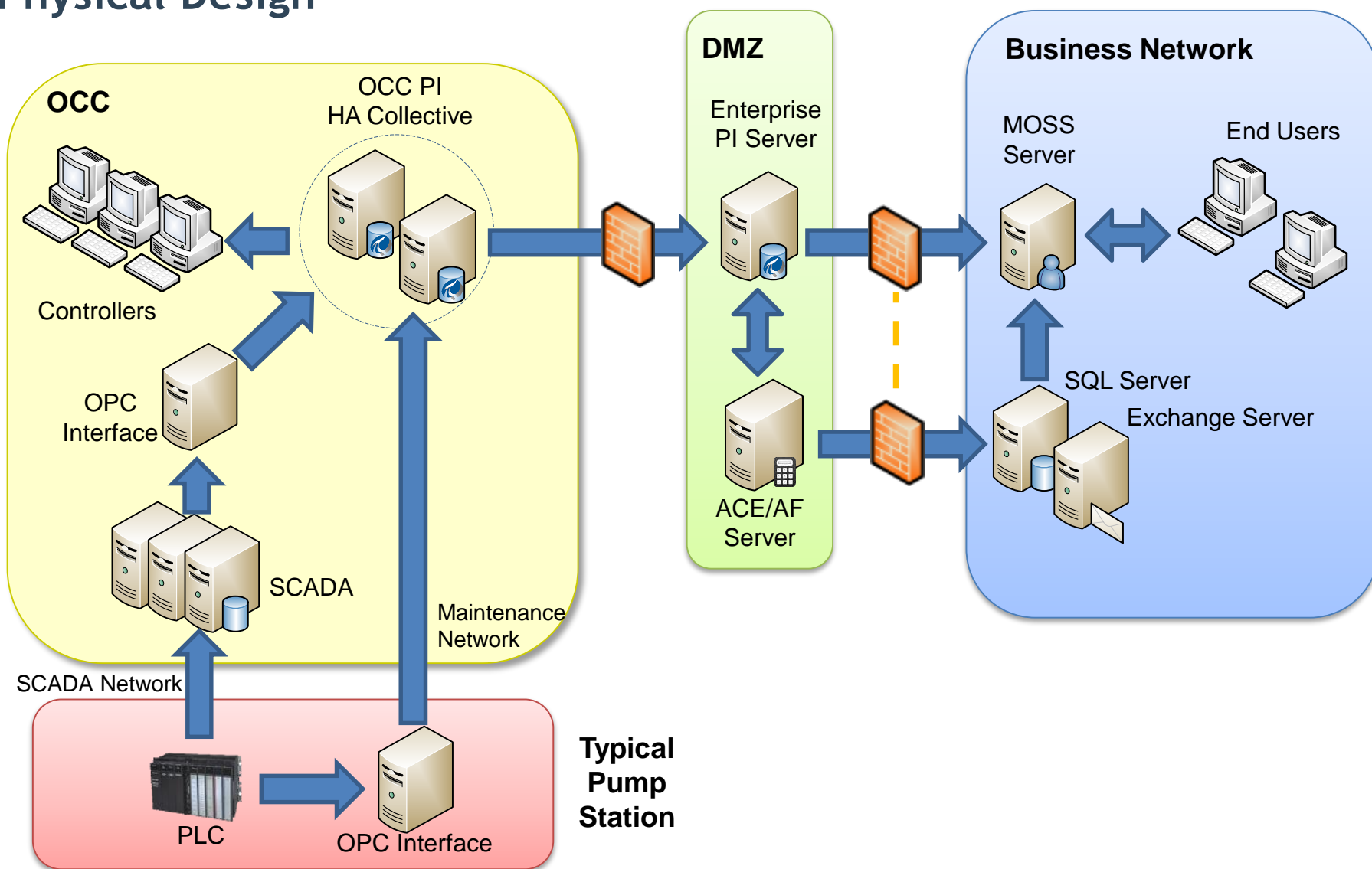
' Get current Digital State for Valve
loTemp = Position_InFullOpen.PrevVal(Pos
If IsNumeric(loTemp) Then
  cVal = CDb1(loTemp)
Else
  Throw New ACE_Exception("FATAL Excep
End If
cTime = New AFTime(Position_InFullOpen.P
  
```

Microsoft Office SharePoint Server & RtWebParts

- Primary Visualization for Enterprise Users
 - MOSS for team collaboration, document management, access control
 - RtGraphic WebPart for PB-developed graphics & trends
 - RtTrend WebPart for Web-based reports
 - RtTreeView WebPart for Navigation
 - Custom Silverlight WebParts as required



Physical Design



Continuous Monitoring proof of concept - RGV Valves



http://aecm:5450/sites/OEM/MDC/default.aspx

Home - Maintenance & Diagnostics Center

OEM Center > Maintenance & Diagnostics Center

Welcome Wiley, Nick J | My Site | My Links

Maintenance & Diagnostics Center

All Sites Advanced Search

Maintenance & Diagnostics Center Planning & Scheduling Maintenance Strategies Equipment Hierarchy **Site Actions**

View All Site Content

Oil Movements Department

Engineering

Maintenance & Diagnostics Center

- Discussions
- Documents
- Lists
- People and Groups
- Sites
- Equipment Hierarchy

Environment

Recycle Bin

Announcements

There are currently no active announcements. To add a new announcement, click "Add new announcement" below.

☐ Add new announcement

Equipment Hierarchy

Alarm Viewer

Online Training

Event Viewer

All Asset Backlog

Local intranet | Protected Mode: Off 100%

MAINTENANCE EVENT SUMMARY

CLOSE EVENT

Equip Tag

20-RGV-8
20-RGV-9
20-RGV-9
20-RGV-9
20-RGV-1
20-RGV-1
20-RGV-12
20-RGV-1
20-RGV-1
20-RGV-1
20-RGV-1
20-RGV-1
20-RGV-1

MAINTENANCE

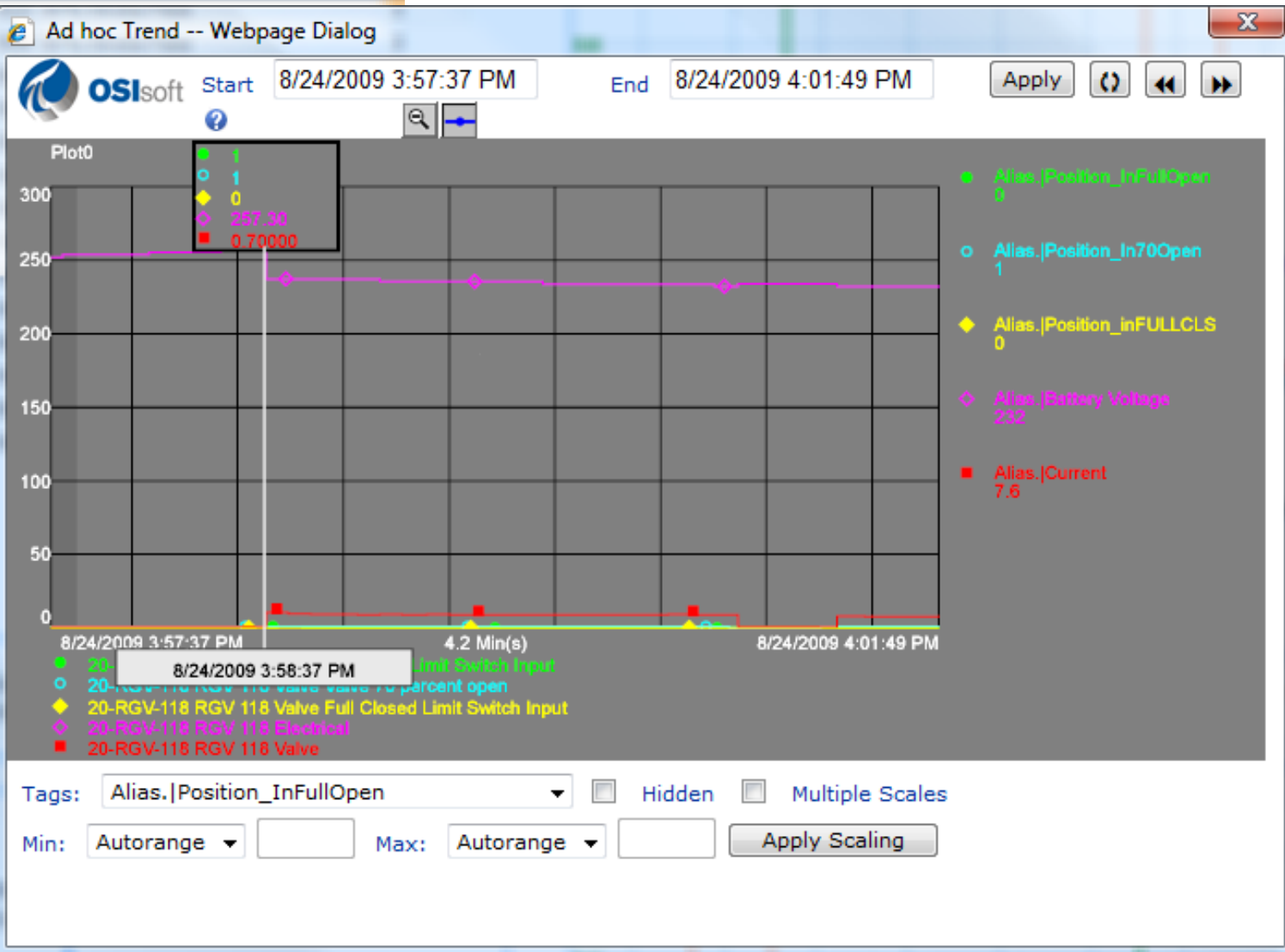
Equipment
Event Time
Description
Stroke Area

Close Time
Close Time
Close Time
Close (Sta
Close (End

Current (I

Current (Average) 9.02
Voltage (Average) 235.17

Current (Average) 7.03
Voltage (Average) 231.49



All Asset Back log

Excel Web Access - AllAssetTemplate

Open Update Find										
	A	B	C	D	E	F	G	H	I	J
	Ace_Calc	Event_ID	ACE_Event_Date	To Schedule	Score	Task Status	Ops Sys	Tag #	Work Group	Crew Code
1										
2					322	READY		OASIS #6905~AIR QUALITY SUPP		
3					172	READY	INVC	0000005915-0	INVCTUINV	
4					-487	READY	GMB	34-SYS-ELEC	PS#04	34M
5					476	READY	FMB	39-BD-4701R	PMC	39CS
6					451	READY	FMB	39-BD-2	PMC	39CS
7					286	READY	INVC	R&R ENDUSER EG	INVCTUINV	
8					478	READY	FMB	20-RGV-119-BD	LWMT	LWMT
9					322	READY		SLR #6956~2007 FISH & WILDLIFE		
10					390	READY		34-SYS-CIVIL	PL PROJ	
11					271	READY	FMB	39-SYS-ELEC	LWMT	LWMT 2
12					390	READY		34-SYS-EQUIP	PL PR(VHF	
13					431	READY	P-EN	39-UCP-4201R	PS#09	OPS
14					451	READY	FMB	38-BD-33	LWMT	LWMT 2
15					356	READY	FMB	39-BD-77	LWMT	LWMT
16					365	RETURN	FMB	31-MOV-120S	LWMT	LWMT
17					371	READY	FMB	20-RGV-31-BD	LWMT	LWMT
18					371	READY	FMB	20-RGV-26-BD	LWMT	LWMT
19					371	READY	FMB	20-RGV-34-BD	LWMT	LWMT 2
20					371	READY	FMB	20-RGV-37-BD	LWMT	LWMT

Equipment Hierarchy

Maintenance & Diagnostics Center | Planning & Scheduling ▾ | Maintenance Strategies | **Equipment Hierarchy**

All Sites

[Advanced Search](#)

Site Actions ▾

[Maintenance & Diagnostics Center](#) > [Equipment Hierarchy](#) > [Shared Documents](#) > [Continuous Monitoring](#)

Start Time

*-20

End Time

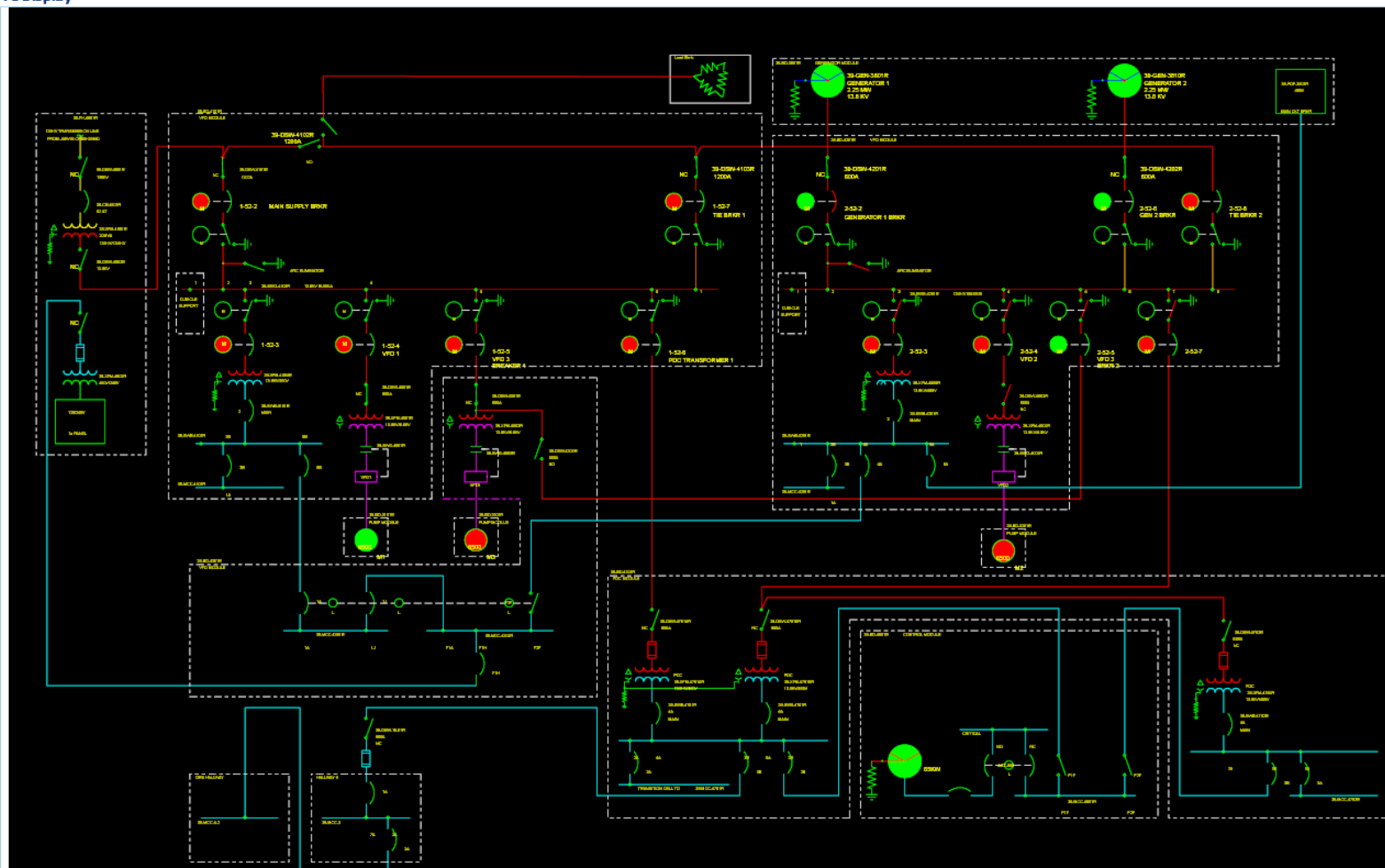


Apply

System View\Power Distribution\PS09

Legend

PI Display

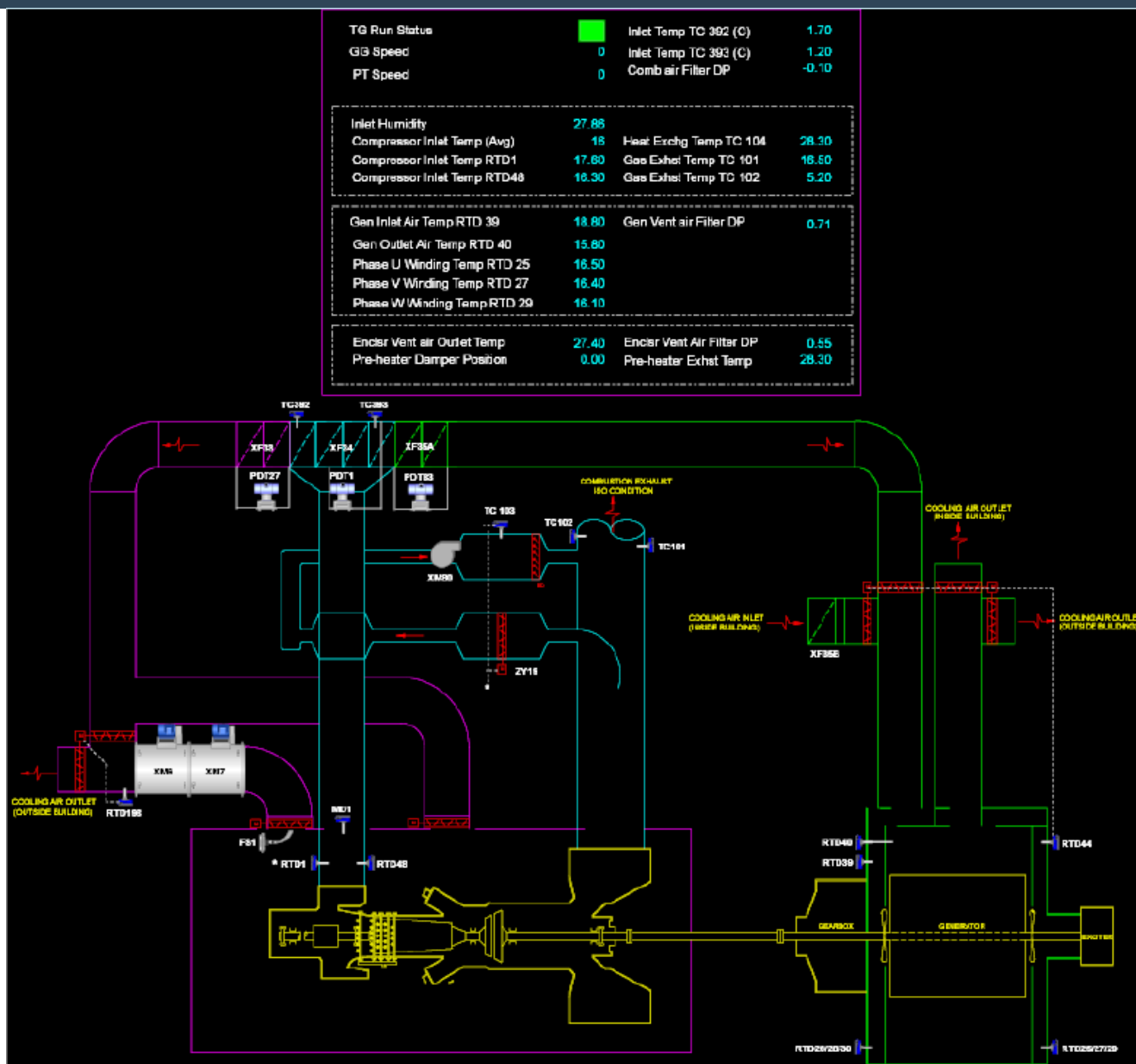


-
- ```

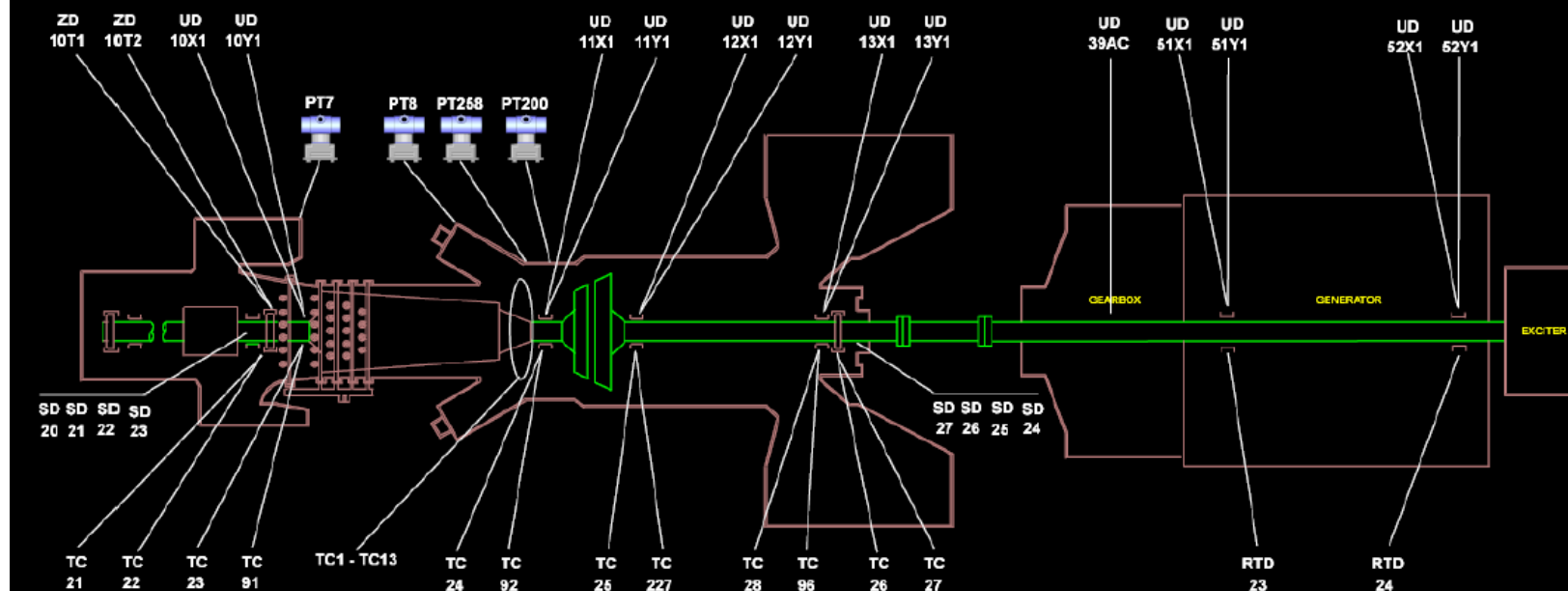
graph TD
 Trends --> PS04
 Trends --> PS05
 Trends --> PS09
 PS04 --> Diesel_Fuel_Systems[Diesel Fuel Systems]
 PS04 --> DRA
 PS05 --> Fire_Detection[Fire Detection]
 PS05 --> Fuel_Gas_Systems[Fuel Gas Systems]
 PS05 --> Gas_Detection[Gas Detection]
 PS09 --> Heat_and_Vent_Systems[Heat and Vent Systems]
 PS09 --> LEFM
 PS09 --> M_L_Relief[M/L Relief]
 PS09 --> Discharge
 Discharge --> 305AR
 Discharge --> 305BR
 Discharge --> Suction
 Suction --> 304AR
 Suction --> 304BR
 Suction --> 304CR
 304AR --> PS04
 304AR --> PS05
 304AR --> PS09
 304BR --> M_L_Pipe[M-L Pipe]
 304BR --> MLU
 304BR --> MOS
 304CR --> Power_Distribution[Power Distribution]
 304CR --> PDC_Module[PDC Module]
 304CR --> Sub_Station[Sub Station]
 Power_Distribution --> PS01
 Power_Distribution --> PS03
 Power_Distribution --> PS04
 PDC_Module --> Switch_Board[Switch Board]
 PDC_Module --> Switch_Gear[Switch Gear]
 PDC_Module --> Transformers
 Sub_Station --> VFD_1_Module[VFD 1 Module]

```





|                      |                                      |                                   |         |                       |       |                               |       |
|----------------------|--------------------------------------|-----------------------------------|---------|-----------------------|-------|-------------------------------|-------|
| TG Run Status        | <span style="color: green;">■</span> | CT DE Journal Radial Vib UD10X1   | 1.16    | Compressor Inlet Temp | 16    | CT Thrust Brg Temp TC 21      | 20.90 |
| GG Speed             | 0.00                                 | CT DE Journal Radial Vib UD10Y1   | 2.47    | Comp Inlet Temp RTD1  | 17.70 | CT Thrust Brg Temp TC 22      | 21.20 |
| PT Speed             | 0.00                                 | CT NDE Journal Radial Vib UD11X1  | 0.86    | Comp Inlet Temp RTD48 | 16.30 | CT DE Journal Brg Temp TC 23  | 20.30 |
| Comb Inlet PSI PT 7  | 0.95                                 | CT NDE Journal Radial Vib UD11Y1  | 0.86    | Interduct Temp Avg    | 19.08 | CT DE Journal Brg Temp TC 91  | 20.60 |
| Comb Inlet PSI PT 8  | 0.97                                 | PT DE Journal Radial Vib UD12X1   | 0.96    | Interduct Temp 01     | 22.60 | CT NDE Journal Brg Temp TC 24 | 24.40 |
| Interduct PSI PT 258 | 0.92                                 | PT DE Journal Radial Vib UD12Y1   | 1.01    | Interduct Temp 02     | 20.80 | CT NDE Journal Brg Temp TC 92 | 24.50 |
|                      |                                      | PT NDE Journal Radial Vib UD13X1  | 1.16    | Interduct Temp 03     | 17.80 | PT DE Journal Brg Temp TC 25  | 20.90 |
|                      |                                      | PT NDE Journal Radial Vib UD13Y1  | 0.96    | Interduct Temp 04     | 17.70 | PT DE Journal Brg Temp TC 227 | 21.20 |
|                      |                                      | CT Axial Displacement ZD10T1      | -278.48 | Interduct Temp 05     | 13.50 | PT NDE Journal Brg Temp TC 28 | 26.60 |
|                      |                                      | CT Axial Displacement ZD10T2      | -271.22 | Interduct Temp 06     | 14.50 | PT NDE Journal Brg Temp TC 96 | 26.60 |
|                      |                                      | Gen Gear Box Acceleration UD39AC  | 0.00    | Interduct Temp 07     | 11.00 | PT Thrust Brg Temp TC 26      | 27.60 |
|                      |                                      | Gen Gear Box Velocity UD39AC      | 0.15    | Interduct Temp 08     | 15.40 | PT Thrust Brg Temp TC 27      | 27.80 |
|                      |                                      | Gen DE Journal Radial Vib UD51X1  | 1.11    | Interduct Temp 09     | 20.40 | Gen DE Brg Temp RTD 23        | 23.20 |
|                      |                                      | Gen DE Journal Radial Vib UD51Y1  | 1.11    | Interduct Temp 10     | 21.10 | Gen NDE Brg Temp RTD 24       | 20.20 |
|                      |                                      | Gen NDE Journal Radial Vib UD52X1 | 1.11    | Interduct Temp 11     | 22.90 |                               |       |
|                      |                                      | Gen NDE Journal Radial Vib UD52Y1 | 0.91    | Interduct Temp 12     | 24.50 |                               |       |
|                      |                                      |                                   |         | Interduct Temp 13     | 23.90 |                               |       |
|                      |                                      |                                   |         | Gas Exhst Temp TC 101 | 16.50 |                               |       |
|                      |                                      |                                   |         | Gas Exhst Temp TC 102 | 5.20  |                               |       |



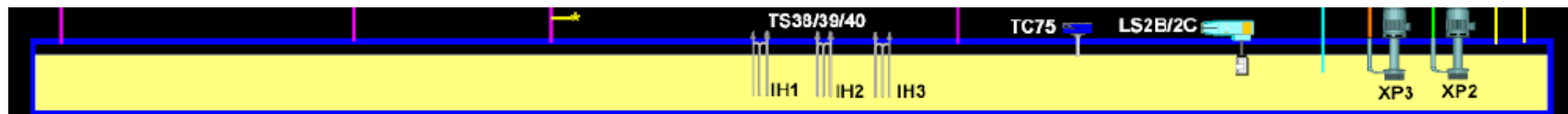
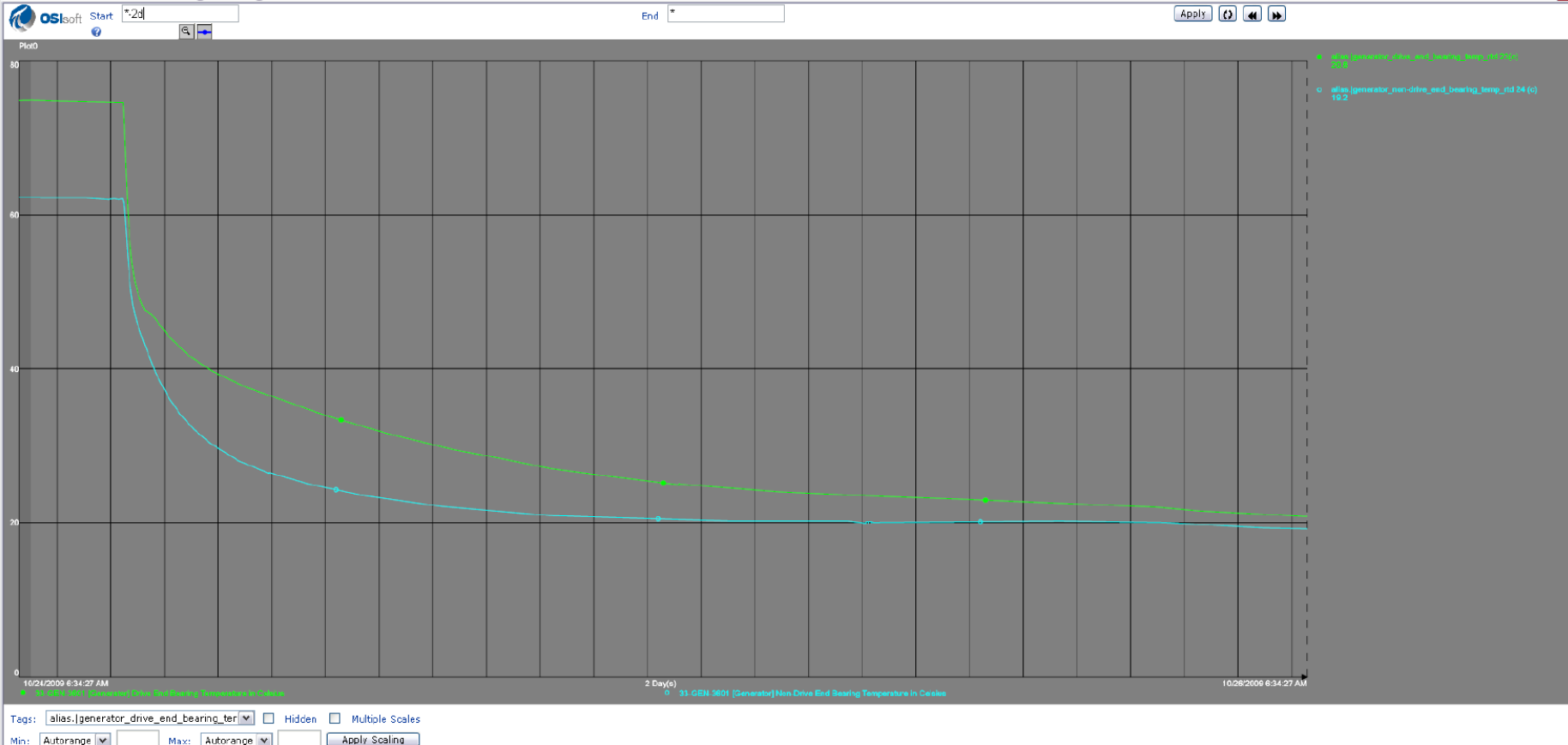
CT Thrust Brg Temp TC 21

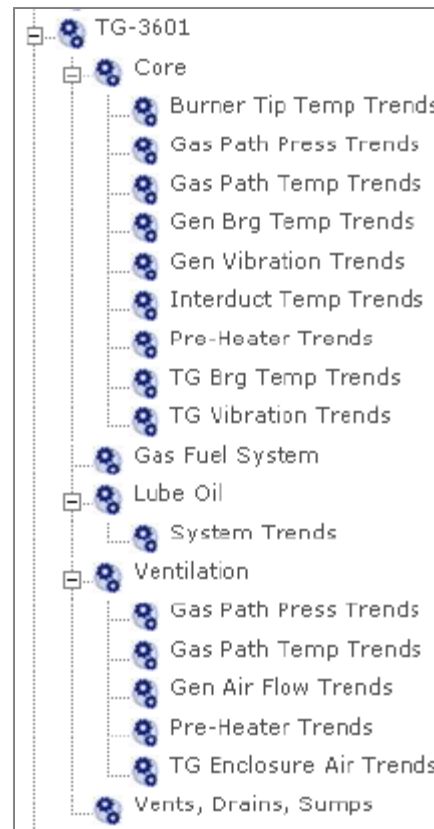
20.90

TG Run Status



Ad hoc Trend -- Web Page Dialog







## Documentation and Rationalization

**DNRSearchBar Web Part**

D\_N\_R Search
PI D\_N\_R Search

**UCOS Tag:**

**PI Tag:**

**MEL Tag:**

**MTL Tag:**

**Network**

**Priority**

**Svstem**

**Location**

**Component**

**Matching Tags**

PS04\_VLV-BST\_PMP\_SMP\_R.almComi
PS04\_VLV-BST\_PMP\_SMP\_R.almWarr
PS04\_VLV-BST\_PMP\_SMP\_R.almDNET
PS04\_VLV-BST\_PMP\_SMP\_R.almGndF
PS09\_VLV-BST\_PMP\_SMP\_R.almWarr
PS09\_VLV-BST\_PMP\_SMP\_R.almDNET

**DNRView Web Part**

D\_N\_R View
PI D\_N\_R View

**UCOS Tag:** PS04\_VLV-BST\_PMP\_SMP\_R.almCommWarn

**UCOS Definition:**

**PI Tag:** PS04\_VLV-BST\_PMP\_SMP\_R@CommWarn

**PI Description:**

**MEL Tag:**

**MTL Tag:**

**SME Information:**

**Cause Definition:** One Channel of MX Communication has failed

**Effects Definition:** One Channel of MX Communication has failed

**Recommended Planning Actions:** Prosoft Card In PLC Chassis

**Recommended Maintance Action:** Prosoft Card In PLC Chassis

**Priority** 10

**Repair Time:**

☐ DR Complete

**Maintance Event Response** >14 Days

**Notification Time**

**DR Complete Date** 1/1/1900 12:00:00

**DR Complete User**

## Maintenance & Diagnostics Center

[Maintenance & Diagnostics Center](#)
[Equipment Hierarchy](#)
[Maintenance Strategies](#)
[Planning & Scheduling](#)

Maintenance & Diagnostics Center > Shared Documents > DNRViewer

### DNRViewer

#### MaintenanceSearchBar Web Part

D\_N\_R Search
  PI D\_N\_R Search

UCOS Tag:

PI Tag:

mWarn

MEL Tag:

MTL Tag:

Network

Select

Priority

Select

Svstem

Select

Location

Select

Reset

Search

Export

#### Matching Tags

PS04\_VLV-BST\_PMP\_SMP\_R@CommWar

#### MaintenanceView Web Part

D\_N\_R View
  PI D\_N\_R View

Priority

10

System

BOOSTER PUMPS

Location

PS04

MTL Tag

MEL Tag

Tag Name

PS04\_VLV-BST\_PMP\_SMP\_R@CommWarn

Tag Description

STAG=PS04\_VLV-BST\_PMP\_SMP\_R.almCommWarn

Tag Justification

Tag Dependencies

General Comments

☐ Tag Active

Tag Type

pttypDigital

Unit of Measure

Point Source

P

Alarm Set Point

DeadBand

0-28800

Span

1

Device Range

Sample Rate

Compression

8 hr

Exception

0

User Group

Display File

Collection Start

Collection End

Creator

piadmin

Create Date

8/6/2009 5:22:26 PM

# Alarm Management

Operations, Engineering & Maintenance (OEM) > Maintenance & Diagnostics Center

**Maintenance & Diagnostics Center** | Equipment Hierarchy | Maintenance Strategies | Planning

Maintenance & Diagnostics Center > Shared Documents > AlarmViewer

## AlarmViewer

WebPart1 Web Part

**UCOS Tag:**

**PI Tag:**

**MEL Tag:**

**MTL Tag:**

**Network** Select

**Priority** 9

**System** Select

**Location** Select

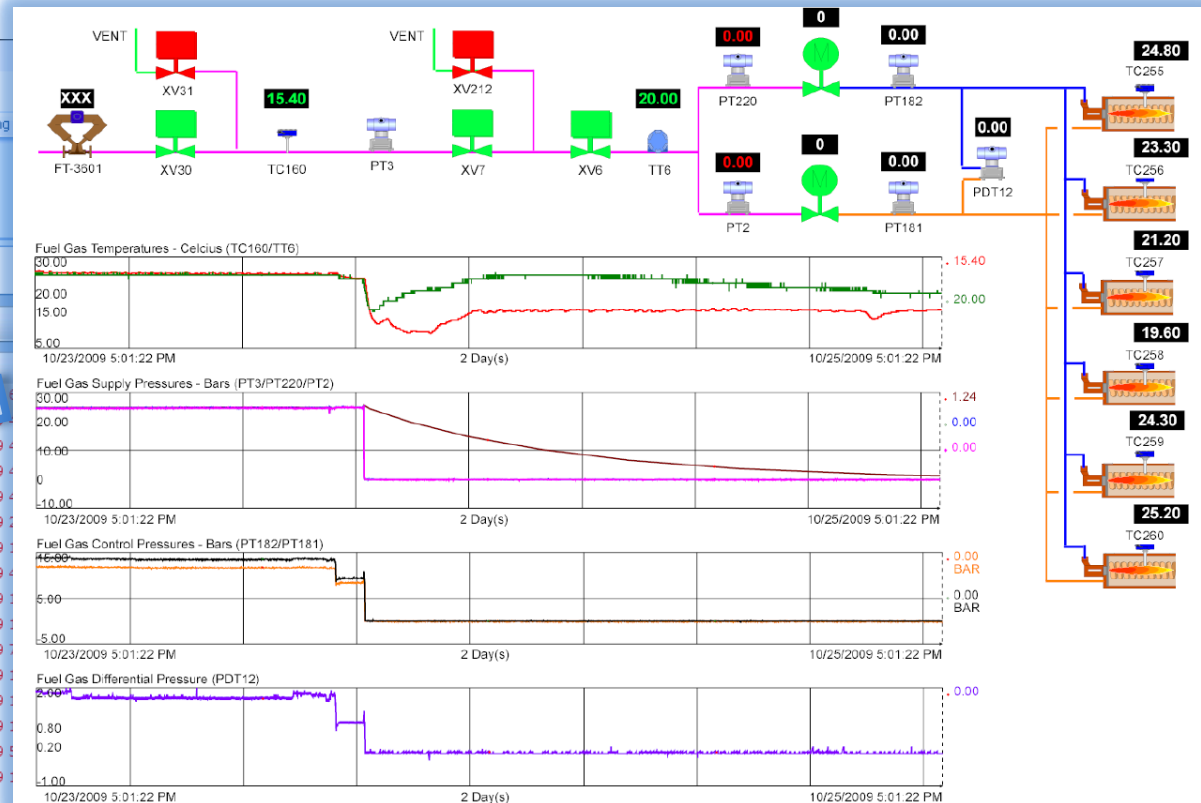
**Component** Select

Reset Search Export

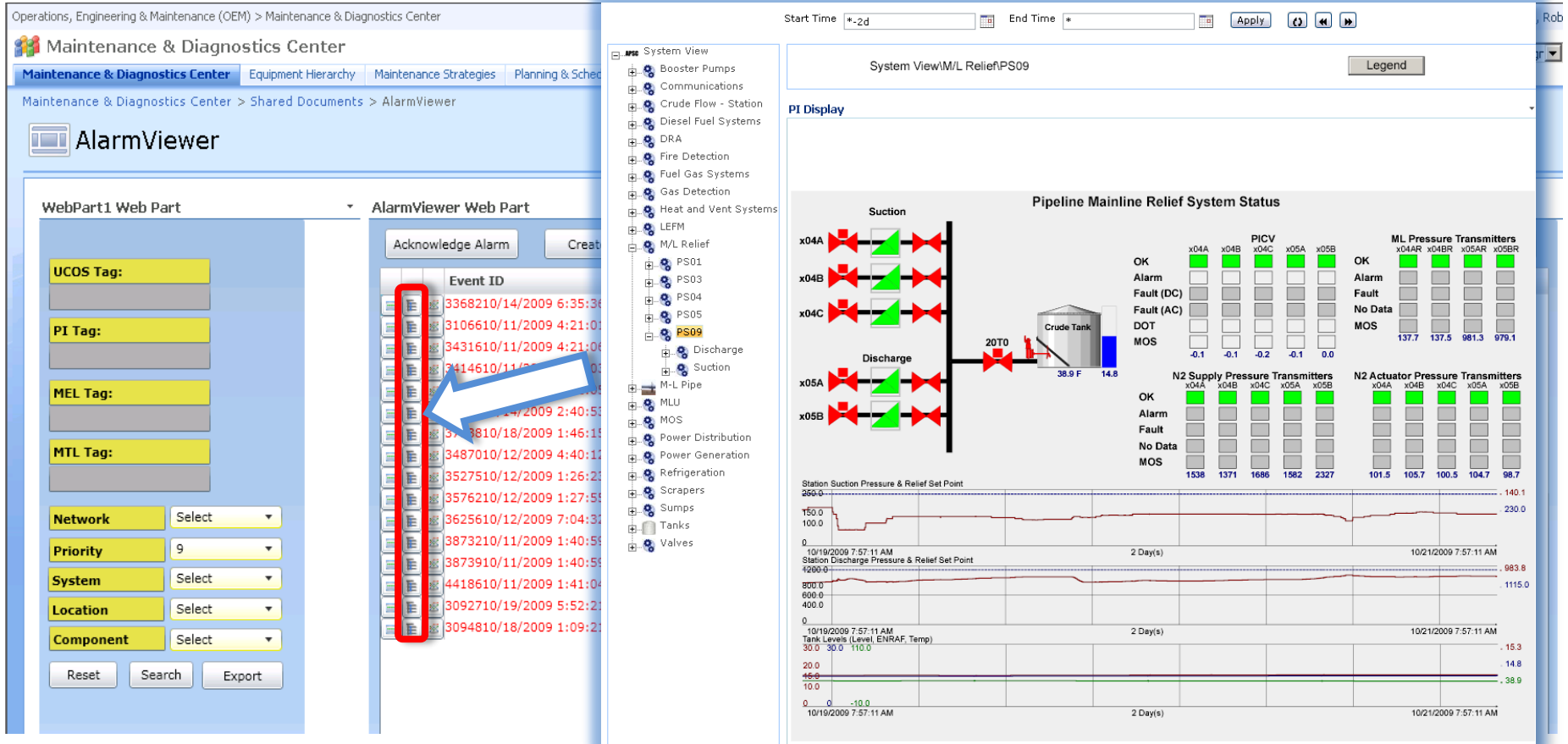
AlarmViewer Web Part

Acknowledge Alarm

| Event ID        |
|-----------------|
| 33              |
| 345             |
| 3414610/11/2009 |
| 3413310/11/2009 |
| 3192610/14/2009 |
| 3783810/18/2009 |
| 3487010/12/2009 |
| 3527510/12/2009 |
| 3576210/12/2009 |
| 3625610/12/2009 |
| 3873210/11/2009 |
| 3873910/11/2009 |
| 4418610/11/2009 |
| 3092710/19/2009 |
| 3094810/18/2009 |



# Alarm Management





# Alarm Management

Operations, Engineering & Maintenance (OEM) > Maintenance & Diagnostics Center

## Maintenance & Diagnostics Center

Maintenance & Diagnostics Center > Shared Documents > AlarmViewer

### AlarmViewer

WebPart1 Web Part

UCOS Tag:

PI Tag:

MEL Tag:

MTL Tag:

Network: Select

Priority: 9

System: Select

Location: Select

Component: Select

Reset Search Export

AlarmViewer Web Part

Acknowledge Alarm

Event

3431610/11/20

3414610/11/20

3413310/11/20

3192610/14/20

3783810/18/20

3487010/12/20

3527510/12/20

3576210/12/2009 1:27:55 PM PS04\_MLU\_2\_UCP-HEALTH\_R.almPanelOpen

3625610/12/2009 7:04:32 AM PS04\_MLU\_3\_UCP-HEALTH\_R.almPanelOpen

3873210/11/2009 1:40:59 PM PS05\_LT-BST\_PMP\_SMP\_AR.almFlt

3873910/11/2009 1:40:59 PM PS05\_LT-BST\_PMP\_SMP\_BR.almFlt

4418610/11/2009 1:41:04 PM PS11\_LAN-11\_R.almMaintSrvWanB

3092710/19/2009 5:52:21 AM MP238\_VLV-DRA\_PMP\_A\_OUT\_R.almCommWarn

3094810/18/2009 1:09:21 PM MP238\_VLV-DRA\_TNK31\_IN\_R.almCommWarn

DNRSearchBar Web Part

D\_N\_R Search PI D\_N\_R Search

UCOS Tag:

PI Tag:

MEL Tag:

MTL Tag:

Network: Select

Priority: Select

System: Select

Location: Select

Component: Select

Reset Search Export

Matching Tags

PS04\_VLV-BST\_PMP\_SMP\_R.almComm

PS04\_VLV-BST\_PMP\_SMP\_R.almWarn

PS04\_VLV-BST\_PMP\_SMP\_R.almDNE

PS04\_VLV-BST\_PMP\_SMP\_R.almGndF

PS09\_VLV-BST\_PMP\_SMP\_R.almWarn

PS09\_VLV-BST\_PMP\_SMP\_R.almDNE

DNRView Web Part

D\_N\_R View PI D\_N\_R View

UCOS Tag: PS04\_VLV-BST\_PMP\_SMP\_R.almCommWarn

UCOS Definition:

PI Tag: PS04\_VLV-BST\_PMP\_SMP\_R.almCommWarn

PI Description:

MEL Tag:

MTL Tag:

SME Information:

Cause Definition: One Channel of MX Communication has failed

Effects Definition: One Channel of MX Communication has failed

Recommended Planning Actions: Prosoft Card In PLC Chassis

Recommended Maintenance Action: Prosoft Card In PLC Chassis

Priority: 10

Repair Time: ☐ DR Complete

Maintenance Event Response: 1/1/1900 12:00:00

DR Complete Date:

DR Complete User:

Notification Time:

Export Update

| Alarm ID | Time               | Tag                                   | Priority | Action      | Description                                                  |
|----------|--------------------|---------------------------------------|----------|-------------|--------------------------------------------------------------|
| 3431610  | 11/20              | PS04_MLU_2_UCP-HEALTH_R.almPanelOpen  | 9        | Maintenance | PS-04 MLU-2 UCP Health-UCP Panel Door Open [34-UCP-4201R]    |
| 3625610  | 12/2009 7:04:32 AM | PS04_MLU_3_UCP-HEALTH_R.almPanelOpen  | 9        | Maintenance | PS-04 MLU-3 UCP Health-UCP Panel Door Open [34-UCP-4301R]    |
| 3873210  | 11/2009 1:40:59 PM | PS05_LT-BST_PMP_SMP_AR.almFlt         | 9        | Maintenance | PS-05 Level Xmtr BP Smp A - Transmitter Fault [35-LIT-510AR] |
| 3873910  | 11/2009 1:40:59 PM | PS05_LT-BST_PMP_SMP_BR.almFlt         | 9        | Maintenance | PS-05 Level Xmtr BP Smp B - Transmitter Fault [35-LIT-510BR] |
| 4418610  | 11/2009 1:41:04 PM | PS11_LAN-11_R.almMaintSrvWanB         | 8        | Maintenance | Maint Server WAN B Comm Status                               |
| 3092710  | 19/2009 5:52:21 AM | MP238_VLV-DRA_PMP_A_OUT_R.almCommWarn | 9        | Maintenance | Communication Failure on Either Channel [25-MOV-145R]        |
| 3094810  | 18/2009 1:09:21 PM | MP238_VLV-DRA_TNK31_IN_R.almCommWarn  | 9        | Maintenance | Communication Failure on Either Channel [25-MOV-149R]        |

Ad hoc Trend - Windows Internet Explorer

http://151.169.2.49:5450/RtWebPartResources/adhoctrendurl.i

Google

Ad hoc Trend

Start \*-5d End \*

Apply

Plot10

PS03\_MLUH1 Power (Pmp Mod-Control Power Not Available) (30-FN-3101BR)

10/21/2009 3:00:09 PM 5 Day(s) 10/26/2009 3:00:09 PM

Tags: PS03\_MLUH1\_FN-PMP\_SHLT\_B\_R.alrr

Min: Autorange Max: Autorange

Apply Scaling

Done

Internet | Protected Mode: Off

100%



## A-Net Tag Details

| Tag         | Description                             | Manufacturer             | Model        | Location | Status | Source | In MTL? |
|-------------|-----------------------------------------|--------------------------|--------------|----------|--------|--------|---------|
| 33-PK-3601R | PACKAGE - CYCLONE GAS TURBINE GENERATOR | ALYESKA PIPELINE SERVICE | BD-GENERATOR |          | ACTIVE | TDDI   | Yes     |

[Work Orders](#)
[Work Requests](#)
[Model PM](#)
[BOM](#)
[TDDI](#)
[TAPS Documents](#)
[Equipment Params](#)
[Readings](#)
[Operating Specs](#)
[Relationships](#)

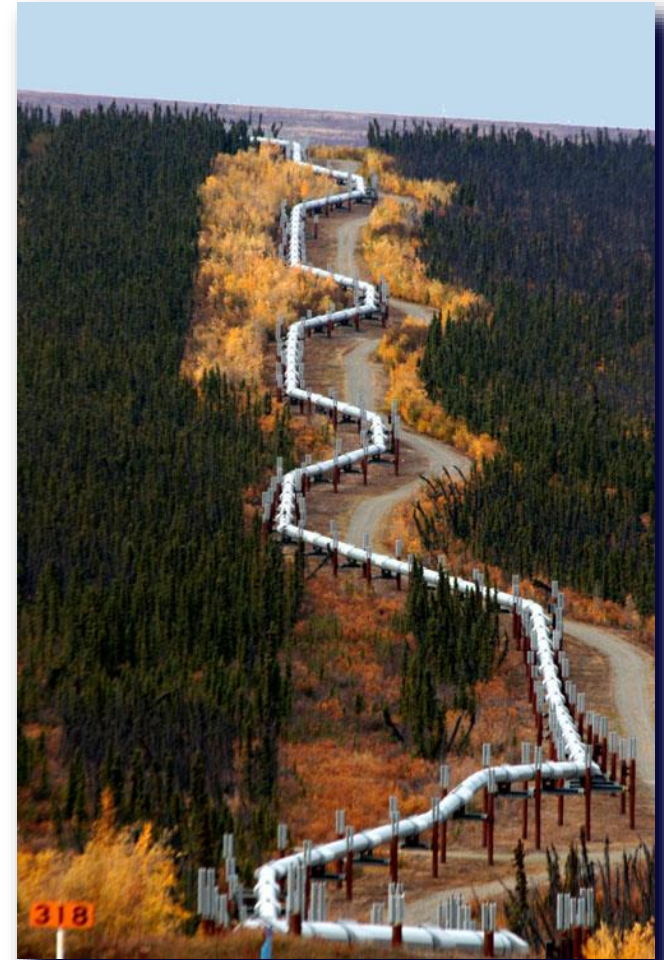
Results from Passport Model Preventive Maintenance (Active PMs Only)

| WO                       | FromTask | ToTask | PMID     | PMRQ | Title                                                             |
|--------------------------|----------|--------|----------|------|-------------------------------------------------------------------|
| <a href="#">38011830</a> |          |        | 00212352 | 17   | Y3,E,33-PK-3601R,24000 HR 12.8MW GENERATOR CHECK                  |
| <a href="#">38011740</a> |          |        | 00212352 | 15   | Y1,I,33-PK-3601R,8000 HR SIEMENS TG PROTECTIVE DEVICE CHECKS      |
| <a href="#">38011683</a> |          |        | 00212352 | 13   | Y2,E,33-PK-3601R,12.8 MW GENERATOR CHECK                          |
| <a href="#">38011004</a> |          |        | 00212352 | 11   | Y3,I,33-PK-3601R,24000 TG LUBE OIL COOLING TEMP CONTROL CK/CALIB  |
| <a href="#">38009493</a> |          |        | 00212352 | 08   | Y3,I,33-PK-3601R,24000 HR SIEME TG LUBE OIL TANK LVL/TEMP CK & CA |
| <a href="#">38009486</a> |          |        | 00212352 | 07   | Y3,I,33-PK-3601R,24000 HR SIEMENS TG LUBE OIL SYS PRES CK & CALIB |
| <a href="#">38009476</a> |          |        | 00212352 | 06   | Y3,I,33-PK-3601R,24000 HR SIEMENS TG GAS FUEL SYS TEMP CK & CALIB |
| <a href="#">38009474</a> |          |        | 00212352 | 05   | Y3,I,33-PK-3601R,24000 HR SIEMENS TG GAS FUEL SYS PRESS CK & CALI |
| <a href="#">38009326</a> |          |        | 00212352 | 04   | Y3,I,33-PK-3601R,24000 HR SIEMENS TG CORE ENGINE CHECKS           |
| <a href="#">38006355</a> |          |        | 00212352 | 14   | Y1,E,33-PK-3601R,12.8 MW GEN CHECK                                |

Found 19 item(s)

## Next Steps

- Additional Asset Modeling in AF
- Develop additional CM and RCM calculations to plug into Event Viewer
- Integrate predictive failure analysis tools
- Automation Genome
- Expand Diagnostics and Resource Center
- Explore Work Management Systems that will allow for tighter integration





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