# Integrated Information Management for Operational Excellence

Presented by Vijendra Pancholi

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# Agenda

- **About Adani Group**
- **Need And Solution**
  - Mercury(Port Information System)
- **Advantage and Benefits of system**

# Contents

**Sections**

# The Adani Group

Leading Business Conglomerate with interest in diversified sectors...

## Resources

Sourcing hydrocarbons from around the world to fuel India's growth

**Resources**

- Coal Mining
- Oil & Gas Exploration
- Coal Trading

## Logistics

Owning a large network of ports, railways, ships and operate various facilities around our ports

Logistics

- Multi Modal Logistics
- Ports
- Special Economic Zones

## Energy

Leading player in private sector power generation

**Energy**

- Gas Distribution
- Power
- Bunkering
- Grain Silos & Fruits
- Edible Oil

# The Adani Group

Adani Group has 3 listed companies....

Adani Enterprises Limited

(AEL)

Adani Power Limited

(APL)

Adani Ports & SEZ Limited

(APSEZ)

# Adani Ports Infrastructure

**Helping India build Port Capacity.....**

- Adani initially started its first port at Mundra location. Later on it has aggressively added new Indian & Overseas ports to its portfolio.
- Adani Ports is targeting to achieve the mammoth figure of 200 million MT per annum Indian cargo handling by 2020
- In the last fin year Adani Ports (India) handled over 100 Million MT of cargo

# Adani Ports Infrastructure

## Helping India build Port Capacity.....

| Indian Ports & Terminals | Location | Year of Operations (expected) | Existing Capacity | Planned Capacity |
|---|---|---|---|---|
| Adani Mundra Port | Mundra, Gujarat | 1998 | 165 | 240 |
| Adani Petronet (Dahej) Port Pvt. Ltd. | Dahej, Gujarat | 2010 | 20 | 20 |
| Adani Abbot Point Terminal Pty Ltd | Australia | 2011 | 50 | 100 |
| Adani Hazira Port Private Ltd. | Hazira, Gujarat | 2012 | 25 | 75 |
| Adani Murmugoa Coal Terminal Pvt. Ltd. | Goa | (2013) | | 7 |
| Adani Vizag Coal Terminal Pvt. Ltd. | Vizag, Andhra Pradesh | (2013) | | 7 |
| Adani Kandla Bulk Terminal Private Ltd. | Kandla, Gujarat | (2014) | | 20 |
| **Total Capacity (Million MT)** | | | **260** | **469** |

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**Sections**

The Adani

**Mercury Overview**

Advantages / Benefits

# Mercury

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## Adani Ports And SEZ Ltd.


Mundra


Dahej


Hazira


Vizag


Goa

PORTS

DVMS

CARGO

ASSETS

SYSTEMS

# Contents

| Sections | Sub sections |
| --- | --- |
| Mercury Overview | Context |
| Reports & Capabilities | Salient Features |
| Advantages / Benefits | Integration with other applications |

# Operation Challenges

- No Transparency of Data across port
- No Benchmarking operational Parameter
- Plans V/S Actual ??
- Manual Reporting prone to errors
- Integrated Operational Teaming ??
- Information flow not real time to be actionable

# Context

**Many questions on port's operational performance**

What is actual operations performance?

How do I bring all the data from different sources into single platform for analytics?

Can I view and monitor live status of operations?

How does this port fare with other ports of the Group?

Is the manual data authentic and reliable?

Has port's performance improved year on year?

Can I continue sparing teams just for manual recording, collection, and reporting of data?

How can the data and standard reports be generated without spending so much time?

Can I select parameters and make my own reports?

**Answers / Solutions to these questions not easily and timely available**

# Context

**Non-availability of solutions to questions on port's operational performance further complicated by**

- Exponential growth in cargo volumes
- Huge variations between average vs peak demands
- Addition of ports in Group's portfolio
- Increasing expectations of clients

**Necessitated need of a robust system for data and information analytics on port's operational performance**

A system which would help in

- Interface with multiple systems / applications
- Automated collection and recording of data
- Retrieval of live and historical data in desired dashboards and reporting formats
- Benchmarking and comparison of performance over periods / across ports
- Flexibility to choose parameters, pull data and create reports as per user's imagination

**Mercury (earlier known as PIMS) conceived as solution**

# Mercury Overview : Silent Feature

Helps to achieve 'Operational excellence' by monitoring and analysing performance in real time

Provides historical and comparative statistics on port's performance

Will Allow the evaluation of system and operator performance

Integrates applications like Oracle, SQL server based and intelligent automation systems onboard Conveyors & Cranes etc.

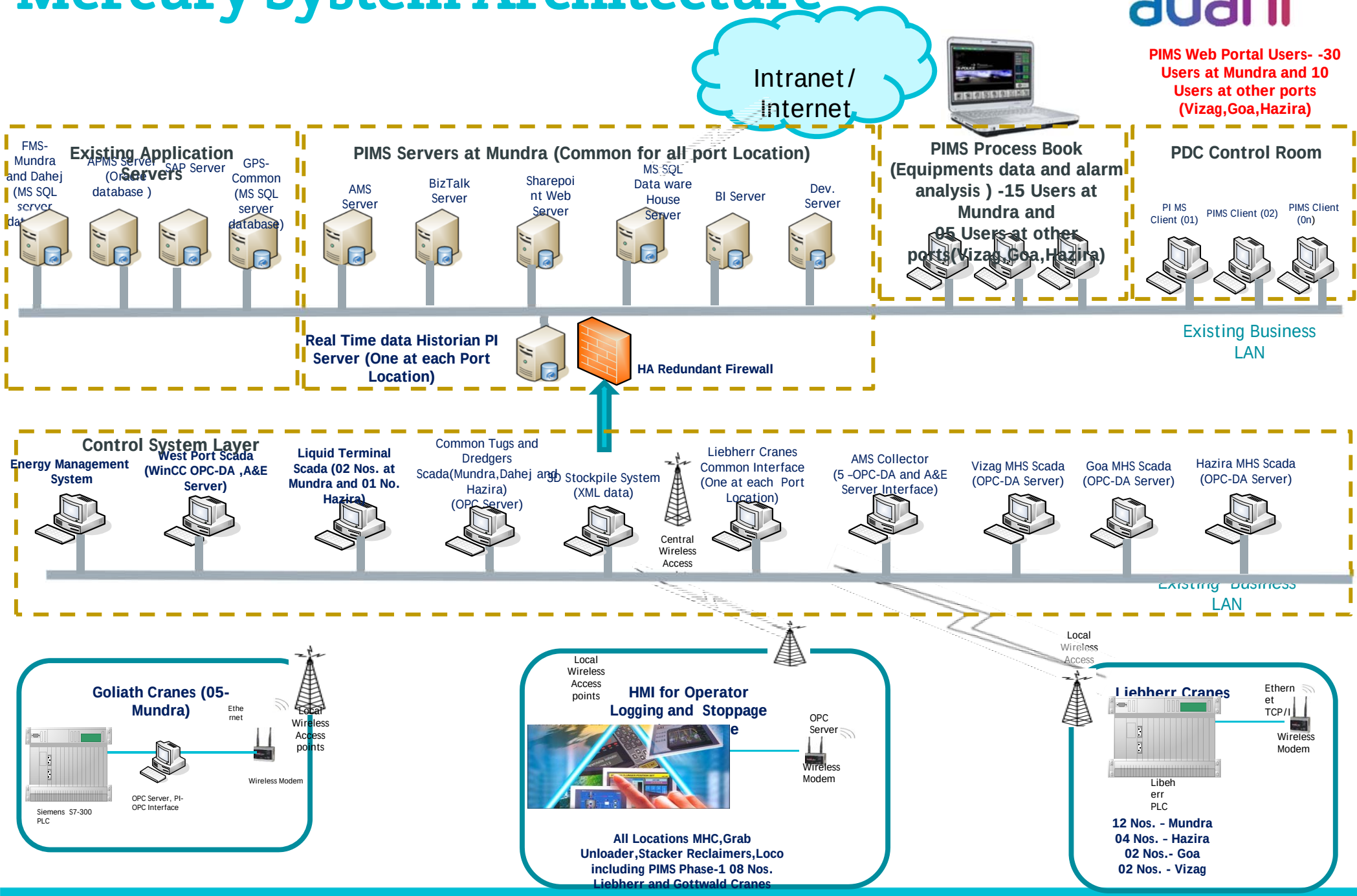
Provide client tools for better trending, handling complex calculations

Main components: Integration of equipment information; reports / dashboards; DVMS

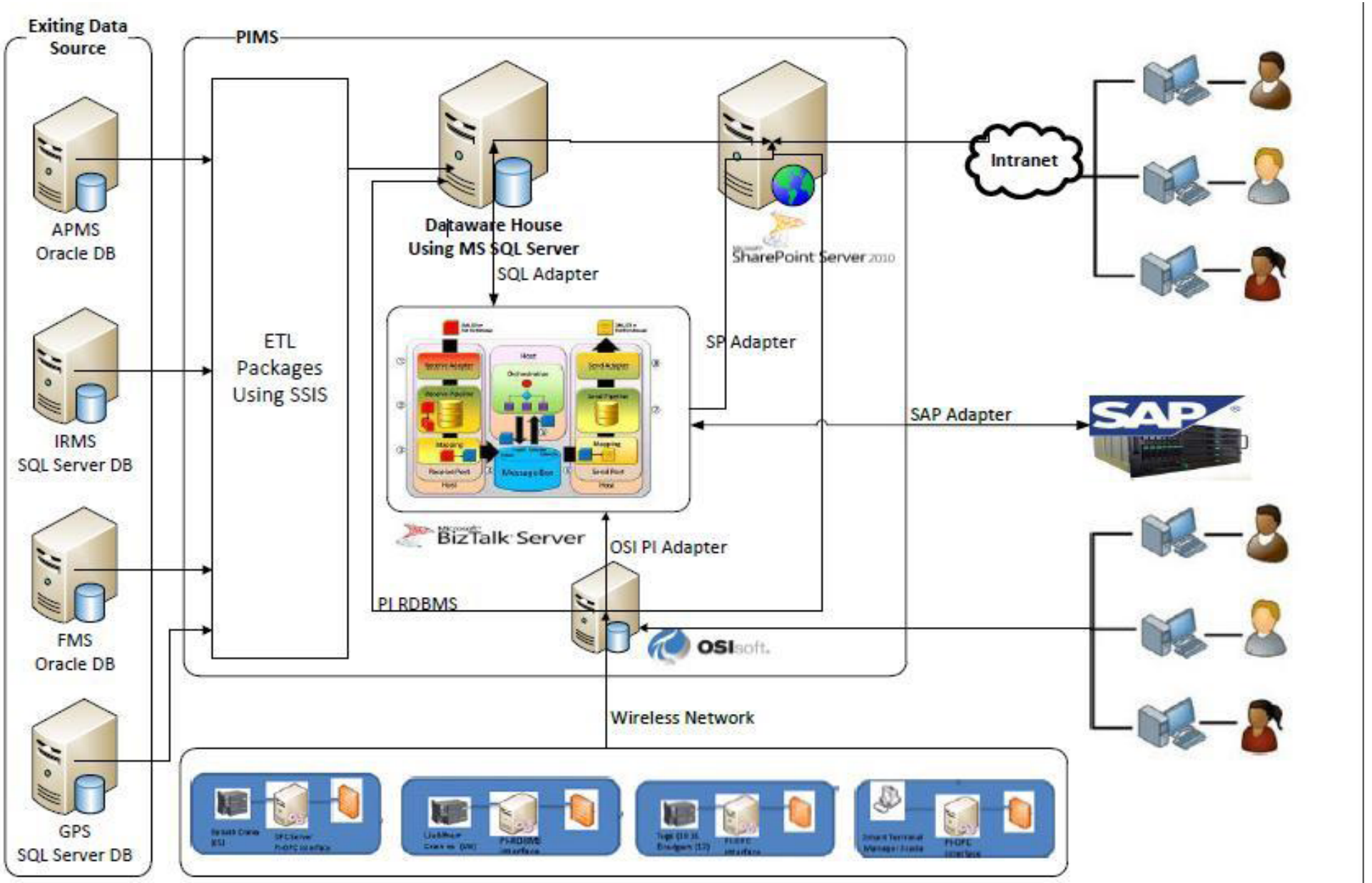
# PI Components used in Mercury

- PI Server 2010 with 10000 tags at Mundra,2000 tags at Dahej, 2000 tags at Hazira,2000 tags at Goa and 2000 tags at Vizag ports
- PI Asset Framework
- PI Clients- PI Combo (PI Processbook & PI Datalink)
- PI RDBMS Interface
- PI OPC Interface
- PI Notification
- PI Web Clients
- PI Modbus Serial Interface
- PI ACE
- PI PSA

# Mercury System Architecture

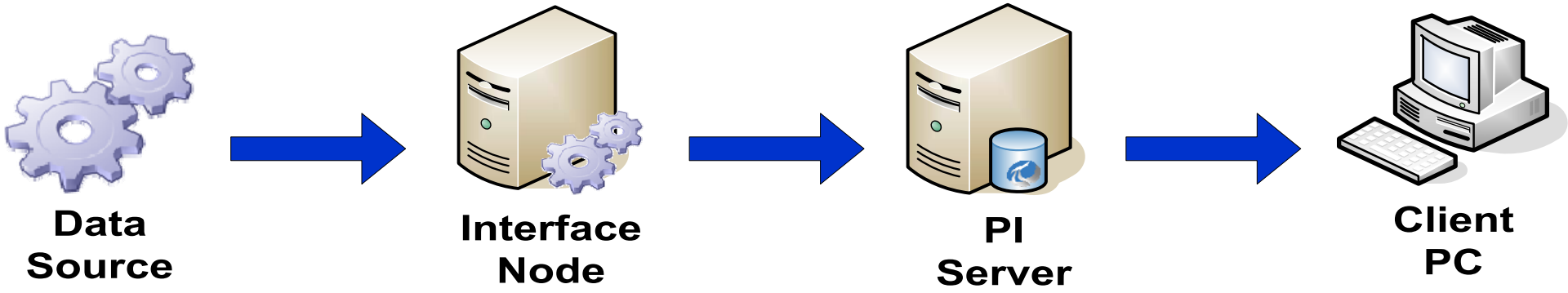


# High Level System Architecture



# Integration with other application

| Systems / Applications / Interfaces | |
|---|---|
| Coal Conveyor System | Liquid Terminal Automation |
| FCC | Stacker-/reclaimer |
| HMI | Wagon / Truck Loading System |
| Mobile Harbour and Yard Cranes | SAP Reports |
| Fuel Management System (FMS) | SSRS Report |
| GPS | Energy Management System (EMS) |
| Tug & Dredger Automation | Alarm Information Management System (AIMS) |
| APMS | Attendance System |



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| Mercury Overview | Static Reports – Interactive/Drill down |
| Reports & Capabilities | PI / Management Dashboards |
| Advantages / Benefits | BI Reports |
| | Delay Recording Application |
| | DVMS(Dynamic Vessel Monitoring System) |

# Statics Report : Overview

## What is it / capabilities

- Regular reports on operations data
- 50+ reports in Phase II covering all departments
- Choose from pre-defined parameters to generate reports
- Access from anywhere on Adani intranet

## Benefits

- Faster reports generation: savings of man-hours
- Analyse trends / Compare performance
- Visualize average vs Peak demands
- Appreciated relational variables such as PBD with berth occupancy
- Store reports on local drive for future reference

# Mercury Interactive Reports

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## Marine

**Berthing / Unberthing movement report**

- Pilotage Movement Efficiency
- Mooring Crew Efficiency

**Berth Occupancy Indicators**

- Berth Occupancy
- Slots available for R&M

## Terminal Operation

**Commodity wise Vessel Performance**

- Nos. of vessels
- Quantity
- Productivity
- Parcel Size
- PBD

**Simultaneous Vessel Operation Report**

- Frequency chart of simultaneous operations

## Stock & Evacuation

**Commodity wise Rake Performance**

- Nos. of rakes
- Quantity
- Placement to Release
- Operations hours

**Tank Overview**

- Tank Stock
- Tank Status

## MIS Reports

**LOA, Draft GRT report**

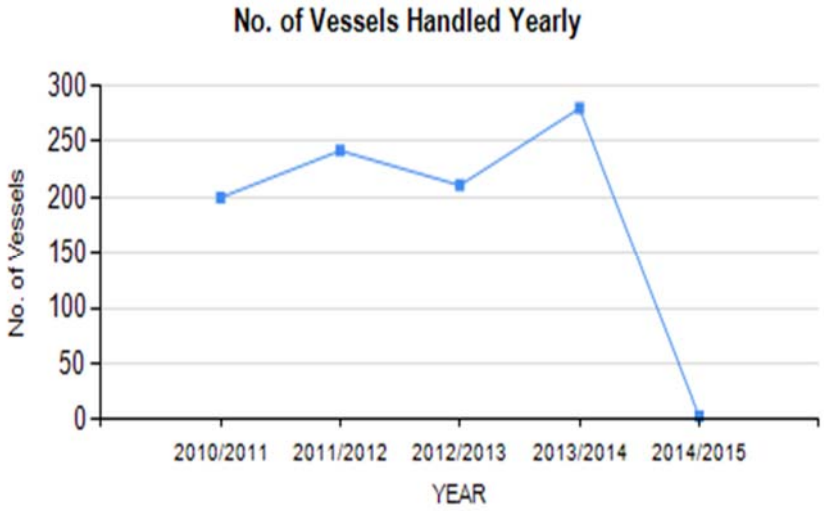
- Vessel-mix analysis

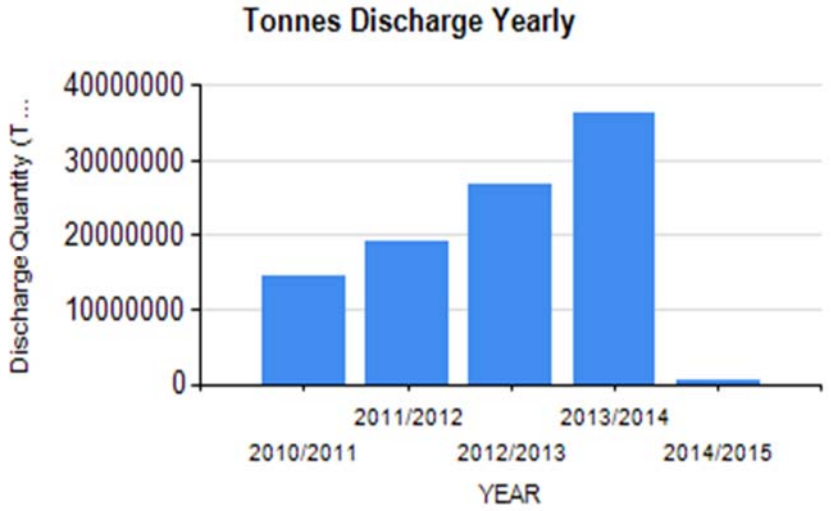
**YTD report**

- Cargo volume
  - SBU-wise
  - Base status (E/I)
  - Commodity-wise
  - Party-wise

**Total 85 static reports available in Mercury**

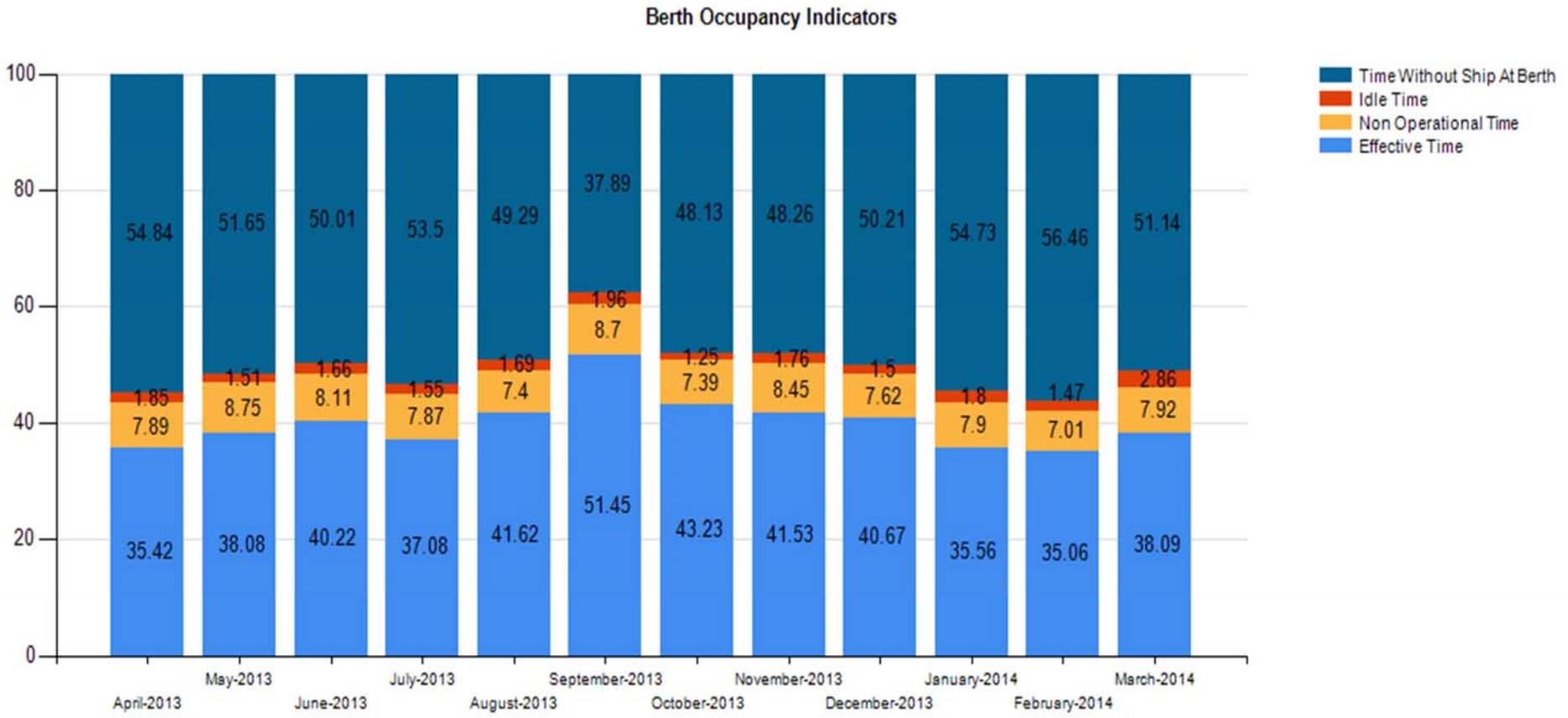
# Reports : Commodity wise Vessel Performance




# Reports : Tank Overview

# Reports : Berth Occupancy indicators



# PI Live Dashboard : Overview

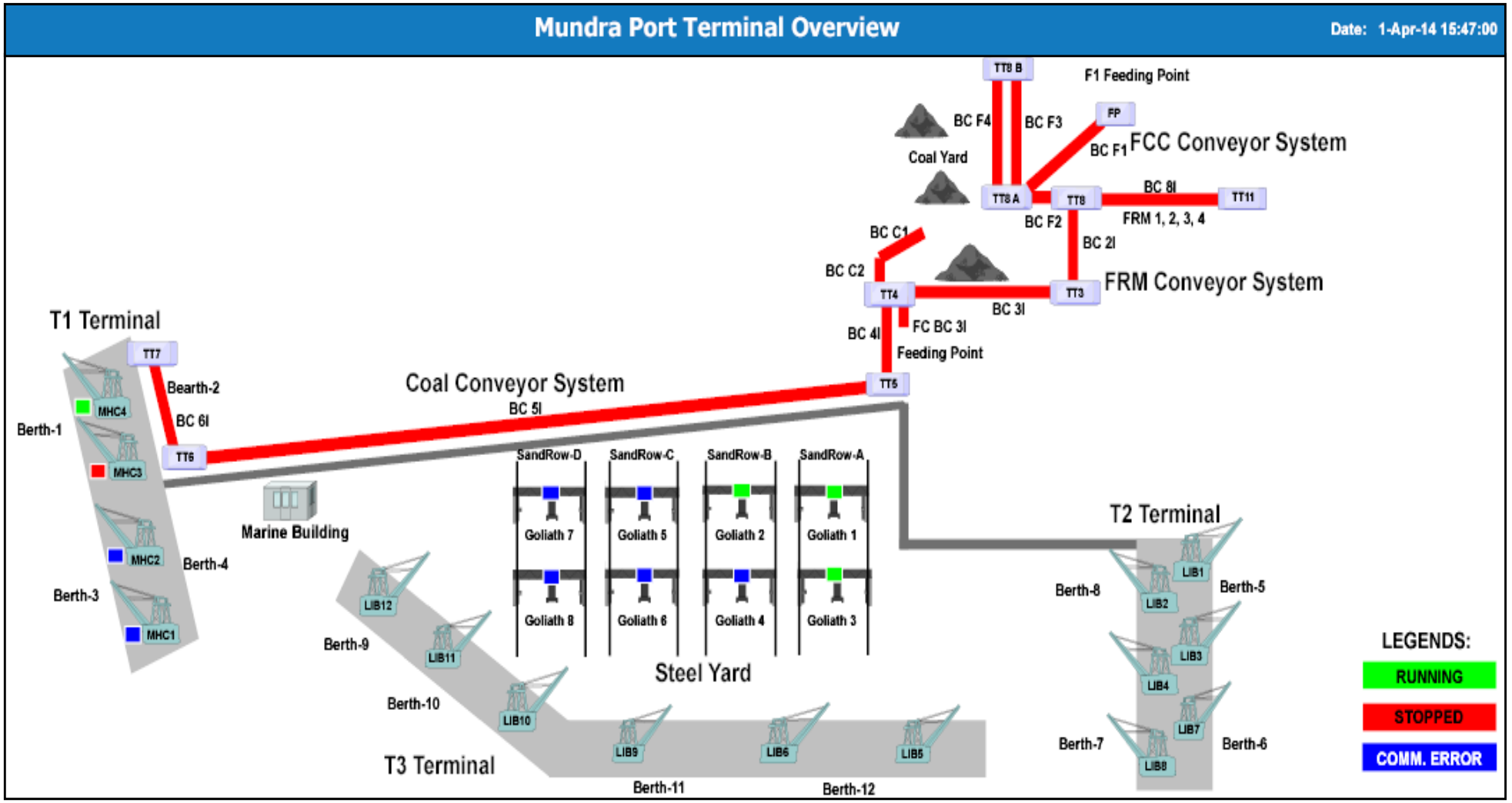
## What is it / capabilities

- Graphical representation of entire systems and facilities
- Live status reporting
- Easy to grasp colour coded visuals
- SMS / Email Notifications on alerts
- Accessible anywhere on Adani Network (Mundra, Dahej, Hazira, Ahmedabad, Mumbai, Delhi)

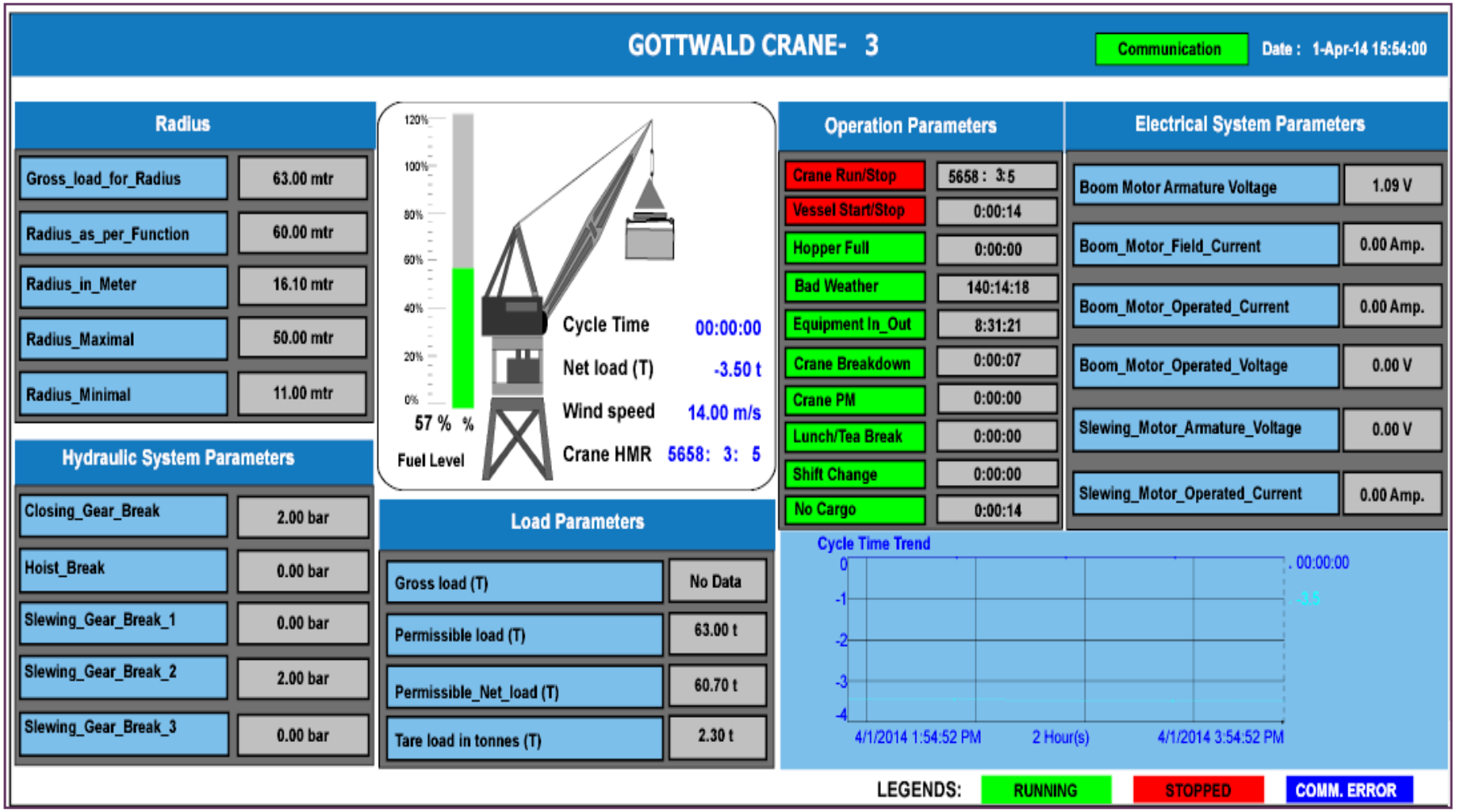
## Benefits

- **Live Status: Real Time Data**
- Glance at KPIs quickly
- No need to phone-call individuals and check
- People can focus on core ops activity rather than spending time on calling up / checking / coordinating and providing data

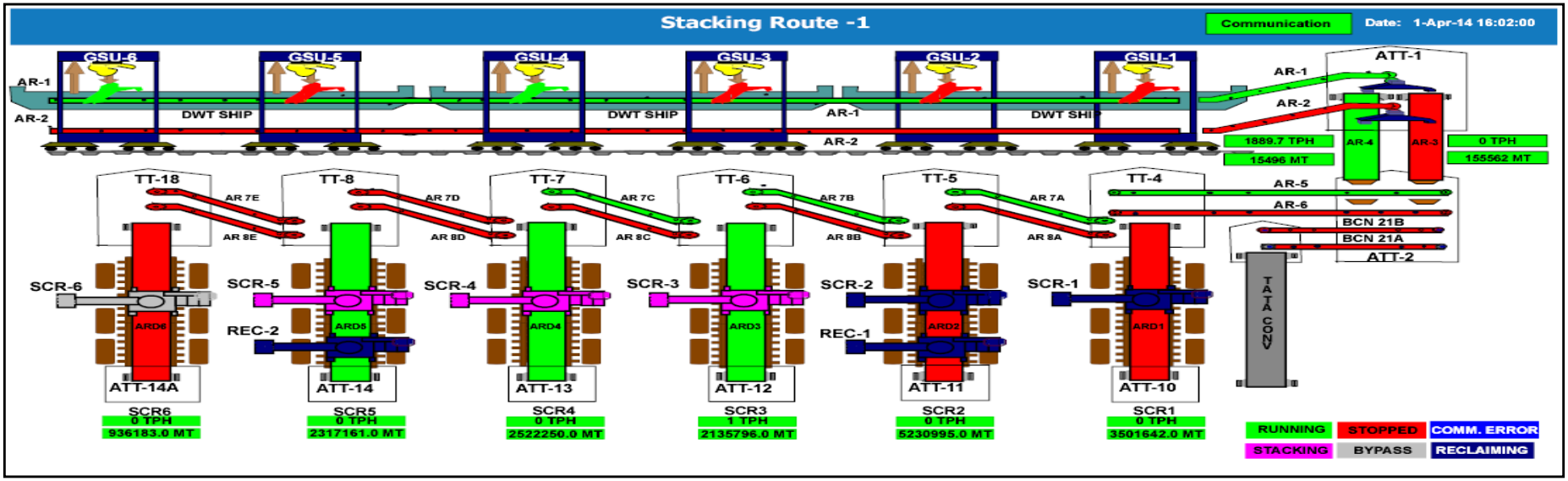
# PI Live Dashboard : Mundra Port

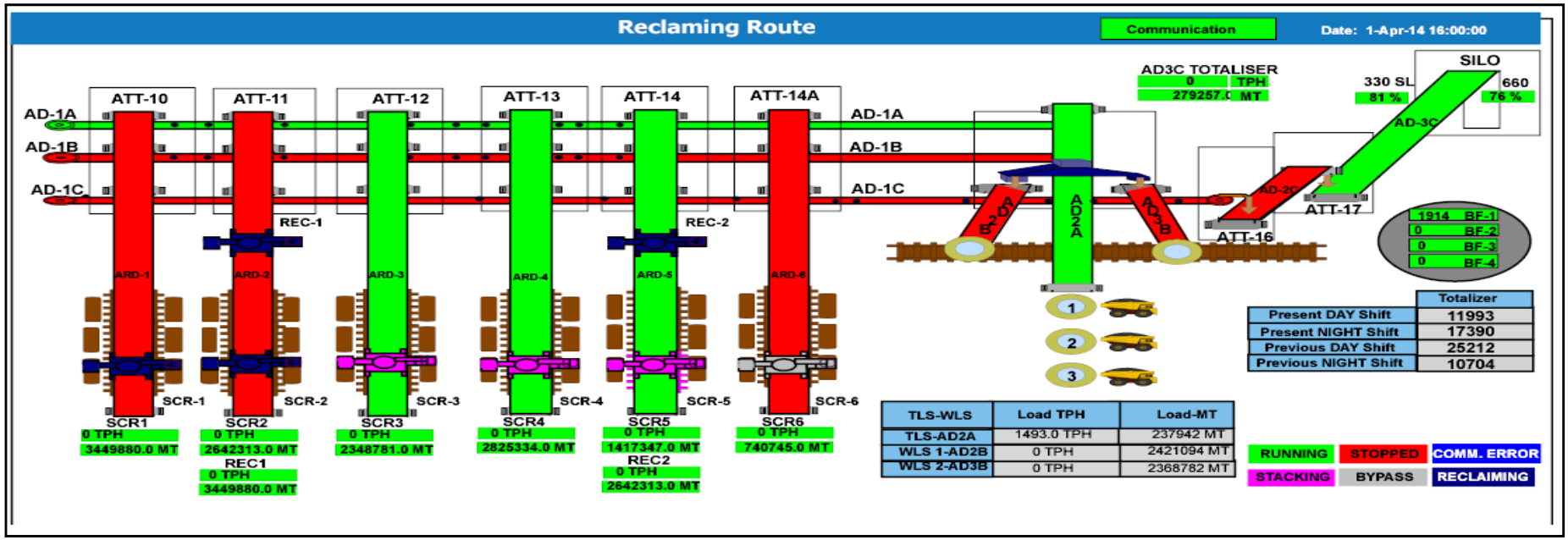


# PI Live Dashboard : Cranes

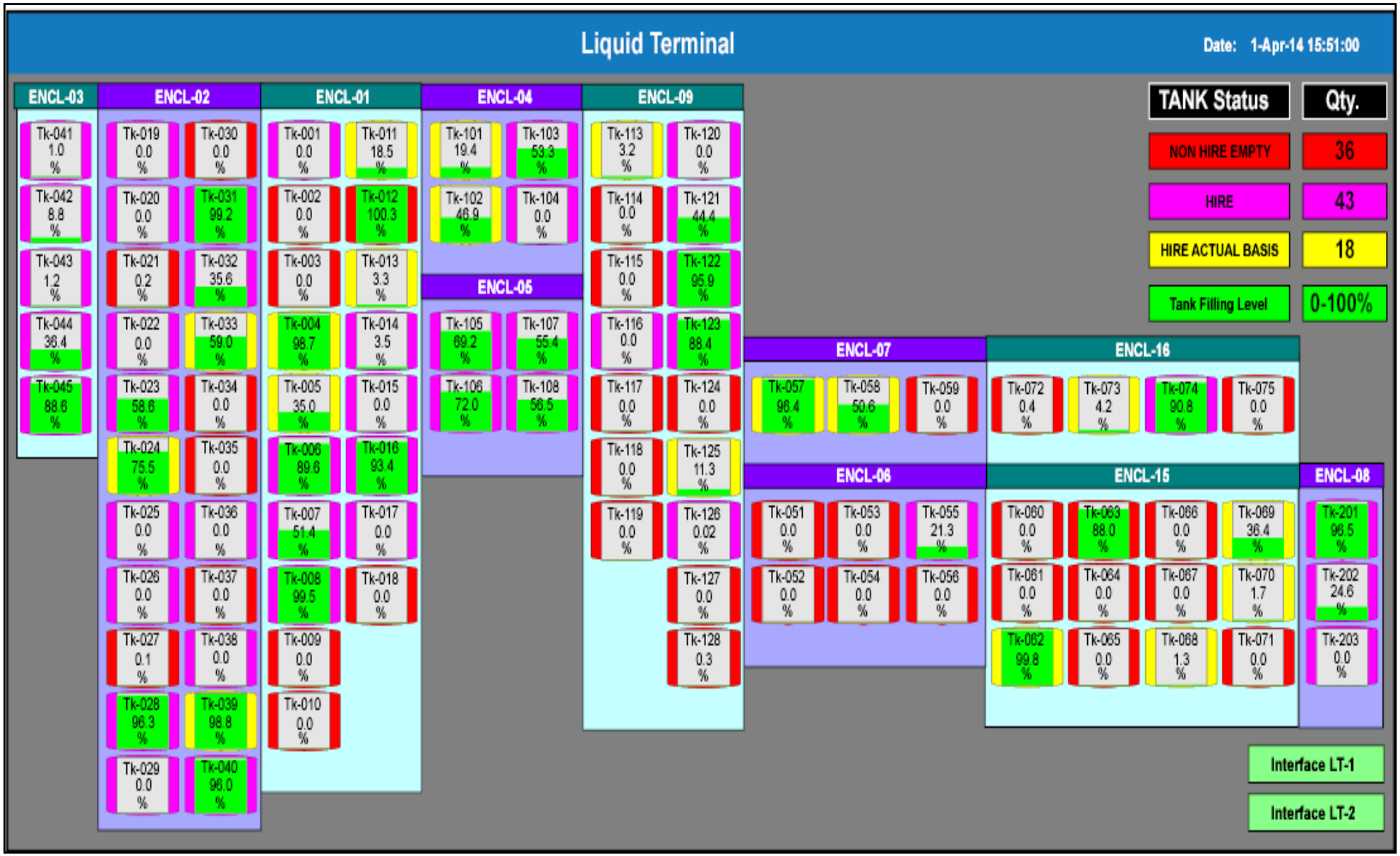


# PI Live Dashboard : Stacker and Reclaimer

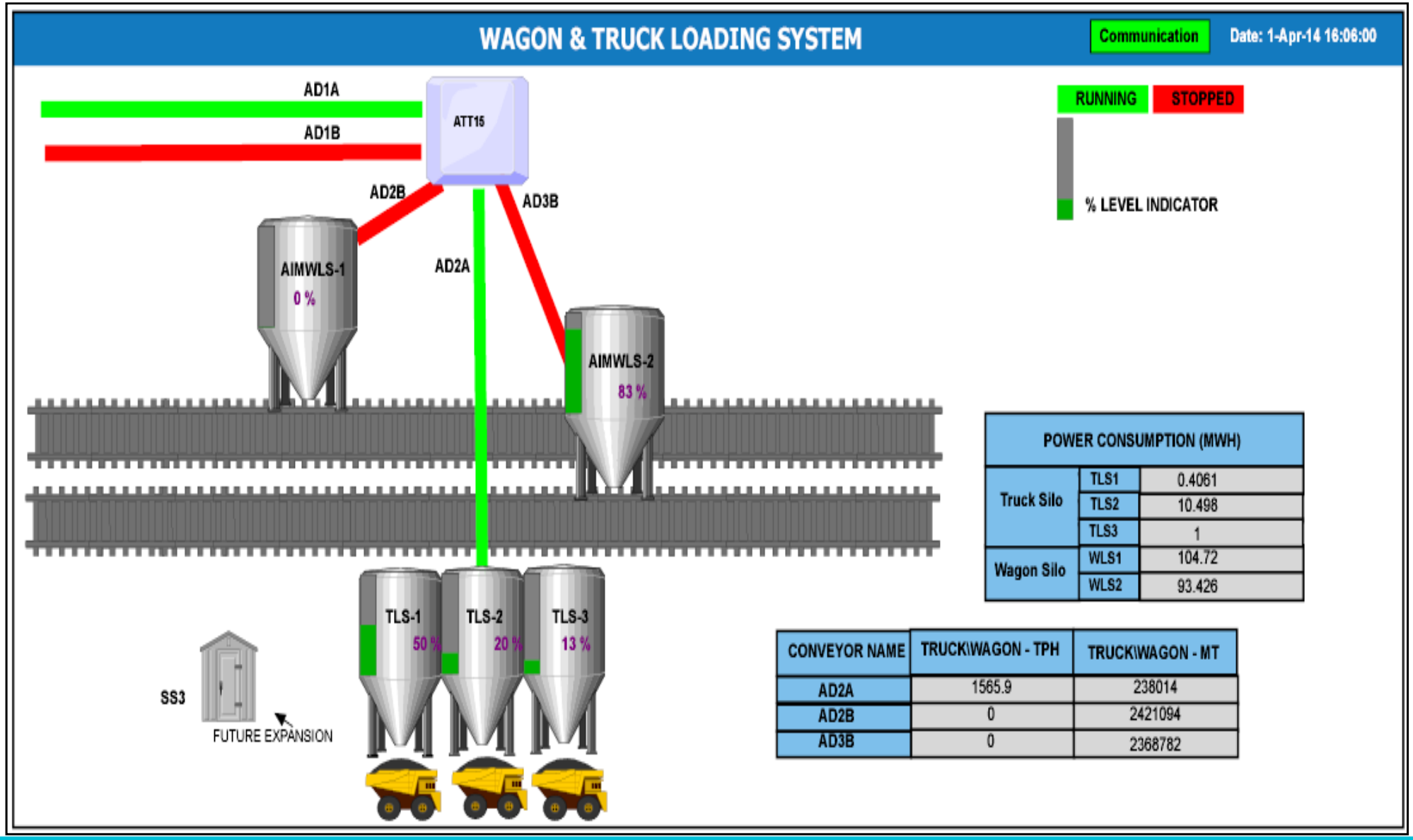


# PI Live Dashboard : Tank Status



# PI Live Dashboard : Wagon and Truck Loading System




| POWER CONSUMPTION (MWH) | | |
|---|---|---|
| Truck Silo | TLS1 | 0.4061 |
| | TLS2 | 10.498 |
| | TLS3 | 1 |
| Wagon Silo | WLS1 | 104.72 |
| | WLS2 | 93.426 |

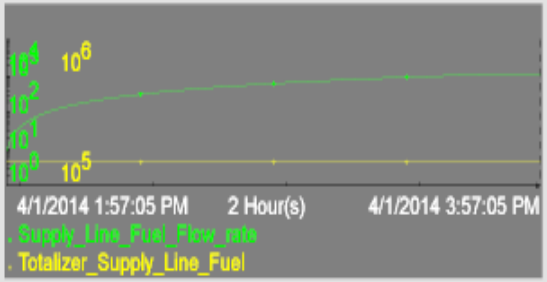
| CONVEYOR NAME | TRUCK\WAGON - TPH | TRUCK\WAGON - MT |
|---|---|---|
| AD2A | 1565.9 | 238014 |
| AD2B | 0 | 2421094 |
| AD3B | 0 | 2368782 |

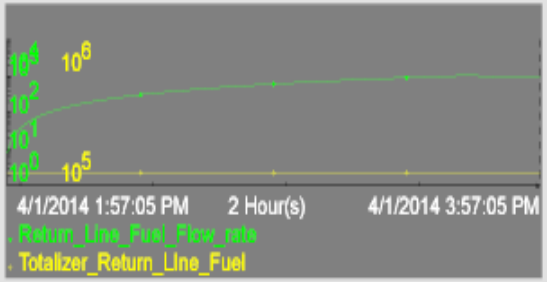
# PI Live Dashboard : Tug and Dredger

## Dolphin-03

Date: 1-Apr-14 15:57:00

| Fuel Parameter | |
|---|---|
| Supply Line Fuel Flow Rate (L/H) | 1030.73 |
| Totalizer Supply line Fuel (Ltr) | 145624.50 |
| Return Line Fuel Flow Rate (L/H) | 948.61 |
| Totalizer Return Line Fuel (Ltr) | 122424.13 |
| Fuel Oil Last Trip Consumption (Ltr) | 631.25 |
| Fuel Oil Running Consumption (Ltr) | 20.17 |



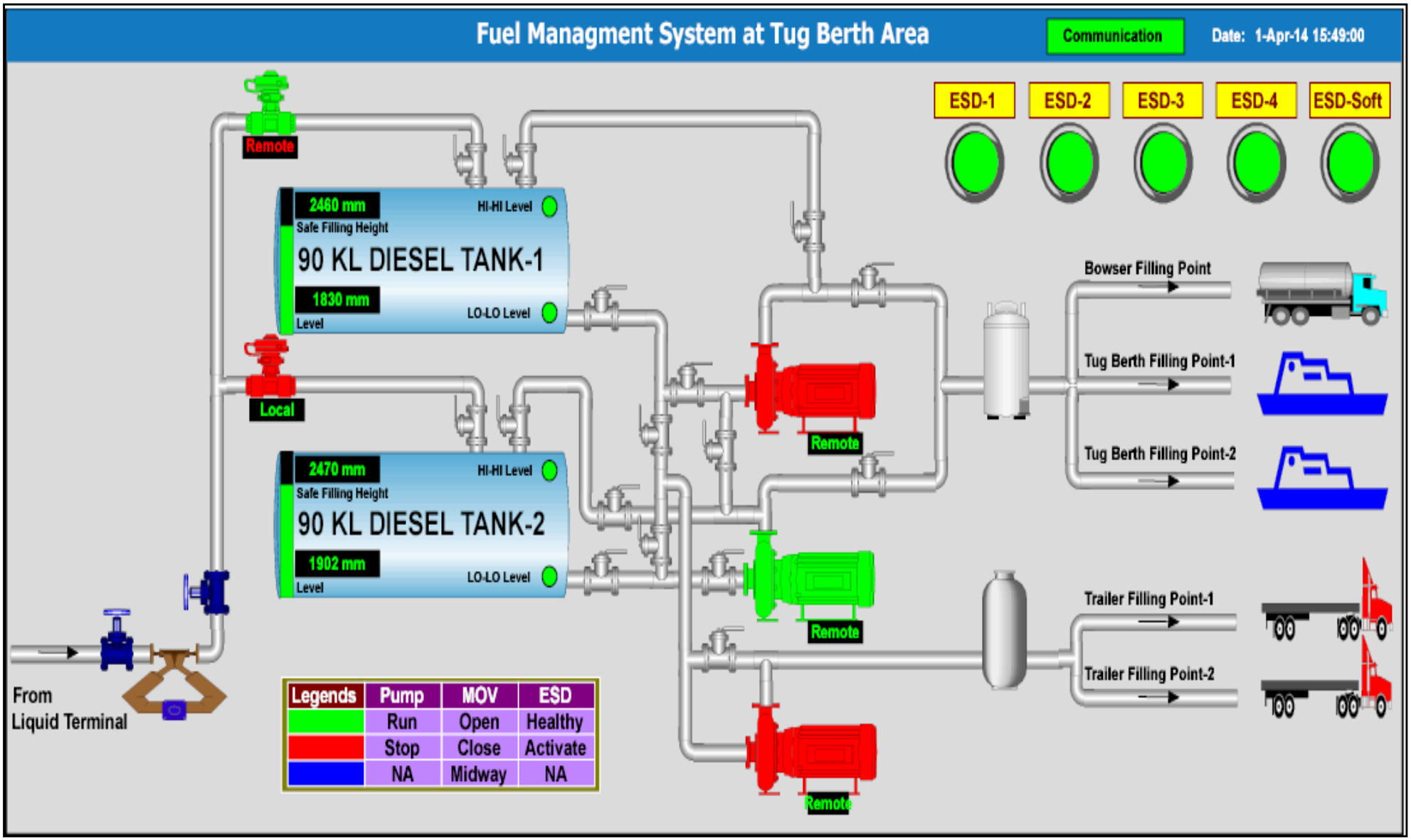




Voyage :- Running

| Engine Parameter | PORT Side | STBD Side |
|---|---|---|
| Running Status | Running | Running |
| Lube Oil Pressure (Bar) | 4.65 | 3.91 |
| Fuel Oil Pressure (Bar) | 1.19 | 1.18 |
| HT Water Temp. (°C) | 57.98 | 60.04 |
| Exhaust Gas Temp. (°C) | 237.78 | 261.72 |
| Engine HMR | 17260.48 | 17451.20 |
| Charge Air Pressure (Bar) | 0.02 | 0.04 |
| Engine Load | 1.47 | 3.80 |
| Engine RPM | 374.00 | 387.00 |
| | | |

| Generator Parameter | Generator-1 | Generator-2 | Harbour Generator |
|---|---|---|---|
| Running Status | Running | Stopped | Stopped |
| Generator Active Power (KW) | 29.00 | 0.00 | 0.00 |
| Apparent Power (KVA) | 39.00 | 0.00 | 0.00 |
| Reactive Power (KVAR) | 25.00 | 0.00 | 0.00 |
| Power Factor (PF) | 0.73 | 1.00 | 0.00 |
| Frequency (Hz) | 49.71 | 0.00 | 0.00 |
| Avg. Phase Current (Amp) | 50.00 | 0.00 | 0.00 |
| Avg. Line Voltage (V) | 448.00 | 0.00 | 0.00 |
| Energy in KWH | 1540.47 | 1953.47 | 120.22 |
| Generator HMR | 12319.08 | 11728.85 | 31842.97 |

# PI Live Dashboard: Fuel Management Sysadani



# Management Dashboard : Overview

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## What is it / capabilities

- Datasets providing bird's eye view of operations performance
- Reporting of select KPIs for each department
- Display data on performance over 4-5 years period
- Comparative assessment of M-o-M, M-o-tM, Y-o-Y changes

## Benefits

- Reports at click of mouse
- Grasp KPIs trends quickly
- Commodity, Department and Port Level performance summary.
- Basis trends management can strategize and prioritize KPIs improvement programs

# BI Reports : Overview

## What is it / capabilities

- Powerful tool for business intelligence on operational performance
- Parameters mapped as Dimensions and Facts
- User can display the data in any manner and generate reports
- Excel based framework

## Benefits

- **Flexibility: Generate your own reports**
- Design the report the way you want
- Extremely simple and familiar interface: Excel
- View the same data from different perspectives

# Delay Recording Application : Overview

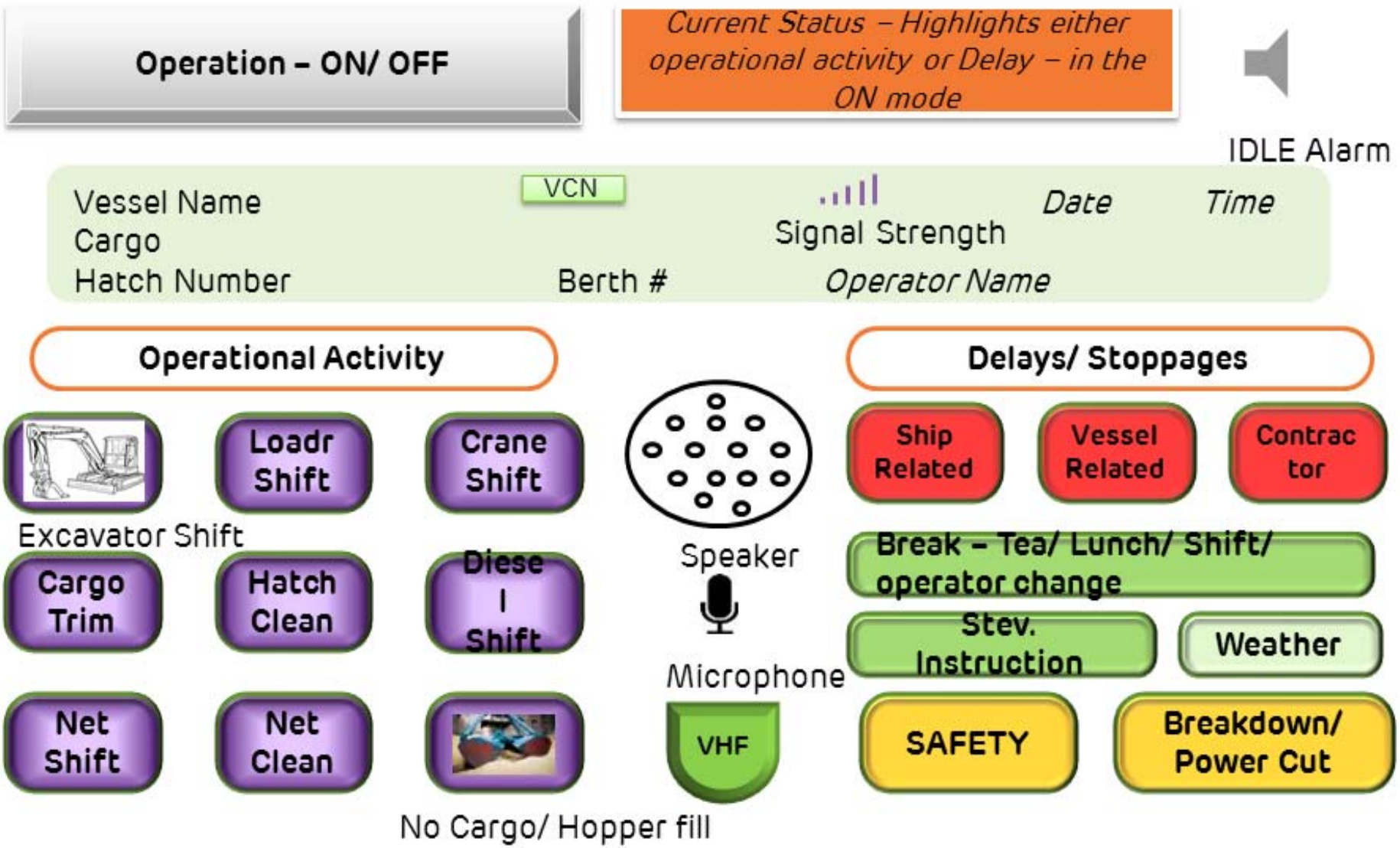
## What is it / Capabilities

- HMI is a screen provided on each crane for capturing working information
- Real time information about cranes deployment
- Provides details on where, when and which vessel the crane is working / worked
- Records delays / stoppages in operations and reason thereof in real time
- Provide crane-wise / operator-wise efficiency

## Benefits

- Elimination of recording by supervisors
- Elimination of manual entry by surveyors
- People can focus on core operations instead of recording / keying in data
- Analyse reasons for delays / stoppages and improve thereupon

# Delay Recording : Screen



# Need Of DVMS

**Port operations are complex and challenging due to**

- Multiple terminals and vessels
- Various nodes of productivity levers
- Geographical spread
- Resource constraints

**Necessitates need of a system for end-to-end monitoring of operations and better utilization of resources**

A system which would help in

- Real time monitoring of multi-vessel operations at the port
- Enhanced visualization of entire supply chain to bring delays / bottlenecks in notice
- Effective usage of resources as per productivity needs to minimize operating costs
- Track and record data for future reference, analysis and comparison

**Dynamic Vessel Monitoring System (DVMS) conceived as a solution**

# DVMS : Overview

## What is it / capabilities

- DVMS is a system for monitoring operations in supply-chain manner
- Provide visualization of all resources and productivity for chosen operations route
- Integrated with multiple equipment / facilities and data points (PI system, APMS, GPS and FMS)
- Identify delay / stoppages / bottlenecks in the supply chain on real time basis
- Trigger alerts in form of SMS / Emails

## Benefits

- Visualize end-to-end operations in real time
- Initiate corrective action in real time
- Balance the entire chain based on throughput
- Reduced resources as per throughput leading to minimized operating costs
- Accessible on any computer at Mundra Port

# DVMS :Architecture

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**Basic Architectural Design of DVMS Operates at 2 Levels**

**Control System Layer**

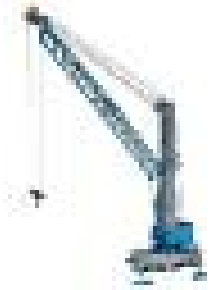
PLC Data + HMI Data → PI Historian → OPC Server

**Operational System Layer**

APMS → Biz Talk Server → PIMS + GPS

# DVMS : Interfaces

**Crane**
Data Source: HMI, Attendance system
- Shows active number of cranes in the system
- Productivity, cycle time, operator



**Dumper**
Data Source: Weighbridge (APMS)
- Number of dumpers and trips
- Last hour productivity

**Resources**
Data Source: Route Master (APMS)
- Shows total number of equipment deploy

# DVMS : Interfaces

**Hatch**

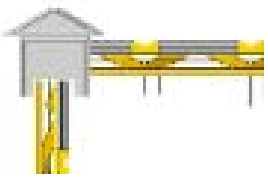
Data Source: APMS

- Hatch number along with cargo stored
- Working hatches and cargo status

**Conveyor**

Data Source: Route Master (APMS)

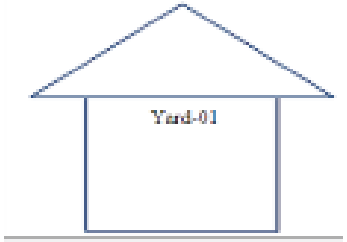
- Visible when supply chain has a conveyor routing
- Hourly productivity



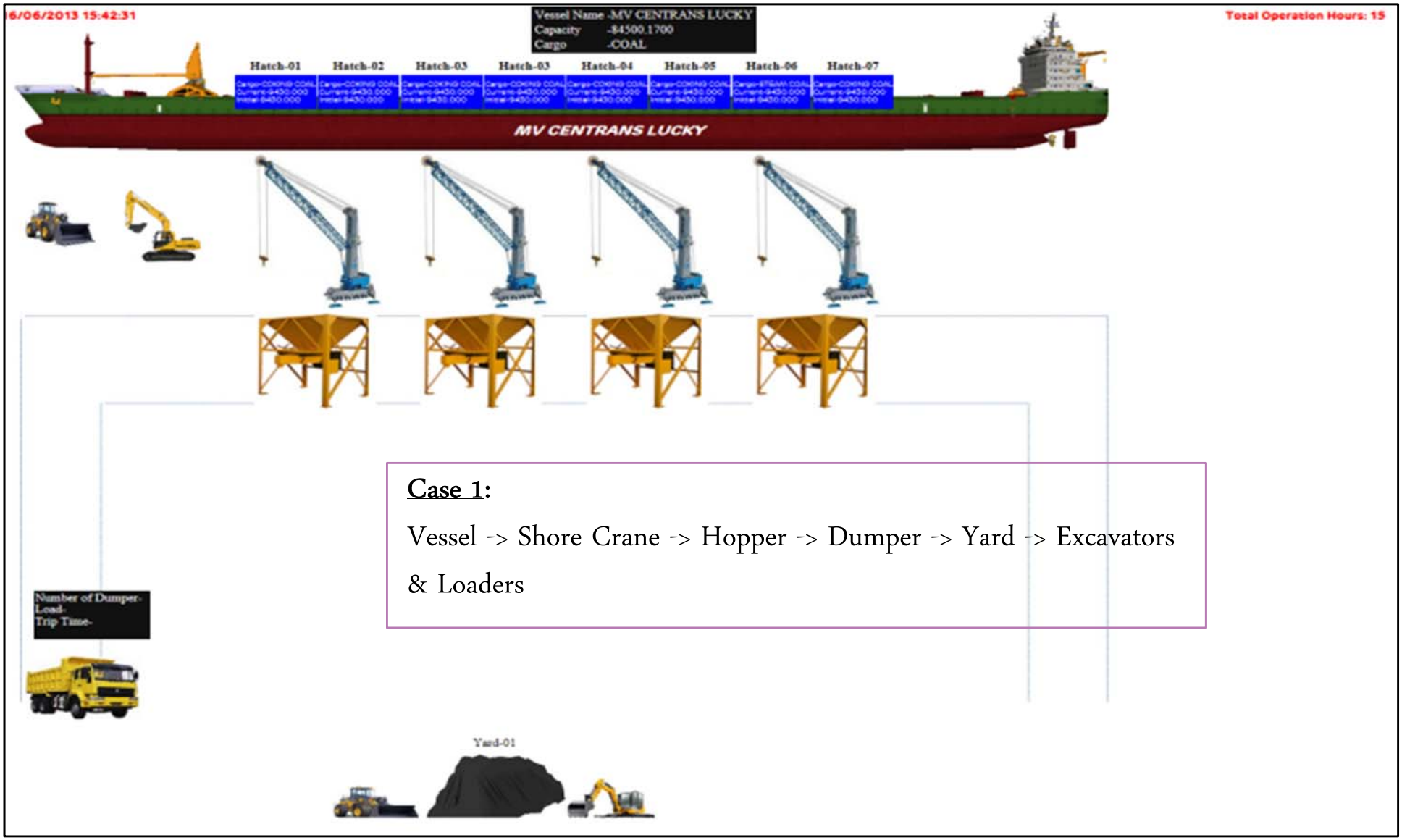
**Yard**

Data Source: APMS

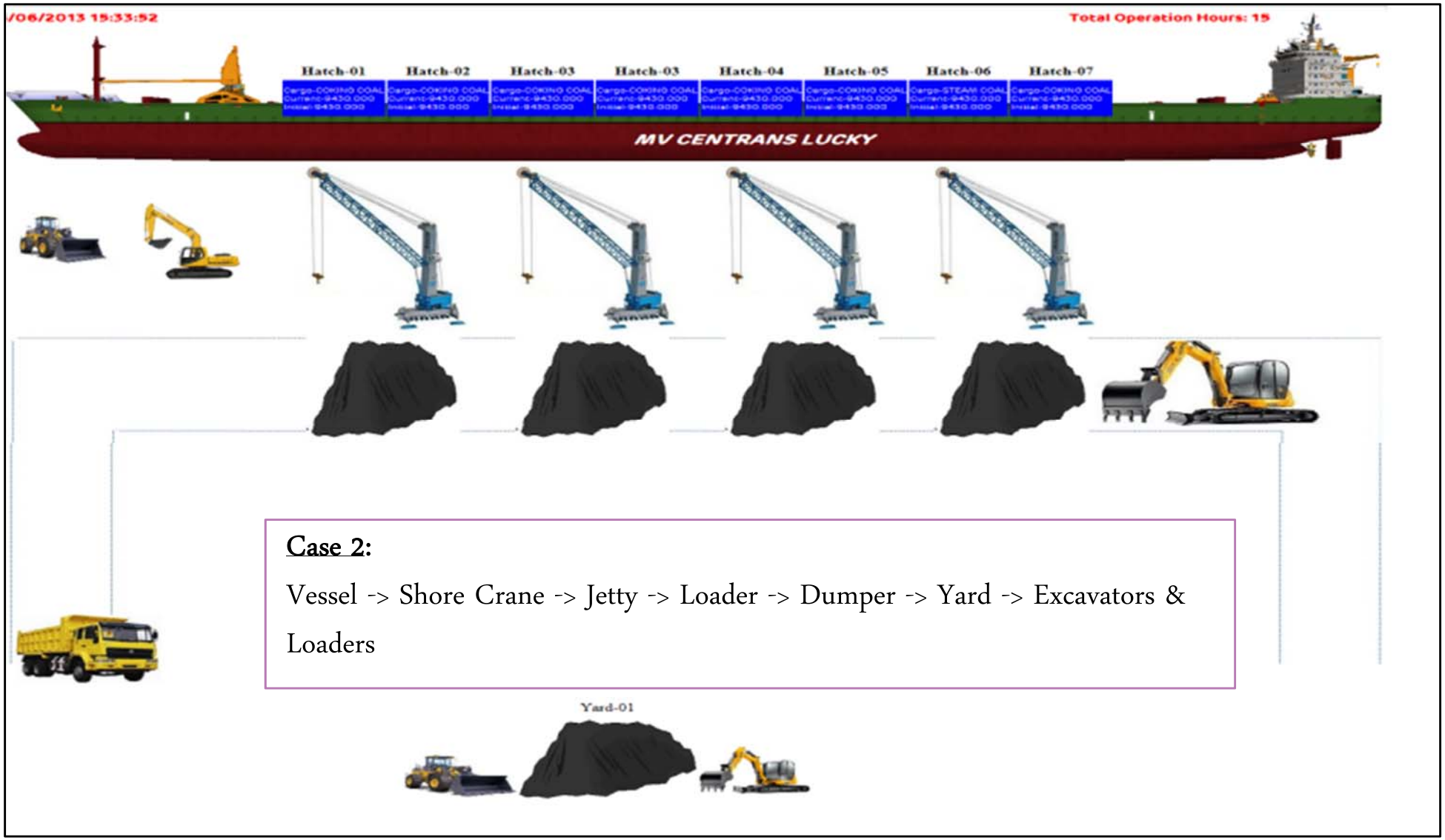
- Allocated yard reflect in the system
- Number of available back up points shown



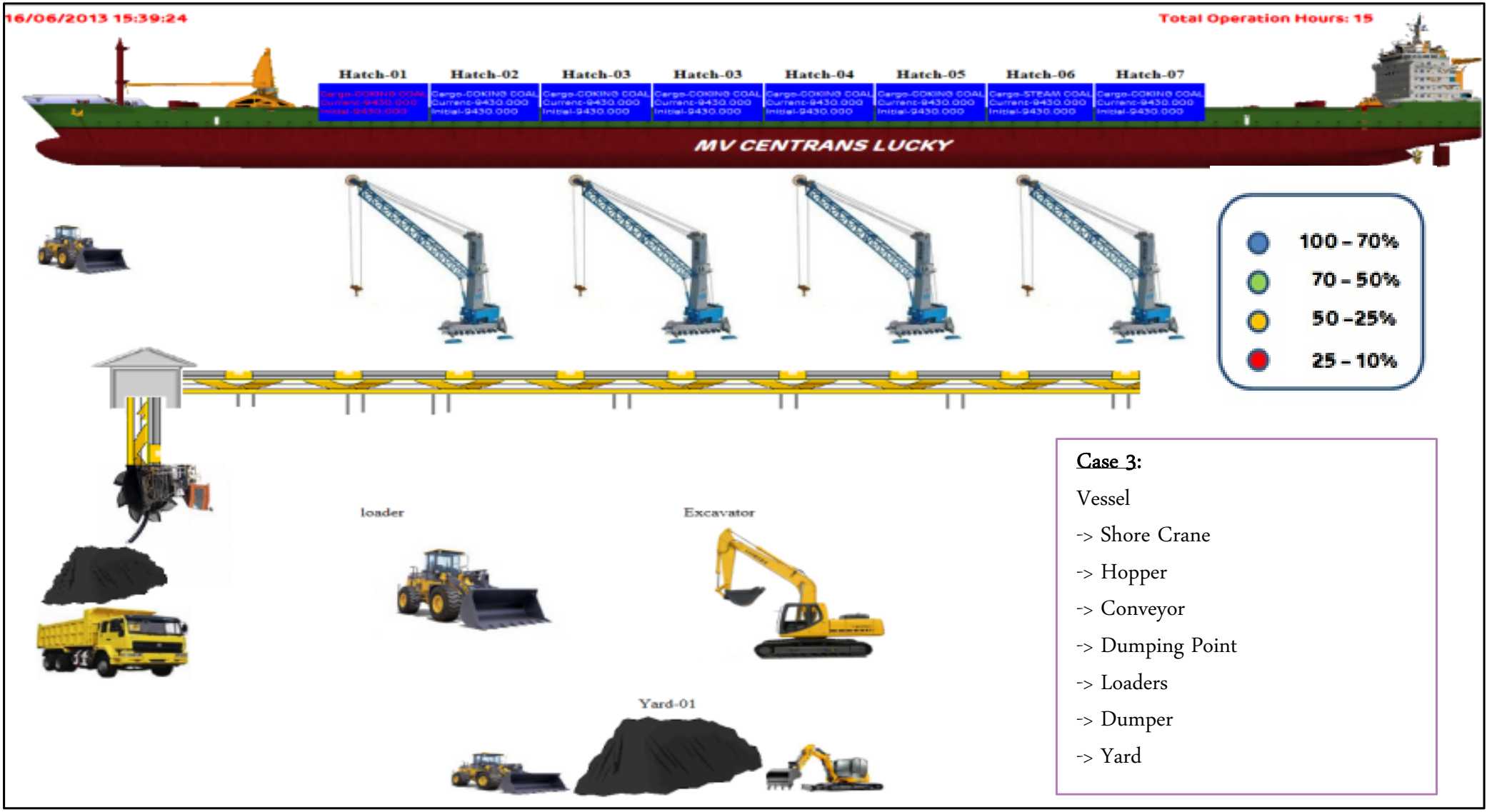
# DVMS : Screen 1



# DVMS : Screen 2



# DVMS : Screen 3




**Case 3:**

Vessel

-> Shore Crane

-> Hopper

-> Conveyor

-> Dumping Point

-> Loaders

-> Dumper

-> Yard

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| **Advantages / Benefits** | Pre vs Post Scenario |
| | Solutions to questions |

# Advantages/Benefits Pre Vs Post Scenario

| Parameters | Earlier | Now |
|---|---|---|
| Data collection | Manual | Automated |
| Live data / real-time | Not available | Readily available |
| Data integrity | Lack of / questionable data integrity | Authentic and reliable data |
| Reporting | Manually generated | System generated |
| Reports | Simple reports | Interactive reports |
| Knowledge base | Plain datasets | Analytical information |
| Benchmarking | No benchmarks | Benchmarking with historical performances |
| Comparison across ports | Not possible | Easily possible |
| Analytical work | Laborious and cumbersome | Smooth and easy |
| Manual Man-hours | Very High | Effectively nil |
| Status update | Through emails / phone calls | Auto triggered alerts / SMSs |

# Context

What is actual operations performance?

DVMS

How do I bring all the data from different sources into single platform for analytics?

Interface with other systems

Can I view and monitor live status of operations?

PI Dashboards

Can I select parameters and make my own reports?

BI Reports

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Can I continue sparing teams just for manual recording, collection, and reporting of data?

Automated reports

**answers these questions and many more…**

How does this port fare with other ports of the Group?

Slicer to compare across ports

Is the manual data authentic and reliable?

Automated data collection

Has port's performance improved year on year?

Management Dashboards

How can the data and standard reports be generated without spending so much time?

Static Reports

# THANK YOU

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