Port Performance and Profitability using PI, Esri Integration and Analytics

Presented by Pradeep Gupta/ Yograjsinh Barad
## Agenda

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Adani - Leading Business Conglomerate with interest in diversified sectors

Resources
- Coal Mining
- Oil & Gas Exploration
- Coal Trading

Logistics
- Multi Modal Logistics
- Ports
- Special Economic Zones

Energy
- Gas Distribution
- Power
- Bunkering
- Edible Oil

Revenue: $12 B
Assets: $19 B
Employees: 10,400
Many Questions on Port’s Operational Performance

What is actual operations performance?

Can I view and monitor live status of operations?

Can I include geo spatial intelligence?

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

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

Has port’s performance improved year on year?

How does this port fair as compared to other ports of the Group?

How can I optimize operations and improve Port productivity?

Answers / Solutions to these questions not easily and timely available
Instituting an integrated system is no longer an improvement program, it is an Operational Need

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
- Integrate Geo spatial information, helps in vessel planning and capture asset delays

Solution: Port Information Management System integrated with ArcGIS and DVMS
Adani initiatives for enabling Businesses

Digital Adani

Smart Ports

Smart Cities

Cloud

Predictive ANALYTICS

Big DATA

Optimize

Integration

Real Estate

Power

Port

Gas

Logistics

Energy

Smart Grid

Agri

Mining

Busesnesses

Assets

Group Vision

Sensors, Actuators, PLC
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Adani Ports And SEZ Ltd.

- Mundra
- Dahej
- Hazira
- Vizag
- Goa
Mercury (PIMS) : Salient Features

- 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
- Provides client tools for better trending, handling complex calculations
- Main components: Integration of equipment information; reports / dashboards; DVMS
Mercury (PIMS): Integration with other applications

| Systems / Applications / Interfaces          |  |
|---------------------------------------------|  |
| Coal Conveyor System                        | Liquid Terminal Automation |
| FCC                                         | Stacker-/reclaimer         |
| HMI (Delay Capture Application)             | 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          |

Data Source -> Interface Node -> PI Server -> Client PC
Static Reports: Overview

What is it / capabilities

- Regular reports on operations data
- 350+ reports 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
## OSI PI Dashboards: Overview

### What is it / capabilities

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<tr>
<td>• Graphical representation of entire systems and facilities</td>
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<tr>
<td>• Live status reporting</td>
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<tr>
<td>• Easy to grasp colour coded visuals</td>
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<tr>
<td>• SMS / Email Notifications on alerts</td>
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<tr>
<td>• Accessible anywhere on Adani Network (Mundra, Dahej, Hazira, Vizag Goa, Ahmedabad, Mumbai, Delhi)</td>
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### Benefits

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<tr>
<td>• <strong>Live Status: Real Time Data</strong></td>
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<tr>
<td>• Glance at KPIs quickly</td>
</tr>
<tr>
<td>• No need to phone-call individuals and check</td>
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<tr>
<td>• People can focus on core ops activity rather than spending time on calling up / checking / coordinating and providing data fetching operations / Equipments data on mobile</td>
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Real time dashboards

- Intuitive web-client visualization tool that delivers fast, easy, and secure access to all your PI System data
- Acknowledge and Comment on Event Frames
- Export data to Excel.
- Situational awareness
- Event Comparison
- Ad hoc: Perform ad hoc analysis, discover answers, and share your insights with others
- Mobile browsers: Support for mobile browsers and customized views for small screen devices
- Display sharing: PI Coresight gives users a quick and easy way to share displays and encourages colleagues to collaborate across the enterprise.
- PI Coresight is easy to deploy, upgrade, and maintain.
Alerts, Notifications and Analytics

Help to send notifications to users or systems when key events occur. Help to store important process or business time periods that represent something happening and impacting your process or operations. Allows to be alerted when specified conditions are met.

- Help to create escalation metrics
- Archive Events on the disc.
- Alarm and Event Reporting
- Computed Alarms
- Information Analysis
- Report Printing
- Email
- SMS Notification
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Implementation approach helped in discovering hidden improvement opportunities

**Project Approach**

**Pros:**
- Well defined, Limited Scope
- Single Deployment
- More Manageable Initial Cost

**Cons:**
- Site Based, One Off Solution
- Not Easy to Leverage / Deploy ‘Best Practices’ across multiple sites
- New Projects require New Solutions
- Cost / Complexity increase over time

**eCubix Program Approach**

**Pros:**
- Supports Transformation through continuous Improvement Program
- Shorter Time to Value
- Leverage ‘Best Practices’
- Engages People
- Minimize Operational Complexity

**Cons:**
- Higher Initial Funding (Offset by Lower ongoing TCO and stronger Value Realization)
Operations at Dahej port before Implementation

- Forecasting of Vessel & Material
- VTMS - Vessel at Anchorage
- Berth planning
- Discharge sequence & Sub sequence planning
- Allocate Assets
- Capture delay and stoppage reasons
- Actual Discharge Monitoring
- Tugs boats - Anchorage to Berth
- Share planning with stakeholders
- Reporting on asset performance
- Monitoring movable assets & Safety
- Re arrange the plan as per available assets
- Monitoring deviations in plan

Capture and share breakdown of assets
Operations after Project Implementation

- Forecasting of Vessel & Material
- DVM
  - Berth planning
  - Discharge Sequence & Sub sequence Planning
  - Allocate Assets
  - Monitor Plan Vs Actual
  - Replan
- Safety Assets
- Weather
- Advance Queuing Vehicle Route Planning
  - Supply Chain Optimization
- VTMS
- West Basin
- FMS
- HMI
  - Capture delay and stoppage reasons
- Share planning with stakeholders
- Tugs boats – Anchorage to Berth
  - Planned

WB WLS / TLS

DVM

Safety Assets

VTMS

Weather

HMI

Advance Queuing Vehicle Route Planning
  - Supply Chain Optimization
DVMS

- Business users were engaged to identify key pain areas and DVMS was conceptualized for differentiating PLANNING and EXECUTION activities
- Improved planning helps in optimal asset allocation
- Higher Port Productivity
Allows to Monitor current progress and deviations

Number of Dumper: 3
Load: 234 MT
Trip Time: 00:12:46
PI System provides effective monitoring against planned schedules and shortens Response time in case of stoppages/ breakdowns.
Future Initiatives

- **Tugs Monitoring**
  Specific RPM of tugs to real time fuel use of tug boats with engine parameter monitoring for Marine teams to deploy or remove tugs and number of engines to be operated.

<table>
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<tr>
<th>Types of Tugs</th>
<th>55 Ton Tug</th>
<th>70 Ton Tug</th>
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<tbody>
<tr>
<td>Distance of SPM from Tug Berth</td>
<td>Knots</td>
<td>2</td>
</tr>
<tr>
<td>Average Consumption of tug at 420 RPM</td>
<td>Litre/hr</td>
<td>125</td>
</tr>
<tr>
<td>Average Consumption of tug at 600 RPM</td>
<td>Litre/hr</td>
<td>363</td>
</tr>
<tr>
<td>Savings in Fuel Consumption/Move</td>
<td>Litre</td>
<td>60.88</td>
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**Summary**

**COMPANY and GOAL**
Adani is $12 B conglomerate with diversified business interests and widely spread assets, manage business complexity effectively for improved performance.

**CHALLENGE**
Unique business needs of each business and too many Information platforms

- Difficult to have an integrated view of operations at Group level
- Pilot project in One business area (Ports) to build a common information platform that can be rolled out to other businesses

**SOLUTION**
Implemented PIMS and PI Integrator for Esri ArcGIS, and optimized tugboat operations

- PIMS implemented
- First phase for Dahej port implemented that includes PI Integrator for Esri ArcGIS, Dynamic Vessel Management, Alert Intelligence, PI Coresight and HMI implementation

**RESULTS**
Ascertained a common approach that can work across businesses

- ROI < 18 months from Tug boat operations improvement alone
- Advanced analysis platform and enhanced visualization for decision making
Contact Information

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Thank You

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