TraPac drives operational results through automation and digitalization at Port of Los Angeles

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About TraPac

- Container terminal operator and vessel stevedore that provides port terminal services to the West Coast of USA
- Leading edge in container-terminal automation in North America
- Among the first to implement and combine:
  - Automated straddle carriers with automated stacking cranes and automated on-dock rail system
  - Terminal-wide PI System
About Hatch

• Multidisciplinary engineering and management consultancy company
• +9000 employees, 65 offices, six continents
• Principal sectors: Infrastructure, Mining & Metals, and Energy
• Extensive systems, process control and PI experience
Business Challenges – Making the Case for the PI System

• Complex automation solution that involves multiple systems from different vendors
• Inadequate data-acquisition tools for in-depth analysis of existing KPIs
Business Solution – Deploying the PI System

- PI System selected because of:
  - Ability to look at data from an operational improvement/process perspective

- Implemented Proof of Concept with OSIsoft’s support
  - Up and running within a few days
  - Organized AF hierarchy and basic calculations and templates quickly
Implementation Considerations and Challenges

• Key productivity metrics include:
  • **Gross Moves per Hour** – total number of containers moved per hour
  • **Cycle Time** – overall time to move container

• Data sent as “messages" but needs to be transformed into Process and Equipment data

• No JMS interface available from OSIsoft
Implementation Details

- **PI Client Tools (DataLink, Vision, ProcessBook)**
- **PI Data Archive Server**
- **PI AF Server**
- **SQL Server**
- **JMS**
  - Telemetry
  - Alarms/Events
  - Process Data
- **ARMG Cranes**
- **Crane onboard computer**
  - STS Telemetry
- **PI Connector for UFL & Custom Application to process JMS messages**
- **Reporting Tool (Tableau)**
- **CMMS (eMaint)**
  - PI Notifications with SMTP
  - PI OPC Interface / RDBMS Interface
  - PI Integrator & PI OLE DB Provider
- **SQL Server**
- **CMMS (eMaint)**
- **PI Interface Server**
- **PI RDBMS Interface**
- **PI Client Tools (DataLink, Vision, ProcessBook)**
- **Strads ASCs**
- **STS Cranes**
- **PI AF Server**
- **PI Data Archive Server**
- **PI Interface Server**
Demonstrating Value of PI – 3 Use Cases

1. Improved operational efficiency
2. Accelerated issue resolution
3. Improved preventative maintenance program
Use Case: Improved Operational Efficiency – Optimizing RMG Travel Times

**Objective:** Improve operational efficiency of RMG by improving travel times for its movements
Use Case: Improved Operational Efficiency – Optimizing RMG Travel Times

Divide the RMG cycle into phases based on crane movement, job status, remote operator status, transfer area reservation status.

- Horizontal
- Lateral
- Vertical

Diagram showing phases:
- Move to Pick Location
- Pick container
- Move to Ground Location
- Ground container
Use Case: Improved Operational Efficiency – Optimizing RMG Travel Times

Used Event Frames to quantify duration of each phase and create a baseline to help identify outliers

Results

- Quantified idle time crane movements which provided necessary data to support programming changes to RMG PLC
- 10% improvement in cycle times
Objective: Leverage PI System to expedite troubleshooting

- Problem reported as significant reduction in RMG throughput
- Initial suspicions pointed to recent control-system update
- Problem was intermittent and visual inspection was inconclusive
Results

- Quick visual recognition of typical spreader profile versus bad
- Worked with mechanics to pinpoint issue – bent spreader flipper, distortion undetectable
- Without PI data, would be guessing at issue
- “Unless we went out there with a straight edge, we may still be searching for the cause!”
Use Case: Improving Maintenance

**Objective**: Leverage PI System to digitalize maintenance workflow and improve maintenance interval compliance

- PI AF configured to send email to third-party CMMS daily using PI Analysis, PI Event Frames and PI Notifications
Use Case: Improving Maintenance

Straddle Carrier
• Automated container transport vehicle
• Travels freely between equipment
• Operates in fenced-off automated area
• Breakdowns may not be addressed until work stoppage
Use Case: Improving Maintenance

**Results:** Data provided by PI System helps drive the PM maintenance regime within our CMMS, particularly for meter driven PM, resulting in a significant upward trend in PM creation.
Use Case: Improving Maintenance

Results: Timely and accurate data has resulted in a significant shift in compliance to PM schedules

- Autostrad PM is typically based on a 200 hrs inspection and a hierarchical 1,000 hrs service interval.
- Actual intervals against this target have been tracked for gauging PM Schedule Compliance.
- PM Scheduling compliance: -0/+10%: on target. -0/+5%: considered hitting the bullseye.
Use Case: Improving Maintenance

More data is desirable before declaring an outstanding success but the indicative trend so far is very favorable.

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The new method supported by PI sees good accuracy and repeatability for the 200hrs inspections interval. The previous method never captured 200hrs inspection data for comparison.
Leveraging the PI System to improve operations

Company and Goal
Automated container-terminal operator with a goal to improve operational efficiency and asset utilization.

CHALLENGE
Inadequate tools and data for detailed process analysis
- Information was siloed
- Data was not appropriately structured for quick insight

SOLUTION
Deployed a PI System and integrated it with container-terminal systems to improve operational awareness.
- Full PI system deployment
- Developed custom application along with PI Connector for UFL to historicize JMS messages

RESULTS
Improved Operational Efficiency: RMG Cycle Time decreased by more than 10%
Expedited Issue Resolution: Significantly faster. Flipper issue resolved within a shift.
Increased Maintenance Compliance: 100% on target
- Major shift in culture at TraPac – Data-centric!
Next steps

- Increase data collection
- Deploy downtime tracking tool
- Identify further optimization opportunities
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Questions

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Grazie
Obrigado