INTELLIGENT DATA DRIVEN PORTS AND WATERWAYS

by

Harald van der Heijden[1]

Modern ports and waterways do not only need to be efficient, reliable and cost effective, they also need to be safe and environmental friendly. To achieve all this, state-of-the-art technologies are needed and data is essential. From data collection by the latest sensor technology, storage in cloud based solutions, data processing and analytics by sophisticated software to intelligent predictive reports of your assets.

1. SAFETY

A safe environment is essential for employees and visitors. From early fire detection, public address and evacuation solutions, remote man safety, man-over-board technologies to video recording and tracking of ships. Modern video surveillance and camera analytics (unattended bags, loitering, perimeter monitoring, fence & boundary breeches, facial recognition, vehicle classification, traffic counts) can assure a safe environment during day and night operation.

Crowd flow monitoring at peak times assure a safe and efficient management of resources with predictability. External air quality monitoring guards personal health, identifies cause and show trends over time. In waterways the water level is monitored by ultrasonic sensors. These sensors monitor the exact water level in assigned areas. Flood protection and prediction software alerts stakeholders well in time.

2. RELIABILITY

Condition-based monitoring provides an exact overview of the current 'health' of machines and assets, for preventative maintenance and avoidance of unexpected and costly stoppages.

Cars can be scanned for damage by the use of camera control analytics. Sensor and car inspection scanning solutions increase efficiency, traceability and accountability of all rolling equipment on-site.

3. EFFICIENCY

Most car movements at ports are currently manual and are influenced by staffing limitations. Autonomous vehicle solutions are developed to support process operations, such as vehicle, AGV movements and off-road commercial equipment. Future visions also foresee autonomous shipping, including loading and unloading of ships.

Smart yard management offers an accurate visualization of the parking status, which enables easier navigation for parking, picking and maintenance activities. This technology also provides tagging, planning, sequencing of vehicles and intelligent directing by tracking real time information. The system assists in picking and shipping the vehicle to the ultimate destination.

Traffic management controls peak times and optimizes the port user experience and predictability.

Smart retail solutions track and analyze people flow in retail environments. This enables store owners to optimize their retail floor space, sales, rental planning and crowd management, people counting, queuing alarms, blocked emergency exits, etc.

---

[1] Bosch Rexroth B.V., Business Unit Large Projects, harald.vanderheijden@boschrexroth.nl

4. INTELLIGENCE

Container and high value asset tracking can monitor a variety of parameters such as; temperature, vibrations and GPS location of assets. Wireless sensors track moving cargo in real-time. The data is immediately sent to a central control center to help improve delivery efficiency and transparency.

Connected power tools can be tracked and controlled within the port.

A unified cross-functional sensor platform creates a dashboard of all sensor solutions within the port. It provides a digital image (digital twin) of the harbor, based on the existing or developing sensor solutions and allows overarching monitoring of all sensors at the port.

Data mining and collection analytics lead to increased knowledge and efficiencies of port and waterway operations.

If required a remote emergency call center can control the surroundings and inform staff or local authorities if needed.

5. ENVIRONMENT

Energy management is a top priority in many industrial applications. How to transfer industrial sites from heavy energy users to energy neutral areas?

Renewable energy solutions such as solar, wind, wave or tidal energy generation, can replace existing energy resources. Energy can be won back by sophisticated drive and control solutions to improve energy efficiency. Battery storage solutions balance demand peaks and reduce infrastructure setup expenditure. Thanks to smart electronic controllers, these storage systems can absorb excess electricity and release it again very quickly when needed. That way they help to stabilize the electricity grid. Battery storage solutions improve port and city air pollution by reduction of ship's exhaust gases.