AVEVA

Transnet, South Africa's largest international shipping port, avoids costly power outages with the use of AVEVA industrial software solutions

Company name - Transnet National Ports Authority
Industry - Transport & Logistics

Goals

- To establish a stable, scalable and flexible operational information and control software platform.

- To mitigate the effect of potential power outages from the national grid.

- To implement standards across the enterprise simplifying future system upgrades.

Challenges

- The port had no effective process for dealing with unexpected power outages from the national grid.

- Its technology infrastructure was out-of-date and unable to scale to keep pace with the port's expansion plans.

- The lack of redundancy measures put the port at risk of losing critical operations data and device communications.

Solutions

- AVEVA™ System Platform, formerly Wonderware

- AVEVA™ Edge

- AVEVA™ Historian, formerly Wonderware

Results

- The port is now able to bring its electricity back online within minutes instead of hours following national grid power outages.

- Operators now have secure remote access and control of medium voltage (MV) switchgear.

- The system offers the scalability to keep pace with port expansion.

- Rapid data analysis through real-time reporting enables TNPA to identify issues down to the device level.

- The port now has fail-safe operations through extensive redundancy measures.

With AVEVA software, transnet's port of durban outsmarts power outages and is positioned for future expansion

DURBAN, South Africa – The Port of Durban plays a vital role in South Africa's economy by handling more than 60% of the country's imports and exports. Managed by Transnet National Port Authority (TNPA), Durban is the largest and busiest shipping terminal on the African continent, and is strategically placed on international shipping routes which handle more than a million tons of cargo from over 4,500 commercial vessels each year.

In 2007, a 40-minute national grid power outage related to load shedding, shut down all port operations which resulted in 20 - 30 million rand, or more than 1.8 million dollars, in losses.

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"Having this major international shipping port offline and non-operational threw the facility into chaos. It took more than two hours until power was restored and we were able to resume operations. Grid-locked cargo traffic as well as the inability of trucks to transport containers from the ships, brought port operations to a grounding halt. Even worse, port electricians were unable to access the facility's substation to switch to the alternative incoming electricity supply to temporarily restore power."

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Johan Sauerman,
Electrical Engineer, TNPA

Following this catastrophic event, TNPA's operations management team quickly determined it was time to upgrade the current technology infrastructure to circumvent any future power outages that would disrupt critical shipping traffic operations

The team determined that technology from AVEVA was key to its operational success.

Project requirements and goals

The management team's first priority was to mitigate the effects of load shedding as well as minimize downtime of port operations by more closely monitoring and controlling the electrical grid network and on-site generators. However, it soon became clear that this was not the only goal.

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"Transnet needed plan to keep capacity ahead of demand, and this meant taking a holistic view of the port's operational needs which went beyond limiting the effect of power outages – we had to look at our current electricity requirements. We had to review the port's ongoing sand dredging and pumping scheme, our central fire system, the millennium tower which serves as a landmark beacon to incoming ships, and the overall air conditioning design which serviced the buildings."

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Johan Sauerman,
Electrical Engineer, TNPA

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To achieve this, the port required a scalable system that was adaptable and could support immediate control decisions. The criteria included the following:

- Centralized engineering which could be easily maintained and scaled to keep pace with future growth of the port without considerable downtime.

- Stable industrial software platform that would support improved data process speed and provide critical redundancy for both data storage and device communication.

- Robust and flexible security processes to enable operators to remotely switch to back-up power sources at any port site.

- Operational safety parameters to ensure that automatic control sequences are available. These are needed to safely setup the network and allow for synchronization of diesel generators with the port's power grid network, enabling electricity to be quickly restored in the event of an unforeseen power outage.

- Improve efficiency of power supply and related cost by automatically adjusting Power Factor Correction calculations to successfully manage equipment electricity usage.

- User-defined reporting facilities to implement trend data for analytical purposes.

- Implementation of software standards to reduce engineering time and costs of future system upgrades related to the port's expansion plans.

- Establish processes for tracking "cause and effect" scenarios with immediate access to real-time and historical data.

Implementation

To implement this comprehensive port operations upgrade, TNPA partnered with Convenient Software Solutions (CSS), a prominent local systems integrator with critical knowledge of and experience in installing software solutions.

CSS added AVEVA System Platform to TNPA's current technology solution to provide a unified plant model that logically represents processes, physical equipment and industrial systems, as well as legacy systems, making the design and maintenance of these systems more efficient, more flexible and with less risk. AVEVA System Platform provides standardized visualization and configuration, as well as enables deployment, communication, security, data connectivity, data storage and management, and collaboration.

"Not only does AVEVA System Platform seamlessly integrate with our existing systems, it also addresses our need for flexibility, scalability, centralized software engineering flexibility, redundancy and the enforcement of standards."
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Johan Sauerman,
Electrical Engineer, TNPA

With AVEVA System Platform, the TPNA team can more effectively use AVEVA Edge software that provides an open and extensible Supervisory HMI and SCADA solution. AVEVA Edge enables the quick creation of standardized, reusable visualization applications, and then deploy them across the entire enterprise without having to leave the office.

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Redundancy and data acquisition critical to port expansion

The CSS team first implemented various "proof of concept" scenarios to ensure the software selected would effectively meet the current and future needs of the port in regard to its planned expansions and increased complexity.

"We paid particular attention to redundancy and data acquisition since this was a critical requirement for the overall TNPA installation. Our team successfully linked 40km of redundant fiber optics to key elements of the TNPA system, which allow for failover to the centralized server network in case of emergencies and unexpected power outages. The 'store and forward' functionality of the system protects data, while a wireless VPN is used to remotely control and operate medium voltage switchgear and generators."

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Warren Hofland,
Systems Engineer, CSS

AVEVA Historian Client was selected as the project's high-performance process historian, because of its capability of storing huge volumes of data generated from TNPA operations. Port managers can now retrieve data collected and stored by AVEVA Historian Client anywhere and at any time from a variety of devices including desktop computers, tablets or mobile devices.

With AVEVA Historian Client, operators can also access a complete and accurate operational history for faster troubleshooting and easier discovery of high-value process improvement opportunities. In addition, its flexible, scalable implementation options reduce IT costs and accelerate system ROI, while the comprehensive reporting and data analysis options enable more team members to gain value from process history and enhances collaboration.

"We have found tremendous value in using AVEVA Historian Client to access historical trend information for both investigative and diagnostic purposes."

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Johan Sauerman,
Electrical Engineer, TNPA

AVEVA provides peace of mind to TNPA

Perhaps the most significant benefit of all for TNPA is the peace of mind that the Port of Durban, the most important international import/export hub in the country, is now master of its own fate with respect to the reliability of its electrical supply.