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BHP Port Debottlenecking Project (PDP1) – Process Control System Integration



Project Background

Client: BHP Western Australia Iron Ore (WAIO)
Date: May 2022 - Nov 2024
Location: Nelson Point, Port Hedland, Western Australia

Background

BHP's Port Debottlenecking Project 1 (PDP1) addressed a critical throughput constraint at Nelson Point, Port Hedland. The project streamlined material flow between car dumpers and reclaimers, ensuring greater operational efficiency and reliability.

As part of this initiative, BHP required seamless integration of new automation infrastructure with existing control systems to support the port's increasing capacity demands. Our role was to provide a turnkey control system solution, ensuring optimal performance, safety, and system resilience.

"The Port Debottlenecking Project (PDP1) intends to close the gap between car dumper and reclaimer rates and achieve a greater net loading rate through Port outflow routes by having South Yard extension, Stacker 6 Upgrade and LRP3 Feed Upgrade."

Challenges

- Integration of New and Legacy Systems – The project required a seamless interface between modern automation systems and existing infrastructure while maintaining high performance and system stability.
- Ensuring High-Throughput Performance—With iron ore throughput rates up to 15,400 mtpd, the control system needed to handle high volumes efficiently without introducing bottlenecks.
- Executing Upgrades in a Live Operational Environment – The control system enhancements needed to be deployed without disrupting critical port operations, requiring meticulous planning and risk management.



The Solution

As Western Australia's leading system integrator, GTE Group delivered a fully integrated process control solution, ensuring reliable and scalable system performance.

Key Solutions Implemented

- Advanced PLC & Functional Safety Programming – We developed bespoke PLC logic and safety protocols, ensuring compliance with industry standards while maximising operational reliability.
- Integrated Engineering - We provided an integrated solution across control systems, functional safety and communications systems disciplines to optimise the final solution while reducing cost
- Robust Network Configuration – Our industrial communications expertise enabled real-time data exchange and system interoperability between new and existing infrastructure.
- Comprehensive Testing and Validation – Factory Acceptance Testing (FAT) and Integrated Systems Testing (IST) implemented to rigorously validate system performance, reliability, and fail-safe operation before deployment.
- On-Site Commissioning & Performance Validation – Our team worked alongside BHP's engineering and operations teams to implement a structured commissioning process, ensuring a seamless transition to full-scale operations.

The key system upgrades addressed the following areas:

- Bucket Wheel Reclaimer 11 (BWR11) & 'F' Area to Conveyor P564 – Throughput: 15,400 tph
- Car Dumper 2 (CD2) & Car Dumper 3 (CD3) to Stacker 6 (STK6) – Throughput: 15,400 tph and 14,500 tph, respectively
- BWR11 to Lump Rescreening Plant 3 (LRP3) via Conveyor P516 – Throughput: 14,500 tph

Results and Impact

Operational Efficiency and Throughput

Integrating advanced automation and process control solutions significantly improved material handling efficiency, reduced bottlenecks, and aligned operations with BHP's 300 Mtpa growth target.

System Reliability and Integration

Our tailored control systems, functional safety and communication systems solutions ensured seamless, high-performance system integration, enabling real-time monitoring, enhanced process control, and reduced system downtime.

Safety and Compliance

With our functional safety programming expertise, we minimised operational risks while ensuring the system met stringent industry safety standards. The rigorous testing and commissioning process reinforced reliability and delivered a fail-safe control system.

Execution

The project was executed in stages, ensuring all system upgrades were integrated smoothly without disrupting operations. Our structured and collaborative approach gave BHP peace of mind, knowing their new automation systems were deployed efficiently and securely.

Outcome

This project successfully enhanced BHP's port operations at Nelson Point, delivering a future-ready, high-performance control system that ensures seamless, safe, and scalable operations. As Western Australia's largest independent system integrator, GTE Group is committed to delivering intelligent, innovative, high-integrity engineering solutions that drive operational excellence for Tier 1 mining clients.

