

Inter-facility Shutdown Signal: Brownfield Control System Design Project

BACKGROUND AND CHALLENGES:

Our client, with a major gas production facility, required a plant shutdown signal to be connected from their Distributed Control System (DCS) to a DCS system of a downstream third party. This connection was essential to relay information to the external process, allowing the Emergency Shutdown (ESD) trip of equipment on the natural gas production site to notify the downstream third-party facility of a potential gas supply disruption. This notification would give the third-party operations enough time to adapt to the gas supply disruption, ensuring a smooth and safe transition during unplanned shutdown events.

Equinox Automation was engaged to complete the engineering and design of the required control system modifications, which would be implemented in an upcoming plant shutdown.

SOLUTION:

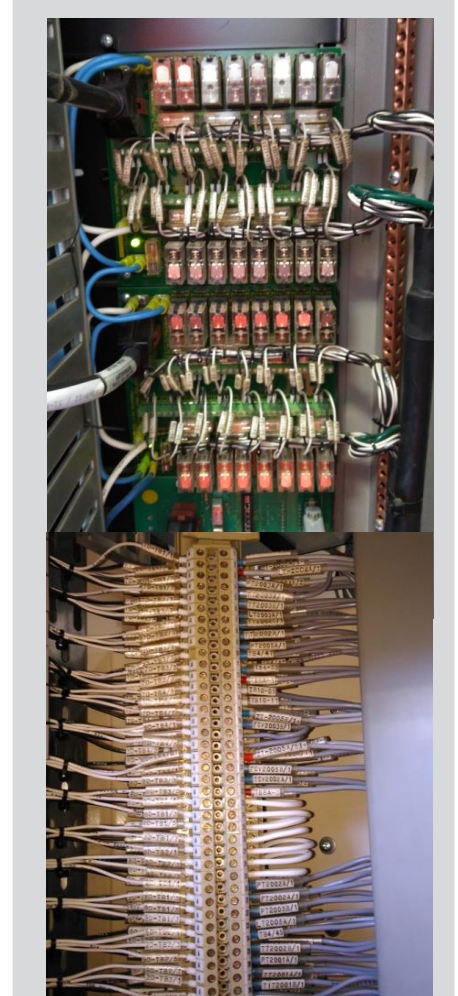
To achieve the desired outcome, our engineers applied a comprehensive approach. The project began with thorough research of the current system, followed by a site visit to determine which panels would be required in the design and where existing connections were installed. All relevant drawings were requested from the client, and once acquired, an overall design was generated, showing the cable connections from the client DCS to the external DCS system.

We established which cabinets already had available connections and determined where additional connections would need to be added. All terminal points were labelled as required, and any cables used from the existing system were already labelled according to the site standard.

To safeguard reliability, we implemented an interposing relay, ensuring complete system isolation. This prevented potential power faults in the upstream system from affecting the downstream facility, enhancing overall system resilience.

Using software-based drawing tools, each drawing was accurately marked up as required for the design modifications. The drawings included updating multiple termination and connection drawings and generating a detailed loop diagram for the new signal. The design was then reviewed internally to ensure safety, accuracy and functionality were achieved.

We produced an Electrical Design Certificate to certify that the design was safe and met the requirements of AS/NZS3000 wiring rules and the Electricity (Safety) Regulations 2010.



Figures 1, 2 & 3: Legacy DCS and control cabinet wiring that required detailed inspection during the site survey.

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A detailed work pack was generated, providing an overview of the work to be done, including installation overview, safety considerations, required equipment, testing and commissioning plans, Health, Safety, and Environmental (HSE) planning, and appendices of the drawings. This work pack provided the information needed to complete the installation in a clear and practical format to simplify site works.

RESULTS:

Our engineers developed an engineered solution that provided the necessary functionality to transfer the shutdown signal from the natural gas source supplier to the third-party control system. By combining a site survey with engineering, our engineers produced a high-quality outcome for our client in a complex brownfield environment at the interface between two operational facilities. We accelerated our delivery with a tight deadline; the installation work pack allowed the shutdown signal to be successfully installed on time by the client technicians during the plant shutdown. As outlined in the work pack commissioning procedure, function tests were conducted to confirm the correct functionality in both control systems.

The project was completed on schedule, with the client praising the high-quality design and detailed work pack, which streamlined installation and improved efficiencies for the time-critical activity.

Through our experience in engineering and designing instrumentation and control systems, Equinox Automation delivered a fit-for-purpose solution while minimising project costs by repurposing equipment where possible in the existing system.

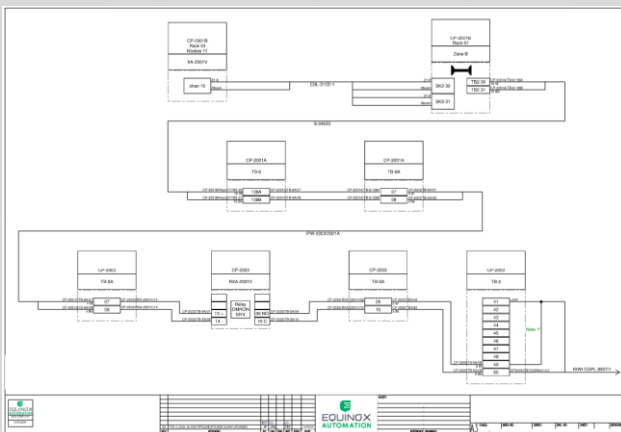


Figure 4: Inter-Facility Shutdown Signal Loop diagram

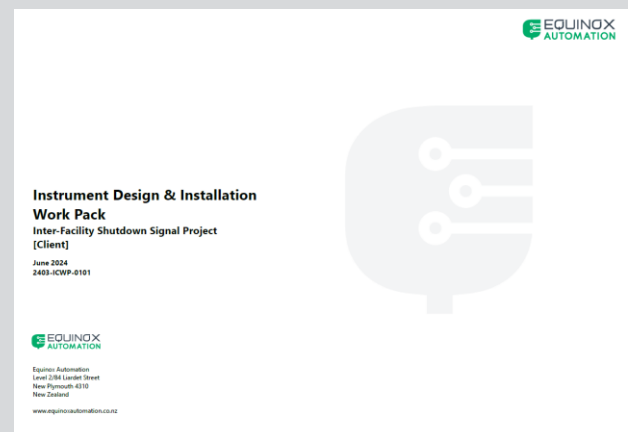


Figure 5: Detailed Instrument Design & Installation Work Pack