Automation IT

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AIT implements Network Control System as part of Expansion Project at Brisbane International Airport

The Brisbane International Airport Terminal

The Brisbane International Airport is currently the biggest airport in Australia and is one of the busiest buildings in the country as it literally operates 24 hours a day, 365 days a year. It is imperative that it has a reliable power supply, which requires a state-of-the-art generator network control system (NCS) in order to maintain power to the building during a mains power failure. As well as controlling supply during mains failures, it is crucial to operate efficiently and minimise the airports' carbon footprint.

One of the existing Switchboards to be monitored by the NCS

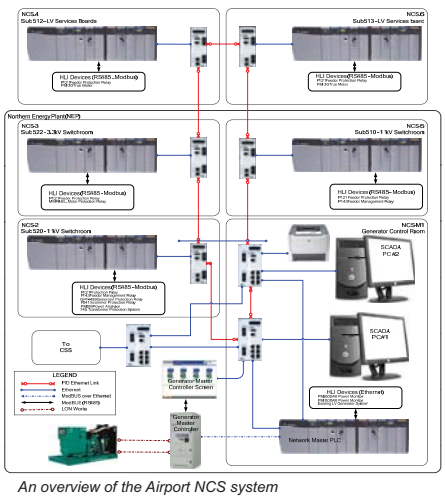
THE CHALLENGE

After the International Terminal Building Expansion project (ITBX) the terminal contained 2 generators, expandable to 6, as well as 28 HV and 86 LV circuit breakers, divided amongst three HV switchrooms and two LV service boards, all monitored and controlled on the new NCS.

Given the complex supply network, the main challenge was working out and accounting for each possible utility supply fail and restoration scenario that could happen within the system and ensuring that the NCS would be able to adjust accordingly.

THE SOLUTION

The solution required six Allen Bradley ControlLogix PLCs at each of the main switchboards, so that in the result of a network failure, each PLC is able to continue processing and making decisions locally. These PLCs are connected over a redundant Ethernet Hyper-Ring, which is also connected to two redundant SCADA Servers to allow the operators to monitor and control the whole system.



An overview of the Airport NCS system

PLC OVERVIEW

The Allen Bradley ControlLogix platform used for this system is able to provide discrete, drives, motion, process and safety control together with communication and state-of-the-art I/O in a small and cost-competitive package, making it an ideal choice for this project.

The ControlLogix PLC was specifically designed for its reliability, high speed and high performance in critical environments. Furthermore with its fully redundant controller architecture it provides seamless switchover and high availability when required.

The Allen Bradley ControlLogix PLC

A Prosoft comms module

The six PLCs are able to communicate to each other using the standard Ethernet/IP protocol. However in order for the PLCs to be able to communicate to specific HLI devices such as meters and relays, the PLCs required an additional Prosoft Modbus Master/Slave Communication module. Similarly, the network master PLC also required a Prosoft Modbus TCP/IP Communication module for it to be able to communicate with the Generator Master Controller using Modbus over Ethernet.

SCADA SYSTEM

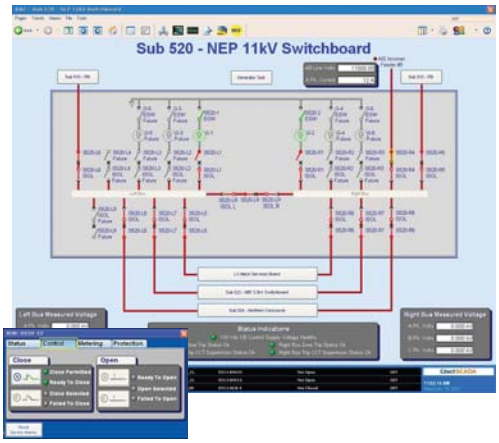
The chosen SCADA software for this project was CitectSCADA as it is a reliable, flexible and high performance product that is able to be fully customised for each industrial application. Citect is able to provide high graphic process visualisation, superior alarm management and built-in reporting, which were all features that were essential for an NCS system of this size.

The SCADA system is able to monitor and control the Master PLC as well as the site wide PLCs via the Ethernet network. All NCS status information and control functions are able to be accessed using the SCADA system. It is possible to independently access information from each of the PLC systems on the NCS LAN. This is critical in the unlikely event that the MAIN PLC fails and the operator needs to access information from the other remote PLCs.

Similarly, the SCADA servers were configured as a redundant pair so that if one PC fails, the other is able to immediately take over all necessary tasks and maintain control over the system.

For each switchboard at the International Terminal the SCADA system is able to provide (where applicable):

- A graphical single line representation
- Device status (Inc Health, Fault, Open, Closed, Remote, Local, & Trip)
- Bus & Device energisation status
- AIS Incomer voltage & current
- Bus 3-phase voltages
- Substation control voltage and trip circuit supervision health status
- Bus zone trip status
- Circuit Breaker Pop-up Pages, providing the following additional information:
    - Device Status
    - Synchronisation Status
    - CB Control Status
    - Protection Relay Data
    - Metering Relay Data



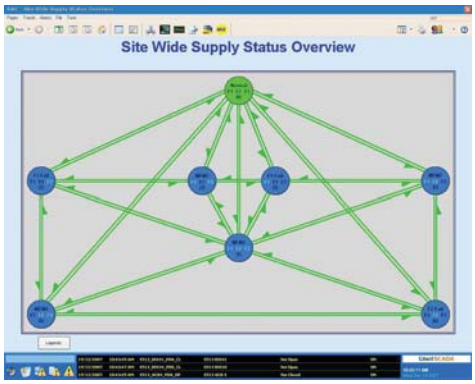
A substation mimic screen and popup

COMMISSIONING

Before the final commissioning could take place, it was important to liaise with several different parties in order to overcome security precautions and scheduling issues. Due to the size and continual operation of the airport, scheduling was critical to ensure that commissioning of the existing switchboards and functional testing across the whole control network would not cause any power outages.

The commissioning process involved testing of all of the field and switchboard PLC IO, as well as full operational checks of all circuits and checking the operation of all equipment on the NCS.

In the same way, each utility supply failure scenario was tested to ensure that the system operated correctly at each stage of the load shedding process. Each switchboard was tested to ensure a safe power down and restore sequence once the generators had powered up including the transfer of load back to mains power.



The site wide fail sequence in the event of a power failure

DOCUMENTATION

As with all Automation IT projects a fully documented project solution included monthly progress reports throughout, detailed software programming specification, electrical drawing package, full test documentation and operation manuals.

To maintain site design consistency for the future, all PLC and SCADA site standards were met.

CONCLUSION

As Network Control Systems are different for each application and environment, Automation IT was able to make a fully customised NCS solution for the Brisbane International Airport that was able to meet each of the specific requirements for the site.

With the use of the NCS, AIT was able to ensure the safety of everyone, as well as maintain vital operations at the airport whenever a mains power failure occurs. Similarly, the NCS was also able to save the Brisbane Airport Corporation money almost immediately after the system was brought online by decreasing the potential for human operation errors as well as reducing the overall site consumption.

Ask Automation IT to create an NCS Solution for you today!