Automation IT is chosen as Principal Contractor in $1.2M Control System Upgrade for Logan City

Logan Water Pollution Control Centre is the largest water pollution control centre in Logan City. Located approximately 30km south of Brisbane, Logan is one of the fastest growing population centres of Queensland.

The current Loganholme plant is the result of six stages of construction and expansion (referred to as 'augmentation'). The original plant was built in the early 1980s and has been progressively expanded to increase capacity. More recently, the plant has also been upgraded to increase flows and improve effluent quality by converting two of the four oxidation ditches to incorporate biological phosphorus removal

THE PROBLEM

After six stages of augmentation the GE Fanuc 90-30 control system, using a combination of Genius bus and Ethernet communications, became increasingly unstable. Problems encountered included:

- Lack of consistency in PLC and SCADA programming, hardware and communications

- No PLC and SCADA site programming standards

- Obsolete or missing items of plant equipment still existed in PLC logic and SCADA graphics

Resulting in:

- Plant operators and contractors not being able to understand how the plant operates

- Sections of the plant functioning inefficiently and incorrectly

- Developing and upgrading the control system had become extremely difficult

- A large proportion of the plant being run in manual mode

THE CHALLENGE

The Logan Water Pollution Control Centre is a live system. Throughout the upgrade plant operation of this critical infrastructure treatment process had to be maintained. Challenges included:

- Replacing 7 off operational GE Fanuc 9030 PLC's with the RX3i PLC.

- Converting the existing Genius network over to Ethernet communications

- Modification to existing PLC and SCADA software to meet new programming guidelines

THE SOLUTION

The solution required a new and carefully integrated control system. The GE Fanuc RX3i was chosen due to its innovative technology enabling users to address major engineering and business issues, such as higher productivity and higher cost control.

The RX3i has a dual backplane that supports 27MHz PCI bus for advanced modules and high speed serial bus for easy Series 90-30 migration. Its new CPU320 is a 1GHz CPU providing 0.047 ms per 1K Boolean contacts/coils with 64Mbytes of user memory. Memory for ladder logic documentation and machine documentation (Word, Excel, PDF, CAD and other files) are stored in the controller to reduce downtime and improve troubleshooting.

CONTROL SYSTEM OVERVIEW
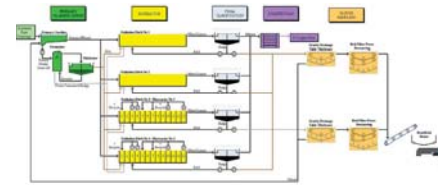
The total control system consists of 7 off GE Fanuc RX3i PLCS's totalling 2000+ I/O and 3000+ SCADA points controlling pumps, valves, blowers and conveyor systems.
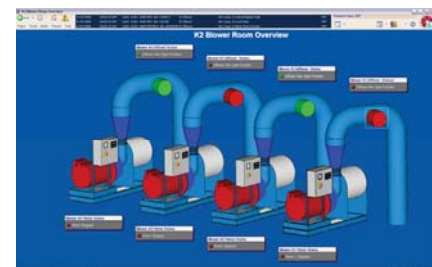
Communications is provided via Ethernet over a self healing Fibre Optic ring.

The main functions of the PLC and SCADA systems are:

- Primary Clarifier

- Blower Control

- Sludge De-watering

SEQUENCE OF WORKS

Due to the proposed methodology of upgrading one PLC at a time, maintaining plant operation with the existing network, it was necessary to implement the new Ethernet network whilst maintaining the existing Genius network.

The first step in the changeover involved the installation and software implementation of a functional self healing fibre optic ring using managed switches. The switches were configured using a ring master and fully tested prior to PLC connection.

The next step connected each of the new RX3i PLC's to the Genius network, maintaining communications to the existing Citect with the data concentrator PLC. Temporary software code was necessary to maintain both the Genius network and the Ethernet network in parallel. This allowed the existing system to act as a backup until the new SCADA system could be fully tested. This interim setup required two extra PC's to enable a roll back facility had it been required.

Once the SCADA was on line the projects could be transferred to the final servers and the old Citect removed.

SEQUENCE OF WORKS - continued...

The next part of the new control system implementation was to transfer each of the PLCs from Genius to Ethernet. As each PLC was cut over they were functionally tested.

On completion of all PLCs being changed over there was a period where both the Genius and Ethernet networks were both active. This duplication of communications was transparent to the plant operations staff.

To complete the control system implementation the data concentrator PLC and the Genius network were removed.

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 plant design consistency for the future, detailed PLC and SCADA site standards were also developed.

CHANGE MANAGEMENT & DATA HISTORIAN

Logan City Council is committed to system improvement. Automation IT included a software change management system to ensure control system changes are tracked and its Assets protected.

This system ensures that changes associated with the plants software and documentation can be verified and monitored to avoid any unauthorised changes to the plant. The solution included a series of additional tools to enable customers to benefit further:

- AIT reporting tool with integrated help system

- Citect compare driver

- Citect backup and restore

- Graphical user interface with web browser capability

As the project has resulted in improved PLC code and plant functionality it has provided greater data access for both operator and management reporting. Logan City Council chose to use the GE Historian to provide a robust and effective plant data repository to collect, archive and distribute large volumes of real-time data. Real-time data is the basis for intelligent decision making that leads to reduced down-time and greater plant efficiency.

Historian provides a window into your operations across all key metrics

Proficy Historian sample screen shot - actual image not supplied

CONCLUSION

Using new RX3i PLCs Automation IT's expertise has boosted the overall performance of the plant, reducing future engineering and commissioning costs. It has significantly decreased concerns regarding short and long term migration and platform longevity.

Since the upgrade the existing process is now easier to understand for both operators and contractors, easy to maintain, and makes future upgrades possible without unnecessary complications.

Mr Peter Bell from Logan Water made the following comment:

"It's a pleasure to visit AIT, you all conduct yourselves very professionally and that also shows through in the works you are currently performing for us"

Automation IT working with Government and infrastructure, making a better future for you.