CASE STUDY

LARGE CONTROL SYSTEM MODERNIZATION GOLD MINE – NORTHERN NEVADA

GEORGE T. HALL COMPANY

THE CHALLENGE

Large Gold Mine in Nevada determined it needed to modernize the PLC control system. While still operational, the hardware being used had reached the end of its commercial life. Additionally, availability of replacement parts and plant downtime was of significant concern.

THE SOLUTION

GTH partnered with Schneider Electric to develop a well-planned phased approach to modernization that represented the lowest risk with the highest value. GTH was able to prove that they could minimize all the potential risks the customer was concerned about.

Large Control System Modernization

One of the largest gold producers in the state of Nevada determined in 2018 it was time to modernize the PLC control system that had been operating their mill for over 25 years. While still operational, the Modicon Quantum Hardware being utilized had reached the end of its commercial life. GTH partnered with Schneider Electric (SE) to find a solution to the gold producer's challenge. GTH/ SE won the project because of their ability to present a plan that represented the lowest risk-highest value, significant savings over the alternatives, ability to maintain investment in AVEVA System Platform, as well as the M580/X80 system which would provide an additional 20+ years to the plant control systems operational life.

A proof-of-concept meeting was organized by GTH and held at the Schneider Electric Andover, Massachusetts offices in early 2019. The meeting included all project stakeholders including mine engineer personnel, GTH and Schneider Electric Modicon engineers where goals were outlined, and a plan of action confirmed.

Goals

The goal was to verify the system can meet or exceed requirements to replace the existing 13 hot standby Quantum systems while maintaining the existing remote I/O network and field I/O racks. To minimize risk and downtime the new system was required to support the existing S908 network as the first phase and easily adapt to Ethernet Remote I/O for the second phase. The proposed design was based on the Modicon M580 PAC (process automation controller) and the X80 IO system.

Given that downtime is so costly, and the change outs must be achieved during annual shutdowns the proof of concept had to demonstrate our understanding of the conversion requirements and the capabilities of the new software and hardware platforms.

With proper equipment in place regardless of the size of the system the old and new parts of they system can coexist, and we can take a phased approach to modernization that minimizes downtime and other operational and business risks.

System Engineering

The testing proved successful, and it was determined the hot standby system could replace the existing PLC processors as the first phase of the modernization project. GTH was awarded a project to develop an engineering study with a complete drawing package to fully develop the upgrade path defining the network topology requirements as well as the power and rack configurations to support the current design as well as the future configuration.

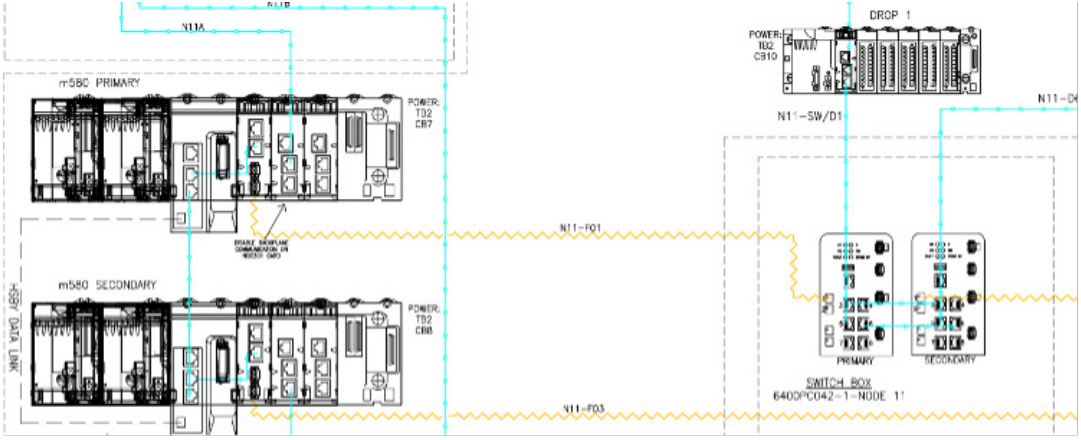


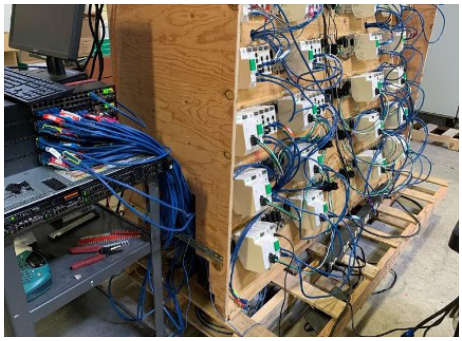
Figure 1. Hot standby PLC architecture

Throughout this phased modernization approach, we took advantage of several tools to make the entire upgrade process less risky and more efficient.

PAC Implementation & Validation - Phase I

Q1 2020

The first phase of modernization to upgrade the existing hot standby systems was awarded and the project kicked off to procure the hardware and convert the PLC applications for compatibility with the new Control Expert based M580 PAC system. As a Certified Automation Partner with Schneider Electric, GTH has access to the Unity M580 Application Converter (UMAC) streamlining the conversion process. Logic functions that were not converted or required modifications were identified and managed by GTH and mine engineers to minimize troubleshooting during the installation. The design was fully vetted using GTH provided servers to simulate the AVEVA SCADA system as well as network switches and the complete hot standby configuration for factory acceptance testing. The testing took place during the Covid-19 pandemic, we utilized cameras and Microsoft Teams to integrate the customer and their local third-party representative to validate the complete configuration.



PAC Installation & Commissioning – Phase II

Q2 2020

Upon completion of the factory acceptance test preparations were made for the field installation and validation. The shutdown window provided was 10 days. To properly plan for this extensive upgrade each system was scheduled for a specific date and time. The existing PLC systems were removed as they became available and the new PAC's were installed and enabled for testing with the plant AVEVA SCADA systems. By the end of the shutdown window all systems were up and running with the new M580 controllers still supporting the existing coax S908 Remote I/O network, Modbus Plus network (utilizing the NR&D MEB II ethernet gateway) and the existing I/O, (comprised of Quantum and 800 series racks). This critical phase of the project proved to be a success and set the wheels in motion for the next phase of replacing all the field I/O racks.

I/O and networking upgrade – Phase III

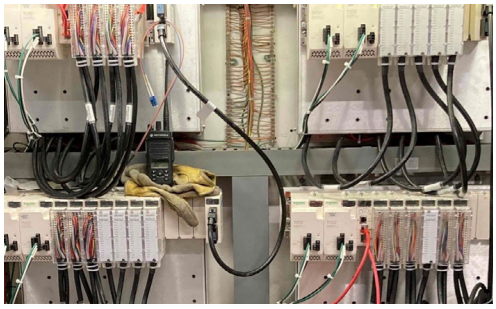
Q1 2021

The existing I/O systems were proposed to be replaced with the X80 I/O platform along with all supporting network equipment to convert from the coax remote I/O system to an Ethernet based topography using a combination of copper and fiber network infrastructure.

This final phase was arguably the most critical. With the replacement of over 700 I/O modules and the over 140 racks, time would be a major consideration for the installation. The down time allotted was 15 days requiring we prepare every rack with the required configuration of I/O modules prior to arriving onsite. Using the Modicon evolution chassis we were able to use the existing cabinet space to house the new X80 I/O rack assemblies and the quick wiring adapters to connect the existing I/O connectors to the new X80 I/O modules further reducing the time for conversion and a reduction in the opportunity for wiring errors.

Q2 2021

The removal and installation of the replacement I/O was successfully implemented with the GTH field team working side by side with mine personnel we were able to complete the conversion and get the mill back up and running in the allotted time. The success of the project was in the planning and execution of proven modernization hardware and software solutions from Modicon. The long-term benefits include serviceable equipment, new network connectivity and more data from the field to make intelligent decisions regarding the system operation.



At GTH, we have decades of extensive experience working with both legacy and modern systems. Here we were able to use processes and tools that minimized downtime and operator training. Our engineers are well-versed in developing solutions that address the concerns and potential risk of modernization allowing companies to experience the numerous benefits a modernization can offer.

Contact a GTH engineer today to learn how we can help with your company's specific industrial control panel needs.

CONTACT

Schneider Electric Certified Automation Partner

Control System EcoStruxure Plant Certified

Certified Alliance System Integrator PLC Modernization Schneider Electric

GTH GEORGE T. HALL COMPANY

1605 E. Gene Autry Way, Anaheim, CA 92085
6625 S. Valley View Boulevard, Las Vegas, NV 89118
8565 Double R Boulevard, Reno, NV 89511

714-939-7100 www.georgethall.com