

CASE STUDY

MODERNIZING A MANUAL GRIND LINE FOR A REMOTE MAGNESIA MINE



THE CHALLENGE

Running a manual grind line at a magnesia mine was becoming increasingly burdensome for the mine as it was producing an inconsistent product, was becoming more costly to maintain with its many aging components, and it was not meeting modern operator safety standards.

THE SOLUTION

George T. Hall (GTH) worked closely with this mining client to identify the scope of work for modernizing the grinder line and then developed and integrated an automated control system and human-machine interface (HMI), making the grinder line easier to operate, more consistent, and safer.

In the United States, many mines and processing plants have been running operations for decades. Compounded with the fact that mines are frequently naturally located in remote, sparsely populated areas, and it can be difficult to get the necessary engineering resources onsite to modernize many of the manual processes still being used today.

But, to improve site safety and output and reduce operational costs, many mines today are looking to modernize manual, outdated, and obsolete systems. This was the case recently for a large magnesia mine in the US that was still operating a grind line manually. This process involves large rocks coming in on the conveyor and then going through the pulverizer and sieve potentially several times. But since they were running each machine locally and did not have a supervisory control and data acquisition (SCADA) system in place where they could control and view their operations, the process was inconsistent and not particularly safe for operators.

To determine the scope of work for this modernization project, we had to work closely with the operators onsite and ask a lot of questions to determine what was really needed.

Like many mines, this mine site did not need a fulltime onsite engineer, but this made determining the status of its current system and developing the requirements for their new automated system challenging.

Therefore, it took several years to get the project to a point where they were ready to bring a third party to work with them on the modernization process.

Once they were ready to begin the modernization of this grinder line, GTH engineers had already formed a relationship with the company as they had built a few replacement panels and provided some OEM equipment and PLCs for other outdated control equipment onsite that was no longer supported. Based on these other services we had provided over the years, it was a natural choice for the mine to bring GTH on as an engineering and system integration resources for this project as well. Let's now look at the challenges presented by this project and how we solved them using our many years of experience working on modernization projects and in the mining industry in general.

Challenge 1: Determining the SOW for Modernization

Modernizing this system required engineering a new solution; but to do this, we needed a detailed scope of work (SOW) outlining the requirements for the new system. Since the current manual system had been in operation for many years, there was not a single source onsite that had knowledge of all the equipment involved in the system and how everything was connected. Therefore, to determine the SOW for this modernization project, we had to work closely with the operators onsite and ask a lot of questions to determine what was really needed. This involved us needing to formulate the right questions that would lead us to understand functions such as the correct sequence for operation and the control loops that were needed for this as well as all the I/O points required.

By working closely together, we determined that to provide a system where operators can just push a button and all the conveyors start in the required sequence, we needed to develop a control panel, program PID loops for motor starters, and provide visualization through a human-machine-interface (HMI) located in a safe place.



Figure 1. To improve site safety and output and reduce operational costs, many mines today are looking to modernize manual, outdated, and obsolete systems.

Challenge 2: Incorporating a Modern, Automated System into a Manual Process Line

Once we had the SOW completed, we built the new control panel and HMI in about three months. However, once we brought the panel onsite, there were a number of mechanical problems on the grinder line that we had to address to get the system running properly. Since the operators did not have much insight into the manual system, while they had suspected there was a lot of equipment that was not running correctly, these suspicions were never confirmed. But as we began to setup the new system, we did in fact identify a lot of equipment that was not running as it should – several machines had stripped gears and motors were burned out, yet no one knew. Again, since the site does not have a fulltime engineer on staff, our field engineering team was an invaluable resource during the startup process as we worked together to address these newly discovered mechanical issues.

Once the system was up and running properly, additional integration phases were added as the site managers wanted to add a weight scale to the existing system and a few more conveyors on top of the original scope. Because we designed the system in a way to accommodate future expansion, these additions were not an issue for our system integration experts.

The Benefits of a Modernized System

The new modern automated system for this grinder line offered several major benefits for this mining operation. First, with the new HMI, operators no longer need to just watch and listen to the system to identify issues. The HMI provides visualization and insight into the process that translates into more consistency in the grinding process. We also programmed various alarms that alert operators to equipment failures. When an alarm state occurs, an operator can look at the HMI and see in real time which grinder and conveyors are active and where a fault is occurring. Additionally, since safety is paramount in mining operations, we added interlocks for when a fault does occur. We also located the HMI in a much safer and cleaner location in an operator building. As a result, operators are no longer near the equipment flipping switches on the control panel.

Having a Trusted Advisor to Support Your Modernization Efforts

During this engagement, we really served as a trusted advisor to this mining client as we worked together to nail down the requirements for this new automated system. By spending the time up front to ask the right questions and nail down the system requirements, we were then able to focus on system development without a lot of back and forth with the customer during the development phase. This allowed us to focus on using our system integration and modernization expertise to program the motor starter control panel and PLC and the operator workstation with a touchscreen HMI to control the operation. This unique combination of upfront advisory services and system integration expertise we were able to provide was exactly what this client needed as they were facing what had seemed like a daunting task of modernization when they were initially thinking about the process.

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Learn how George T. Hall can work closely with your team to develop the requirements for and execute the next modernization project at your mining site.

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