

# Digital Twin Solution Readies Mine for Successful Start Up

## RESULTS

- Virtualization simplifies training
- Simulation eases commissioning
- Early training and easy commissioning bring on-time start up



## APPLICATION

Gold, silver, and copper mining.

## CUSTOMER

Barrick Gold Corp and Goldcorp companies.

## CHALLENGE

After ten years dormant, a Dominican Republic mine was expected to produce an annual revenue of \$1B in gold, silver, and copper. With that goal in mind, the Barrick Gold Corp and Goldcorp companies sought to start up as quickly as possible.

Barrick, owning 60% of the mine and leading the project execution, recognized that carefully designed automation tools and techniques could reduce complexity to shorten commissioning time and ensure a successful startup. They also recognized that the available but untried operators needed be trained in order to obtain returns quickly in successful production.

## SOLUTION

The reopening required re-engineering about 20 automation sub-processes, such as limestone crushing and rough grinding. To automate and manage the approximately 11,000 I/O points or device signal tags (DSTs) required for the processes, Barrick chose a combination of the Emerson DeltaV™ distributed control system and third-party PLCs.

Barrick also chose a simulated automation environment using Emerson's DeltaV Simulate and Mimic™ simulation software. DeltaV Simulate software resided on a PC and simulated the DCS controllers while leaving intact the DeltaV logic and operator graphics. And to give a realistic process response, Mimic software simulated I/O for the controllers in the DeltaV Simulate process models.

*“The main driver for this simulation system was to prepare our operators for start up with unified, hands-on training before the plant was up and running.”*

**Barrick Process Systems Engineer**

The team focused on ten processes that were critical to production, and similar to other processes. Because Mimic offered a range of simulation fidelities, the team could adapt to project constraints. Together, Emerson and Barrick teams composed a solution that consisted of 10% low fidelity with basic I/O tiebacks that would assist in simple tuning; 60% medium fidelity that promoted engineering-first principles and led to energy and mass conservation; and 30% high fidelity that assisted with complex process models involving mass energy transfer equations.

### Operators Trained and Ready for Start Up

The team began a program called Ready for Start Up (RFSU) that included training on process fundamentals using computer-based interactive modules and simulator-based training. Training also included field demonstrations with hands-on practice.

The training simulations embedded screens and graphics with realistic process dynamics and responses. Operators reacted in real-time to alerts, alarms, and process interlocks — and were coached to devise more effective responses during the simulation. Operators completed training well prepared to handle myriad situations and failures.

Through simulation training, the operators could suggest ways to smooth out human machine interface (HMI) issues before commissioning began.

### Shorter Commissioning and Earlier Gold

Barrick reported that commissioning required less time than expected because simulation helped them develop testing of both DCS configuration and function logic. The team could easily evaluate and fine tune the interactions between control system elements to ensure they worked together as designed and intended.

In the end, simulation helped Barrick better understand process interactions, remove bottlenecks, and provide insight for managing variability. All leading to a faster startup to mineral production.

***“We can evaluate and fine tune interactions between different elements of the control system, and make sure they’re working together as designed and intended.”***

**Barrick Process Systems Engineer**



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