

CASE STUDY

END OF LIFE DRIVE UPGRADE WITH STATCOM BENEFITS

Electricity use is expected to grow in mining as the industry looks at ways to decarbonize its operations. A mining company in the US recently engaged with TMEIC and CTCS to scope out possible solutions for the following issues that one of their crusher, feeder, and conveyor systems was experiencing:

- Low reliability in the electric power and delivery apparatus
- An extremely dusty environment of crusher/apron feeder control circuit led to frequent nuisance trips
- Stocking of multiple spare parts for VFDs
- Power quality issues at the point of interconnection
- Arc flash safety issues
- Perform the migration from the existing to the proposed solution during regular scheduled downtime

The site was experiencing loss of production due to frequent trips and problematic troubleshooting and repairs with existing equipment, requiring factory technicians to travel to the site. Improving circuit reliability and uptime was the reason for the inquiry into an upgraded solution on the crush and conveyor circuit feeding the mill stockpile. Issues caused by a myriad of site conditions, including frequent thunderstorms, dusty environment, power quality, personnel changes of trained staff, and limited preventive maintenance (PM). Figure 1 shows the configuration that existed at the time the mine engaged with TMEIC and CTCS to seek a solution.

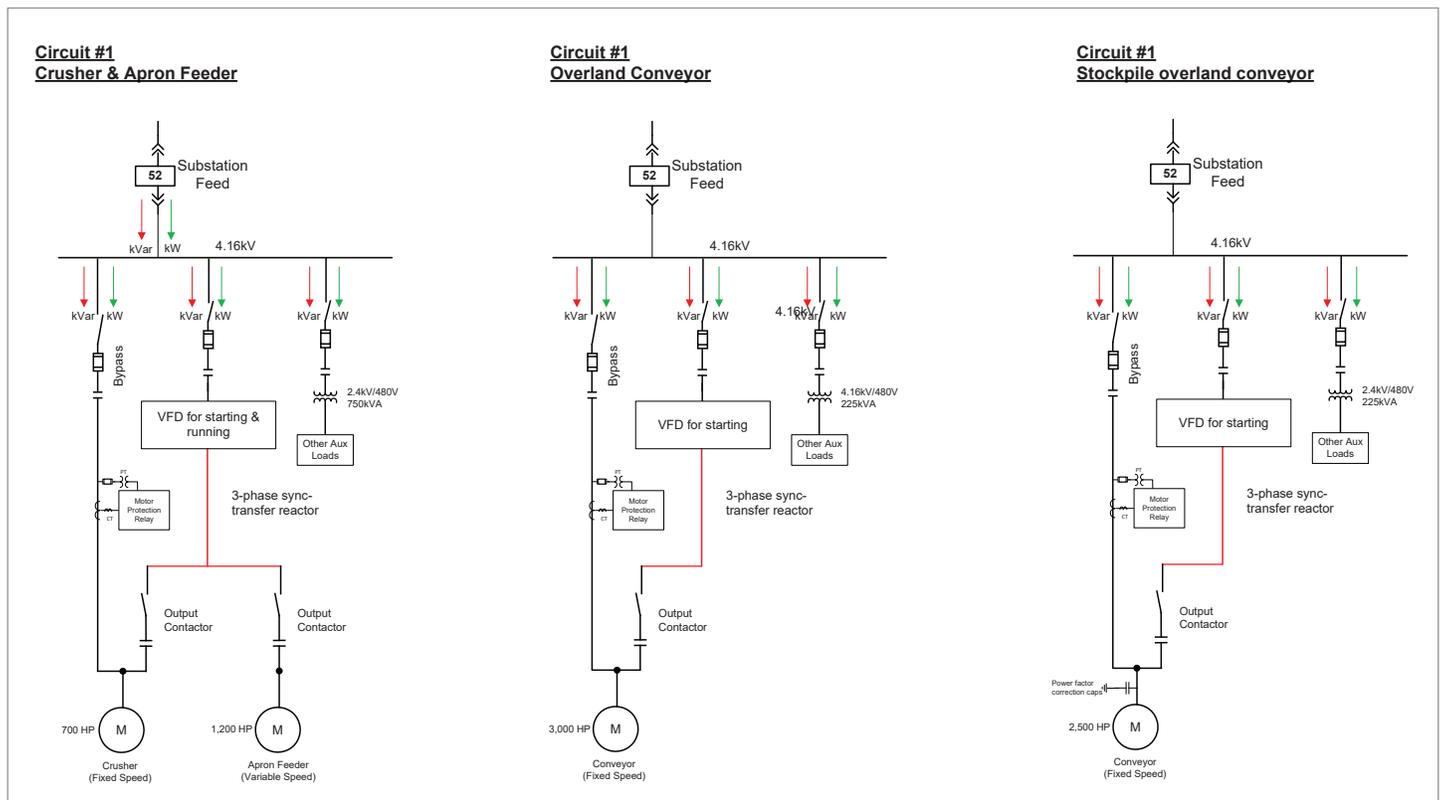


Figure 1: Current site set-up at the mine prior to the proposal

The Solution

TMEIC and CTCS's expertise on the existing system design and customer's need to minimize downtime allowed us to provide a solution that not only addressed the reliability issue but improved overall power quality. Further, by standardizing on a single size TMdrive-MVe2, TMEIC could capture efficiencies in terms of spare parts management, site personnel training, and PM. TMEIC and CTCS orchestrated

the change with minimum downtime by staging the new equipment in industrial control buildings provided by CTCS, leaving the existing equipment in operation. Hence, only tuning of drives to motors and sync-transfer checkout was required to switch to the new equipment, significantly reducing the chance of commissioning delays. Figure 2 shows the proposed system.

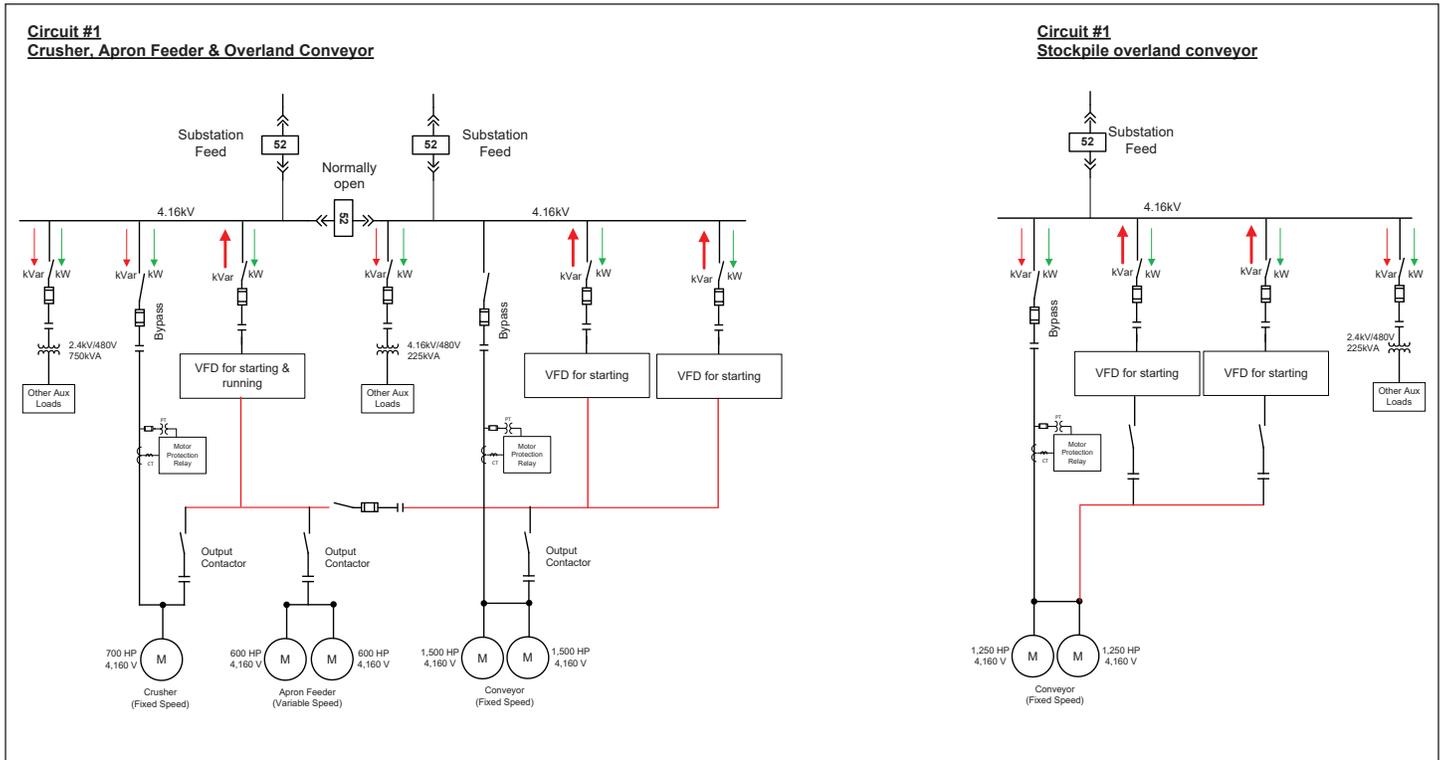


Figure 2: Proposed system configuration

Dyna-VAR™ Dynamic Compensation

Recall that power hardening was one of the requirements of the mine. While several solutions exist to ride through voltage sag events, TMEIC's Dyna-VAR capable MVe2 drives each offered 2,050 kvar of active PF correction when in standby mode and the single drive operating the 1200hp apron feeder will provide

1,025 kvar active PF correction for a total of up to $\pm 9,225$ kvar. This system can both boost and sag the volatile mine pit loop voltage, stabilizing the circuit, improve reliability of equipment and reduce nuisance trips. Figure 3 shows an example of how the drive's Dyna-VAR™ feature leads to lower voltage sag events.

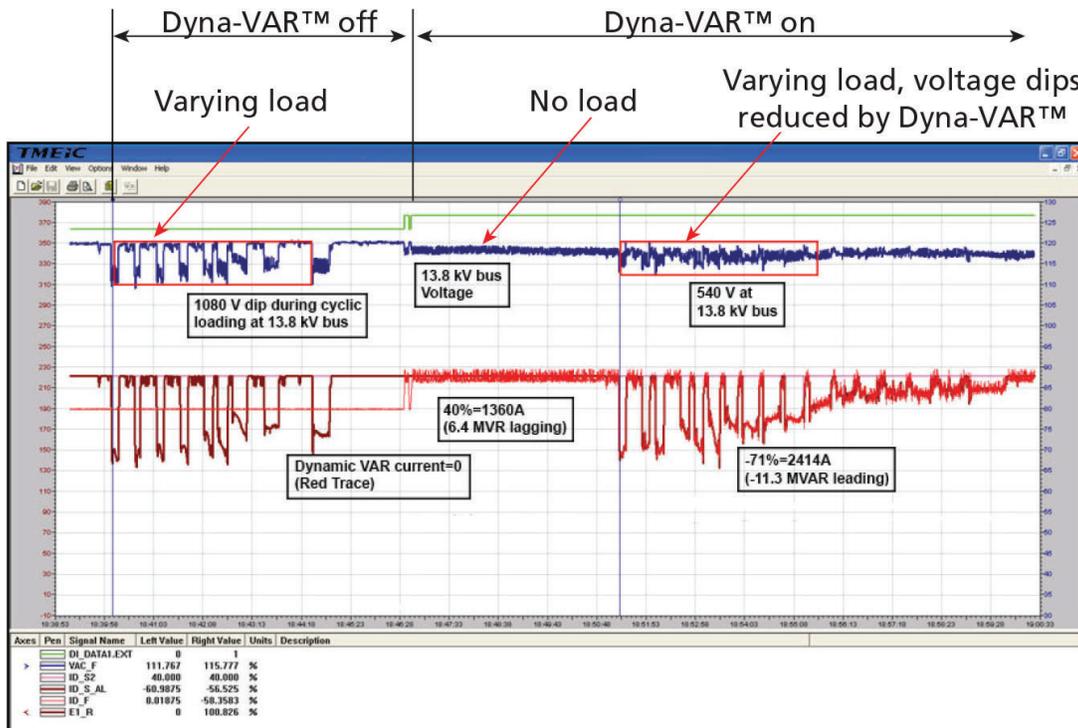


Figure 3: Real-time traces of bus voltage and Dyna-VAR™ output showing bus voltage dips reduced by over 50%

Conclusion

The solution proposes high-speed earthing switch technology to protect the switchgear line-up while meeting the customer's safety requirements and protect the equipment. The technology's ability to reduce the incident arc flash rating and minimize the chances of catastrophic failure allows for quick repair of the equipment.

TMEIC and CTC's extensive experience in supporting turnarounds in both Mining and Oil and Gas industries add value to the project. The staged installation approach minimizes downtime during the switch to the new system by assuring drives and switchgear are functioning correctly before shutting down and swapping power, resulting in no unplanned loss of production.

Summary

Consolidate two separate buildings into a single off-site industrial control building (ehouse):

- Free up critical space around the crusher to speed up the maintenance cycle and improve safety
- An ehouse move from the very dusty environment by the crusher to a much cleaner environment made simple by clean output waveform able to run long lead lengths without filters
- Add appropriate number of VFDs for full redundancy of the crusher and conveyor system
- Dual power feed to further improve reliability

Remove 3 different size drives and replacing with 5 x identical drives for full redundancy:

- Reduce spare parts required
- Simplifies maintenance
- Oversized units provide more Dyna-VAR™ Active PF Correction.

Arc mitigated line-up meets mine site safety standards of < 8cal

For specifications not mentioned here, contact TMEIC or CTC Solutions

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