

WHITE PAPER / EPC ADVANTAGES FOR MINING

# IMPROVING MINING PROJECT EXECUTION THROUGH EPC

BY Joel Canchola and David McLane

Working with an experienced, comprehensive engineer-procure-construct (EPC) team provides considerable advantages for the mining industry to manage complex and high-risk projects. Now is the time to evaluate how EPC project delivery can reduce risk, control schedules and enhance mining outcomes.





In early 2010, the mining industry was in the midst of high commodity pricing, new land purchases, rising expansion and an increase in large capital projects and acquisitions. During this period, mine owners executed projects using the more traditional design-bid-build contracts, as well as engineer-procure-construct (EPC) and engineer-procure-construct-manage (EPCM) contracts.

The complexity, size, location and fast-track nature of projects during this time period opened owners and contractors up to risk. The result was not only cost and schedule overruns but tremendous losses in project development and, in some cases, abandonment of efforts. This experience, combined with volatility in commodity pricing, lowered confidence and outside investment.

While 2020 presented its own unique difficulties for the mining industry, *Engineering & Mining Journal* reported more than \$209 billion worth of projects under construction. Similarly, Industrial Info Resources monitored almost 12,000 mining projects that reflect nearly \$1.2 trillion in investment.

Larger mining projects are now returning, and the industry is embracing a range of projects from greenfield development to brownfield expansion to retrofit initiatives. An experienced EPC contractor will use the proper planning, controls, scheduling, communication and change management tools to avoid past mistakes and help mining owners realize project success.

## MOVING FORWARD WITH REDUCED RISK

The risks involved in mining projects are broad and challenging, from project controls to commodity and development cost volatility. Partnering with a full-service EPC contractor that uses direct-hire construction delivers substantial benefits while managing considerable risk.

## SCHEDULE COMPRESSION

Working with an EPC contractor delivers tremendous advantage to safely and effectively streamline plans. These advantages are amplified with a self-perform EPC contractor that can save time and money while controlling quality and safety through collaboration with in-house construction teams from the outset. By engaging design, engineering and construction professionals from the

beginning, mining owners can remove the risk of a “crystal ball effect” that permeates so many large projects and increases risk. A self-perform contractor uses trade-specific resources to deliver accurate estimates, has the knowledge to thoroughly evaluate subcontractors’ qualifications, and is motivated to complete work on time.

Mining projects need experience and bench strength in the planning phase to avoid unnecessary schedule and cost overruns during execution. Projects require experience in planning, executing, and change and risk management to prevent adding months to a program schedule.

Other project approaches, such as design-bid-build (DBB), are drastically different and involve construction only after the specifications have been defined. Unfortunately, decisions that look good on paper don’t always translate in the field.

For example, a project that designed a steel lining for an 1,800-foot ventilation shaft used 5-foot liner sections that were bolted together and lowered down the shaft at installation. However, when the construction company began the install, it was apparent that the bolted flanges would get caught on the shaft walls when lowered. If identified before fabrication, the design could have been changed to full-welded connections. Instead, the liners had to be scrapped and refabricated, adding both cost and delay to the project.



## CLEAR CRITICAL PATH

Upfront collaboration among personnel in project engineering, procurement and construction helps streamline each area's process and the overall project. Turnkey EPC contractors can leverage knowledge during the design phase to avoid an unnecessary learning curve during execution.

Not involving construction during the initial planning phase can create a skewed and misrepresented path to completion. Often, the critical path is permitting, procurement or long lead-time of materials. Therefore, by the time a construction contractor is on board — and while it may be capable of executing the work — the contractor is unable to begin because the critical path wasn't correctly defined.

Relying on an experienced EPC contractor provides clarity around ownership, among key stakeholders. An EPC contractor takes on the risk of project success and is, therefore, driven to provide a clearly defined path by validating and verifying requirements and responsibilities early to achieve the stated results.

## COST CERTAINTY AND SAVINGS

Partnering with an EPC contractor can offer greater cost predictability. A broader spectrum of input is gained with a collaborative approach and inclusion of construction input during design and planning. With considerable experience to offer, in-house construction resources provide upfront design input, flag challenges, suggest better ways to operate and present opportunities to save money and reduce risk. Whether it involves access, equipment arrangement or bill of materials, construction input invariably provides insight and input that can help cut costs and mitigate hazards that a design might otherwise overlook.

An EPC delivery model can also include an incentive structure that drives savings for mining owners. The complete EPC team works together to accurately set the goals, budget and schedule of a project. These efficiencies can't be over emphasized. Because stakeholders have been involved from the beginning to define deliverables, all personnel are collectively focused on achieving — and improving — the outcome.

## RESULTS: A CASE STUDY

When a global manufacturer identified an urgent need for a new production line, the company turned to Burns & McDonnell and its EPC best practices to get things moving.

Faced with a number of regulatory and internal process reconfiguration challenges, our team worked with the manufacturer to develop the project scope and budget within an accelerated timeline. Understanding requirements for material processing, designs for detailed engineering plans and development of new production processes allowed preliminary plans to be created and approved quickly.

By including construction planning with upfront design and engineering, the project was fast-tracked by conveying clarity throughout the whole team.

In addition to establishing a new production line amid stringent regulatory standards, structural changes to the manufacturing facility were also necessary. All were designed and constructed to comply with the manufacturer's global manufacturing practices.

The production line and associated systems — for dust control, storage and delivery of raw materials — were designed, procured, constructed and installed within four months. The work delivered the manufacturer more than \$400,000 in documented project savings, plus several million dollars in savings achieved through value engineering practices.

An EPC approach also reduces the owner's risk and makes projects more competitive for outside or private financing. Robust and inclusive planning, EPC ownership of risk, and budget and schedule clarity work together for an attractive project proposal.

## FOCUSED RESOURCES

Mining operations are complex and require on-site personnel to deal with tremendous challenges and risks to achieve results. It is not unusual for mining companies to have limited resources available to manage a large capital project effectively. Project management, design, controls, scheduling, procurement, construction and more collide with the resources and time required to coordinate capital funding and lead times. When not appropriately resourced, the critical path of a project gets pushed down the road.

Internal execution of mining projects also takes a toll on conflicting operating interests, resulting in delay and increased cost. When a conflict arises between running the mine or executing the capital project, operations often win. Adopting an EPC approach reduces conflicts for personnel and contractors operating under separate or competing contracts.

Partnering with an EPC contractor adds value to existing mining teams by working together toward a common goal. The value delivered is tangible for mining owners by avoiding the recruitment, coordination and funding of additional work personnel, project experience, and specialists for planning and execution. Even using a different project execution model, such as DBB, still requires owners to commission, manage the punch list and get a new facility online.

The EPC model focuses on delivering a completely operational and functioning facility to mining owners. This approach allows owners to be flexible in their involvement while relinquishing project execution to the EPC contractor.

## CONCLUSION

Despite the turbulent period in the early 2010s, EPC project delivery techniques and processes ideally lend themselves to mining projects, whether retrofit initiatives or mega projects. Partnering with an EPC contractor can deliver significant benefits and predictable mining project results from upfront collaboration, communication and planning among all stakeholders. EPC project methods allow mining companies to reduce both cost and schedule risk, streamline capital project processes and free-up resources so operators can focus on their core business.

## BIOGRAPHIES

**JOEL CANCHOLA**, a project manager at Burns & McDonnell, has over 15 years of large capital construction management experience in the public and private sectors. Specific industry experiences include land development, industrial, manufacturing, mission-critical and commercial projects. Active in the AEC industry, Joel promotes best practices, client relations and transparency through integrated delivery methods.

**DAVID McLANE** is a project manager at Burns & McDonnell responsible for a wide range of mining design and construction projects. With a decade of experience in project management, engineering and construction, David has successfully managed multimillion-dollar underground and surface mine projects worldwide.

## ABOUT BURNS & McDONNELL



Burns & McDonnell is a family of companies bringing together an unmatched team of engineers, construction professionals, architects, planners, technologists and scientists to design and build our critical infrastructure. With an integrated construction and design mindset, we offer full-service capabilities with offices, globally. Founded in 1898, Burns & McDonnell is a 100% employee-owned company and proud to be on *Fortune's* list of 100 Best Companies to Work For. For more information, visit [burnsmcd.com](https://burnsmcd.com).