

Delivery with a difference



With prerequisites that include a competitive bid, ability to incorporate new technology and, often, guarantees on deadlines and budgets, EPCM firms face varied and extreme pressures from their mining clients. Dan Gleeson looks for their coping mechanisms

The backdrop for mining EPCM companies has changed substantially in the last five years.

A half decade ago, the talk was still focused on offsetting execution risk and generally trying to improve on the performance of the most recent commodity boom and initial bust – a period that witnessed project overruns and capital cost blowouts.

The application of new technology was mentioned, but it was a side note on the agenda of most miner-contractor discussions.

Times have changed.

“Now, it’s expected that systems and tools in the management and engineering process, as well as construction planning, methodology and execution, are taking advantage of technological advances,” Steve Rusk, VP of Mining at **Stantec**, told *IM*. “The bar has definitely risen. We have to be able to demonstrate an understanding of these tools as well as show specific uses and applications.”

Noting the same technology considerations rising on the agenda of Tier 1 and Tier 2 miners in the last five years, **DRA Global**’s Senior Vice President – Global Origination, Christo Visser, said advances made in 2020 – a year when the ability to operate remotely was tested to its fullest – could prove pivotal.

“In 2020, this has moved from an agenda item to a priority with the outbreak of the COVID-19 pandemic,” he told *IM*. “Digitisation and related initiatives are fast becoming a prerequisite when bidding; this includes project management, construction, safety, efficiency and decarbonisation.”

Janne Tikka, Head of Global Mining and Metals at

AFRY Process Industries – a company created with the 2019 merger of ÅF and Pöyry – has witnessed this transition at both greenfield and brownfield projects in the sector.

“In the case of greenfield investments, the enterprise-level digital architecture is planned and established during feasibility study phases in order to optimise the used resources for the investment case,” he said. “For brownfield investment projects, an Industry 4.0 roadmap can be created to provide a holistic approach to develop a digital transformation pathway.”

Technology-agnostic value

Applying new technology is a major component in the pursuit of **Stantec**’s work in the mining business, according to Rusk.

“Our clients want to see that we are engaged and that we are putting our best foot forward to even be considered for award,” he said. “Mining companies are integrating technological advances across their business and expect service providers to be doing the same.”

There are different routes mining EPCM providers can pursue for these innovative technological advances, all of which come with an element of risk.

Nick Bell, SVP, Mining, Minerals & Metals Sector Lead for **Worley**, said: “Innovation, by its nature, is a change from what has been done before. It introduces new risks, uncertainties and costs. Being the first adopter of concept and prototypes is not within the comfort zone for many companies.”

He says there is support required to explain, manage and mitigate these risks, with **Worley**

Wood’s design for IAMGold’s majority-owned Côté project included layout work to develop the Autonomous Operating Zones (AOZ) and operational interfaces; communication networks for AOZ; interface management with facilities for AOZ; design layouts including AOZ requirements; and calculating the costing benefits of autonomous hauling (photo: IAMGold)

recommending a partnership approach that allows miners to draw on a mining EPCM provider’s experience in developing and transferring similar technologies in comparable operating environments.

It is partnerships with OEMs and other mining service providers that have many mining EPCM companies competing in this new mining tech space.

Wood’s President of Mining and Minerals, Dave Lawson, says his company is already working closely with miners and technology providers to deliver digital twin offerings to clients, while concepts such as cloud-based design and global integration have helped **Wood** deliver the latest designs at the same time as controlling project cost and schedule.

Such abilities proved vital on a project where **Wood** was tasked with implementing haul truck and drill automation on an open-pit greenfield gold development in Ontario, Canada.

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Fluor will be well aware of such automation considerations given the work it has carried out on **Josemaria Resources**’ feasibility study for the **Josemaria** copper-gold-silver project, in Chile, a project planning to take advantage of the latest in drill and haul truck automation.

Visser says **DRA** seeks to partner with all OEMs,



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technology and service providers, maximising the opportunities for its clients.

“DRA provides project management and engineering and the OEM forms part of a broader team that aims to deliver the best value-add solution to the client,” he explained. “True collaboration will, however, only be realised when both parties work together to maximise value for clients instead of delivering separate solutions with individual value streams and, oftentimes, competing for engineering in a bid to sell technology or equipment.”

This is where the ability and pledge to be “technology agnostic”, promoting the best solution for clients, can help the EPCM provider stand out from OEMs looking to compete in this engineering space, Visser said.

Stantec’s Rusk says the company’s relationship

with OEMs has changed substantially over the last five years.

“We recognise that we have to be much closer and much more interactive,” he said. “In some cases, we are directly involved in the development and path forward for software solutions, as with our enterprise partnership with Autodesk.” This partnership has seen Stantec apply Autodesk’s 3D design solutions on mining projects.

Stantec also looks to work with and integrate existing software solutions to provide enhancements for project delivery, Rusk says, providing that ‘value add’ mining clients appreciate.

Like Stantec’s Autodesk tie-up, **Hatch** recently used Bentley Systems’ plant open modelling applications to design a complete, intelligent digital twin of a new sulphuric acid manufacturing plant in the Democratic Republic of the Congo.

This twin was used to manage and share information among Hatch’s engineering offices in Canada, South Africa, India, Australia, and the DRC, and help compress project timelines that, Hatch says, would otherwise not have been possible using traditional drawing-based piping isometric quality processes.

Worley’s Bell says it is a two-way relationship, with mining EPCM providers playing an integral role in commercialising new technologies from the start-up and established manufacturing communities.

“Our role is to help the OEM (or other researchers, technology start-ups and even in-house innovation teams) who has developed a solution to a product stage to leverage our technology development and transfer experience,” he said. “This assists our customers to bridge the gap and deliver the benefits of the products or innovations to their operations.”

This risk management step – from prototype to commercialisation – that mining EPCM firms take on is recognised by many in the industry.

“We are invited to be the technology adoption provider, or the validator of how a technology should be applied,” Bell said. “We look at the risks, costs and



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benefits that are likely to be encountered and achieved. We also take on the role of technology development partner to help scale and industrialise a concept that addresses a customer’s immediate issues.”

He added: “Our increasing relationship with OEMs, researchers, tech start-ups and customer technical teams has been a significant reflection of the market’s need to adopt new innovations and technology. This is helping provide the technology-agnostic validations and developments required to translate benefits from a promise on paper to the financial results in operations.”

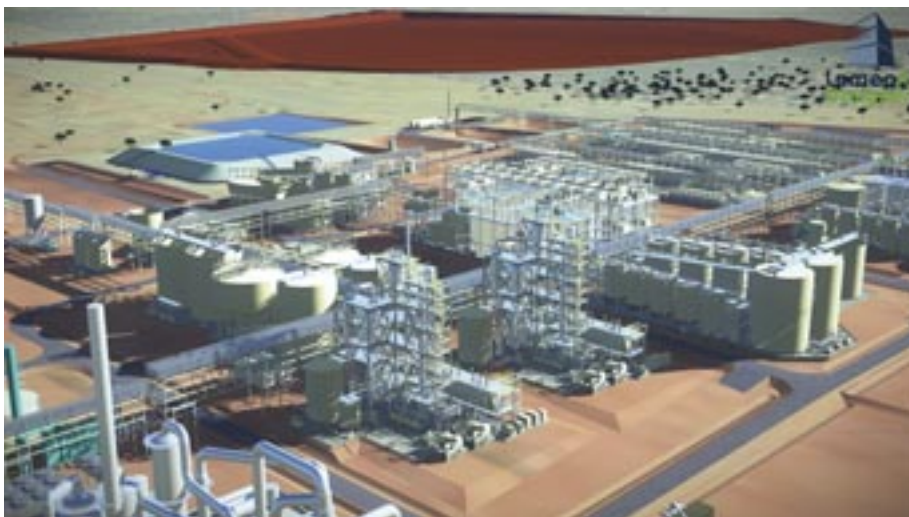
Cross pollination

This holistic and technology-agnostic approach has also seen leaders in the mining EPCM field take learnings from other industries and adapt them for mining, particularly when it comes to digital developments.

Rusk said: “On the applied digital technology side, we have to be able to adapt technology from other industries because mining is not a large enough target market for the Silicon Valley crowd. It’s really important for us to be able to look laterally across many industries and identify digital technologies we can take advantage of and implement.”

AFRY has been leveraging its experience in both the automotive and pulp and paper industries for its process industry and mining and metals EPCM customers, according to Tikka.

“AFRY has a long history within the automotive industry, one of the few industries where Industry 4.0 has been applied in operational plants,” he said. “AFRY is utilising, for example, these learnings...in process industry EPCM implementation projects.



Fluor recently exhibited the ability to futureproof process plant design in a Project Execution Plan for Clean TeQ Holdings’ Sunrise Battery Materials project, in Queensland, Australia (photo: Clean TeQ Holdings)

“We also have a long history in the pulp and paper industry, and the vertical and horizontal data integration from this sector is also used today in mining and metals.”

Wood is cross pollinating across industries to ensure its mining clients receive new, innovative and fit-for-purpose solutions, according to Lawson.

“One key differentiator is our ability to develop solutions in-house to help solve tough challenges,” he said. “For example, our asset optimisation team has leveraged its digital capability and maintenance knowledge to deliver new solutions to mining clients.”

This has seen the company apply “artificial intelligence tools” to identify noise sources and help focus a mine’s operation on mine-created noise (and not noise from other sources), as one example. And, when it comes to integrating automation elements – a process Wood is renowned for, Lawson says – the company is only just getting started in the mining space.

“We bring deep domain knowledge and rich experience, as well as proprietary technologies and platforms, while remaining system and vendor-agnostic in identifying, or developing and deploying, the right solution for our client’s assets, wherever it may come from,” he said.

Worley’s oil and gas project delivery expertise is likely to bear fruit at the Koodaideri iron ore project, in the Pilbara of Western Australia, an asset that will consolidate technology already in use at other Rio Tinto operations, such as autonomous trucks, trains and drills, across the mining value chain for the first time. Worley was awarded the EPCM contract for the Phase 1 project in 2019, with a brief to use data-centric engineering processes to also produce a digital asset for the miner.

Bell said: “We do see an increased appetite to bring learnings from other sectors into mining, particularly in the digital and energy transition space.”

A race

The inevitable problem with making a pledge to adopt new technology is the pace of innovation a company must keep up with.

Over a two-year mine build, the available technology selected during the contract tendering stage is expected to have changed, most likely for the better.

This has mining EPCM providers racing to stay ahead of the innovation curve, particularly when it comes to digital solutions.

Dawson said: “Digitalisation is becoming increasingly more important in both the way projects are delivered and how plants will be operated as miners want to realise the advantages digitalisation brings. Remote operations are becoming more common in our industry, and this has trickled down to mid-tier operations.

“The change we are now seeing is how future-



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facing design criteria affect the design of new facilities.”

Fluor recently exhibited such design into a Project Execution Plan (PEP) for Clean TeQ Holdings’ Sunrise Battery Materials project, in Queensland, Australia.

Weighing up the approved 2.5 Mt/y limit on pressure acid leaching (PAL) feed at the project, the fact that there would be surplus refining capacity in later years of the operation as ore grades begin to decline, and the fact the already acquired autoclaves – the key component of the PAL circuit – could treat up to 3.3 Mt/y of PAL feed, Fluor designed the Sunrise processing plant to readily accommodate a de-bottlenecking opportunity to support additional ore throughput after year four of operation.

The need for such futureproofing is likely to see both mining clients and mining EPCM providers shoulder a bit more risk than they would previously have been comfortable with, as Visser acknowledges.

“Where typically mining companies have found safety in proven technologies, we’re likely to see more of a willingness and openness to new untested technologies and more of an interest in developments in optimisation,” he said.

What is the reason for such a leap of faith? Many look to the environmental, social and governmental (ESG), and carbon reduction initiatives miners are pursuing for the answer.

“Technology will play an important role in setting the standards and harnessing resources and influence to develop evolving ESG practices,” Visser said.

The wider mining EPCM market agrees with such an assessment.

Lawson thinks technology developments from autonomous fleets to artificial intelligence will end up

playing vital roles in securing and maintaining mining companies’ collective social licence to operate.

“The adoption of new technologies will also help miners set and achieve ESG targets amidst growing pressures from investors and communities for more responsible mining practices that minimise fresh water consumption and reduce disturbed footprint,” he said.

Energy transition and decarbonisation will be the key focus areas for the industry over the next few decades, Lawson predicts, with new real-time data measurement and analysis tools, and renewable and hydrogen/electric technologies potential facilitators of the required changes.

Stakeholders are looking at mining from many different perspectives and demanding change, but, at the same time, the need to reduce carbon emissions and greenhouse gases will mean the demand for metals and minerals remains, according to Rusk.

“ESG, through carbon reduction, drives electrification, alternative energy and a renewed look at energy efficiency,” he said. “ESG will also drive extraction alternatives and the development of necessary applied technologies in digital communication networks, sensors and instruments, as well as data management systems and processes.”

The alternatives required to change the way the industry mines, but still produce the needed metals, will be driven to a large extent by technology and innovation from outside the mining business, Rusk expects.

Bell, meanwhile, says it will be a mix of operational and technical innovation that helps the industry realise a future where it uses less energy and water, while producing valuable commodities with lower emissions and lower costs.

It is easy to get carried away when acknowledging these catalysts for innovation, but new technologies will only gain widespread appeal across the industry if the price is right and the application is not to the detriment of project delivery.

Visser said: “Technological innovation definitely plays a role but is by no means the silver bullet. True ‘value add’ and a competitive bid are still the prerequisites for mining EPCM firms.”

But to achieve the ambitious ESG and decarbonisation goals many of the mining industry leaders have set for themselves, they will inevitably have to leverage some innovation.

The mining EPCM sector, which establishes the groundwork for long-life mining operations, is a good place to start. 