



MODULAR PASTE BACKFILL PLANT, O&M SERVICES FOR CAPRICORN COPPER, AUSTRALIA

Outotec® Modular Paste Backfill Plant, O&M management services, EPC scope - key in achieving mine's targets

The Capricorn Copper mine in north-west Queensland, Australia, is located in a prolific base metals region and has a significant high-grade resource base.

Background and history

Mineralisation in the mine's region was discovered in 1882, with an underground mine and concentrator on the Mammoth Deposit commissioned in 1970.

Capricorn Copper mine was acquired in 2015 by Capricorn

Copper Holdings Pty Ltd, which is 100% owned by EMR Capital. The Capricorn Copper Board and Management Team are comprised of some of the most experienced operators in the Australian Copper Sector.

Paste and backfill at Capricorn Copper

Capricorn Copper has five primary ore bodies contained within a 1.5km radius, with mining from multiple ore bodies through two declines. It was determined that the optimal solution for mining at one of the key ore bodies, the mammoth ore body, was paste backfill.

This ore body is a combination of in-situ ore, along with remnant workings from previous mining operations. These remnant workings pose an operational restraint to further mining of the mammoth ore body. Studies established that a

CHALLENGES

- Tight timeline
- Reduce CAPEX
- Minimise OPEX

SOLUTION

- Outotec® Modular Paste Backfill Plant (MPB 80)
- O&M services of paste backfill plant, backed by KPIs in plant availability, paste quality
- EPC scope

RESULTS

- Reduced CAPEX and OPEX
- Accelerated delivery and installation
- Plant operating immediately at design fill rates
- Low maintenance
- Flexibility to varying feed conditions
- O&M - best practice tools and expertise

mine backfill operation would provide a safe and efficient manner to remediate areas extracted by open stoping. Furthermore, long term planning of the Mammoth ore body determined open stoping mining, coupled with paste backfill, to be an attractive method of ore extraction. Therefore, backfill reliability and quality are critical to the success of the underground mining operation.

Backfill scope at Capricorn Copper

In 2017 Outotec was contracted to provide EPC (Engineering, Procurement and Construction) of a new paste backfill plant. The plant comprised the Outotec® Modular Paste Backfill Plant (MPB 80), a cost-effective solution for low-range backfill throughput. Additionally, Outotec's scope covered services for the Operation and Maintenance (O&M) for this new MPB 80 plant at Capricorn Copper.

Modular Paste Backfill Plant - MPB 80

The MPB 80 is a high-quality, cost-effective plant for underground mining applications with low-range backfill throughput. It is a modular wet tailings solution, utilizing 80m² of vacuum disc filtration and Outotec's latest backfill technology. The MPB 80 or the larger MPB 120 can be optioned with different size slurry storage tanks, flocculant dosing and binder storage systems.

The MPB 80 is an ideal alternative to installing a concrete batching-style plant that has been reconfigured for producing paste backfill. With a dedicated paste backfill plant, mines are assured of a high-quality paste output at a lower cost than modified concrete plants and larger previous-generation traditional paste backfill plants.



Completed civils

The solution is suitable for non-ferrous applications such as gold, copper, zinc, nickel, and lead. The modular, pre-engineered design enables fast, cost-effective delivery and installation to ensure a short ramp-up time, whilst the integral paste mixer and hopper reduces the overall plant footprint and enables uninterrupted paste production. The solution is suitable for both green and brownfield mine sites.

O&M services, supported by KPIs

Outotec's O&M services agreement includes the disciplines of operation and maintenance, management and leadership, reliability, planning and scheduling, continuous improvement and health and safety. Central to this O&M agreement are Key Performance Indicators (KPIs).

At the core of Outotec's O&M Services is the concept of "shared risk", measured by KPIs. An agreement in pricing structure between Outotec and Capricorn Copper is based around key KPIs such as safety, availability and paste quality. Coupled with a fixed monthly fee, this approach ensured that there is vested interest from both parties for a successful paste operation.

Additionally, having one partner from concept to operations ensures the operational profitability is directly related to reliability of all plant assets, systems and underground fill system components. Additionally any warranty, system failures and related issues are quickly analysed, rectified and improvements sought.

MPB 80 = accelerated and smooth commissioning

Due to the MPB 80 modular design, the Capricorn Copper plant was installed and commissioned in an accelerated start-up phase. Furthermore, as the plant was fully integrated with the upstream process plant as well as the downstream underground reticulation and management systems, the entire operation worked seamlessly. The plant began operating immediately at design fill rates.

Expertise in underground operations

Outotec's vast experience in mining backfill promotes an efficient and effective implementation of an operate and maintain contract. Experienced plant trainers deliver fast-tracked training to minimise downtime in the ramp-up period. Supervisors and engineers on site offer guidance in paste fill implementation in underground operations, as well as technical support to the client on all matters relating to the mine backfill process.

MPB 80, plus O&M services = optimised maintenance

One of the features of the MPB 80 design is its low maintenance. Due to its compact and innovative design, minimal process material build-up and spillage is generated during operation. The MPB 80 can therefore operate for multiple shifts without shutting down for cleaning. This represents a major improvement over previous plant designs which are normally shut down at the end of each shift, at least, to clean away build-up of paste in the plant's paste hopper. The vortex mixer also provides significant design improvement by way of pre-dissolving the binder with slurry before it enters the paste mixer, thereby also delivering a lower maintenance plant.

As part of Outotec's O&M services, the plant-specific Computerised Maintenance Management System (CMMS) ensures that all preventative and unscheduled



MPB 80 - design

maintenance is tracked and monitored closely to ensure plant reliability remains optimal. Through regular weekly meetings with an Outotec maintenance specialist, routine and non-routine tasks are discussed to ensure that all maintenance is undertaken in a timely and safe manner.

Enhanced design leading to enhanced quality

At the core of the Outotec MPB 80 design process is Outotec's industry leading plant design and automation. Through nearly 20 years' experience in the mine backfill industry, the MPB 80 plant represents a highly sophisticated plant with intricate control over all inputs into paste fill production. Coupled with a high degree of automation and human-machine interface control, the MPB 80 is an industry leading design. Intricate and precise control over the production process ensures high quality of the paste fill, drastically minimising the risk of paste-associated complications further in the mining sequence.

Flexible to varying feed conditions

Significant variations in the tailings characteristics required design modifications, new parts and changes in parts. This is being achieved through on-site Engineering and Operations personnel, backed by technical experts from various disciplines. One of the major benefits of a performance service partnership is "access to offsite technology expertise"

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Mr Moran continues "Outotec's ongoing operate and maintain of our paste backfill plant has also delivered value to Capricorn Copper".



MPB 80 at Capricorn Copper

Summary

Outotec is delivering value to Capricorn Copper with its MPB 80 solution, coupled with Outotec's O&M services.

The modular plant design at Capricorn Copper facilitated a cost-effective plant solution, delivered accelerated, smooth installation and commissioning, with the plant operating immediately at design fill rates.

Outotec's O&M services at Capricorn Copper are delivering value to site, backed by variable pricing based on KPIs and supported by industry-leading Outotec backfill experts. Outotec's paste backfill expertise and involvement from concept to ongoing operations reflects Capricorn Copper's long term commitment to best practice and plant performance.

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