



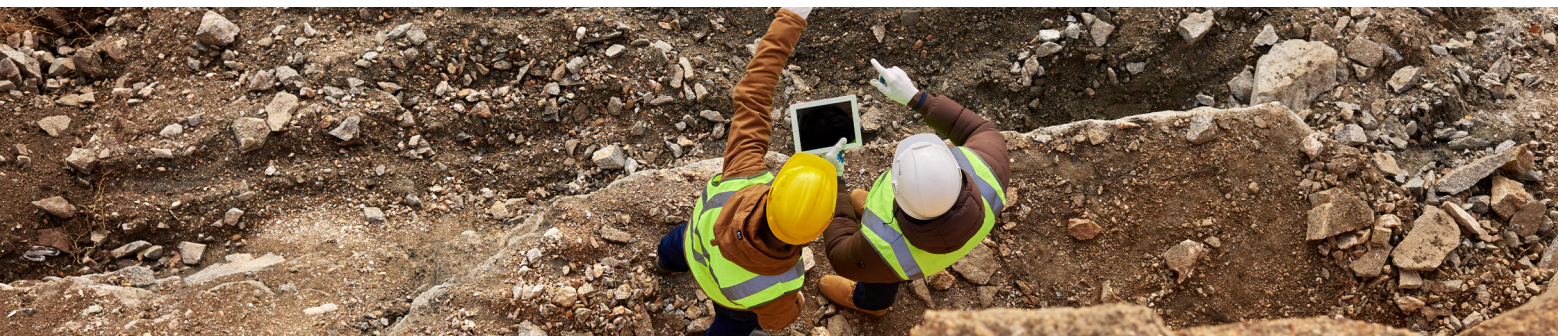
Proudfoot

Mining & Metals Ramp Ups

What if you could...

Finance, develop and operate the largest Underground Mine globally, on time, within budget and with zero harm to your people?

...with Proudfoot, you can.



Improve Return on Invested Capital by Safely Compressing Ramp Up Transition Times

When you invest in a new development, committing vast sums of capital and reputation, the ability to mitigate the risk of delay, harm or even failure, is paramount.

You need to ensure your Ramp Up on schedule, on budget and implemented safely. This is why Proudfoot is on the ground at some of the worlds largest and best known mines.

Proudfoot can compress key areas of your Ramp Up to improve planning, scheduling, shaft construction, reduce risk, maximize your return on invested capital. We do this by implementing Ramp Up Transformation through people, safely. This our core competence.

Within mining and metals, Proudfoot has realized over US \$1 billion in benefits for our clients through our most recent assignments.

Each project typically achieves an ROI of between 4 and 10 times the cost.

We have completed thousands of successful transformation projects over 72 years and our engagements are often cost neutral before the end of the project.

What if you could...

Deliver full production, on budget, shorten the ramp up transition & deliver target ounces ahead of schedule, safely?

Achieve record results, maintain the best safety record of global projects and achieve these results with zero harm?

Align your entire site to One Plan; suppliers, departments, functions and people, and execute it as OneTeam with the culture you want and need?

Increase shareholder value by engaging your people in positive transformation and safely achieving record production.

Change the industry standard of 'one-week planning horizon' for scheduling work to an industry standard of one day?

...with Proudfoot, you can.

Ramp Up at Rio Tinto, Gobi Desert, Mongolia

About the mine

Rio Tinto is developing the vast Oyu Tolgoi (OT) copper mine project in Mongolia. Over 80% of its total value lies 1.5km underground. In the biggest financial undertaking in Mongolia's history, the \$5.5bn project will become one of the largest underground mines in the world.

As underground construction became more complex, OT realised its existing project management systems were not robust enough. They needed a management operating system (MOS) – a set of tools, meetings and behaviours used to manage people and processes and deliver results, site-wide.

What we did

Proudfoot created and implemented a bespoke, state-of-the-art MOS, designed to work in conjunction with an integrated planning process (IPP). The IPP optimizes the allocation of space, time and materials across more than 20 practices, recognizing any constraints or conflicts on the schedules and resolving them. It helps deliver the project to the master schedule, while:

- prioritizing safety
- removing complexity
- producing better productivity and
- creating behaviors that ensure compliance.
- Ultimately, it frees up supervisors to focus on outcomes rather than processes.

Challenges

- The sheer scope of the project. The mine's deposits lie over 1.5km under the Gobi Desert over an area of 12km. The mine is expected to reach full capacity in 2021, employing 3,000-4,000 workers on site, so we factored the development of a 'city' – with facilities, roads, airports etc. – into the MOS.
- The remote location. Mongolia's capital Ulaanbaatar is 550km away from OT. Temperatures can range from -30 degrees in the winter to 40 degrees in the summer. Proudfoot's team was international (from the US, South Africa, Canada, UK, France and Spain). We worked on a 4+1 rotation pattern, spending four weeks on location followed by a one-week break. Each trip to site took up to 40 hours.

- Cultural differences. Almost 90% of the project's current population of 3,000 is Mongolian and the international workforce all have different approaches to work. Implementing the MOS was like creating a language that everyone could share.
- Promoting a One Team mentality. We designed the MOS to work across silos/teams, changing thinking to 'What's best for the business'.

Results

We overcame these challenges and more to deliver:

- a project that is on time and on budget.
- **Zero Harm to People in achieving the results** - the safest operation in Rio Tinto's underground mining divisions.
- **43% Reduction in Shaft Sinking Cycle Times**
- an effective, adaptive MOS/IPP for OT that scales up as work progresses – the first such system for an underground mining project of this size.
- **New record production for Batch Plant in one Shift**
- **Third new record in Advancement in 4 months**
- work schedules being made 48 to 72 hours and even one week in advance, when the standard for the mining industry is one day.
- **300% Improvement in Development Rates from May to July**
- a MegaMine 2.0 board game to train leaders (about 120 people) that worked so well it was rolled out to the entire workforce (currently about 3,000 people). We have now designed a MegaMine 2.1.

This project is helping to transform Mongolia's economy. Today, the mining industry accounts for nearly 90% of exports and contributes about one third to the nation's GDP.

"The culture in Shaft 5 changed. Six weeks ago no one wanted to be here, now people walk and act with purpose. They greet you with a smile, they want to be here."

"The design of the Integrated Planning Process and Management Control System are world class"

- General Manager, Underground Project Oyu Tolgoi

Ramp-Up Acceleration

West African open pit iron Ore

Ramp up issues

Leadership at one of the world's major integrated steel and mining company's faced ongoing challenges with their ramp-up plan at their West African open pit iron ore mine. Guided by a philosophy to produce safe, sustainable steel, the Country CEO launched a plan to increase production from an average run-rate of 3 Mega tonnes per annum (MTPA) to a target of 5 MTPA.

Despite significant increase in equipment through the full value chain, the extracted and shipped volume didn't rise and expansion plans were questionable given the volatility of the operational performance.

The major challenge they were facing was summarized by the Group Head of Mining as "we have lost the

memory of producing 5 MTPA". 2015 Ebola Outburst led to a significant operational impact, with 50% of expats and experienced managers leaving the project without developing the local talent.

Demonstrating the asset and regional team capability to achieve the targeted volume was critical to secure further funding and cash flow for a 2nd stage of development. They needed to achieve the initial mine plan of delivering over 10 MTPA.

Proudfoot team was engaged on a Rapid Assessment to initiate quick results and provide an operational transformation plan.

Remarkable Results

For the first time since the 2016 ramp-up plan launch, and 2 months after completion of the acceleration program, the production run rate demonstrated the 5 MTPA level.

50% Run rate improvement in 10 weeks

20% Critical Equipment Utilization increase in 4 weeks

5x Increase of active supervision time by front line management during the shift

"After 2 weeks of the initial Supervisory intervention including intensive on the floor coaching, I can already see changes in my Team behavior"

- Operations Manager

"What the Proudfoot approach enabled in this amount of time was exactly what we needed to boost the local team"

- Group Head of Mining

Transformational Approach

Working with the Group Project Manager, we rapidly confirmed the main bottlenecks and gaps, to deploy a quick results program week 2 of our arrival.

- Identify & plan to remove the key constraints related to reliability and utilisation of equipment, and deliver a risk mitigation plan to ramp-up above 6 MTPA?
- Lead a Pilot program to develop local supervisory skills on Active Management supported by a robust Coaching Process to "Jump Started" the team to effectively manage bottleneck areas?
- Rapidly design & implement the key Visual management tools with hourly monitoring of Production Plan Vs Actual, to identify variances, roll out action plans, and together

with Maintenance and Operations Front Line Management, remove the root causes of lost production?

- Finally address hot-seat and lunch break staggering to increase utilization on critical equipment and implement the new processes & organization structure to make it work effectively?
- Make Pre-Inspection checklist for critical Equipment a valuable part of the day to enable smoother run times and improved uptime?
- Collaborate with the Supply Chain to provide weekly visibility for critical equipment part delivery to enable effective PM & Capacity planning?

We serve commodities leaders around the world



Areas of Impact

- Project construction and ramp up
- Planning and engineering
- Purchasing and procurement
- Production
- Warehousing and distribution
- Supply chain
- Energy
- MaintenanceHealth and safety
- Employee engagement and alignment
- Smelting and refining
- SG&A and shared services
- Contractor management
- Shutdowns and turnarounds
- Community engagement

