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Ramjack's Remote Operations Centre adds \$58M value to Tenke Fungurume's mining operations in first year of implementation

[Home](#) > [Blogs](#) > Ramjack's Remote Operations Centre adds \$58M value to Tenke Fungurume's mining operations in first year of implementation

TFM, one of the world's largest copper and cobalt producers, realised additional \$58M USD value in the first year of utilising Ramjack's rROC. The savings were a result of:

- Savings of \$8M due to reduction in machine failure, maintenance costs, and improved availability in the first year of using the rROC
- The mine avoided lost production equal to \$50M in the first year of using the rROC

Together, all of these benefits reduced the fleet's maintenance costs by \$8M and added \$50M back to their production outcome through secondary improvements.

PLAYERS

Tenke Fungurume Mine (TFM) in the Democratic Republic of Congo (DRC) specializes in exploration, mining, extraction, processing, and sales of copper and cobalt. They rank as one of the biggest producers of highest grade copper and cobalt mines globally. TFM is located 177 kilometers northwest of Lubumbashi with an area of approximately 1,600 square kilometers.

TFM is owned by China Molybdenum Company Ltd. Through the safe production of copper cathode and cobalt hydroxide, TFM produces vital metals for transportation, computers, construction, and emerging technologies. In 2019, 177,956 tonnes of copper and 16,098 tonnes of cobalt were produced.

As of 2019, 98% of 3,400 full time workers and 94% of 5,300 contractors are citizens of the DRC. With such vast operations, they knew the opportunity to streamline utilisation of data was significant, with their existing Modular Mining Systems' MineCare technology. Outsourcing the operations centre made sense to the team for many reasons addressed later. Having a long-standing, successful business relation with Ramjack, they chose to implement the rROC – Ramjack's Remote Operations Centre.



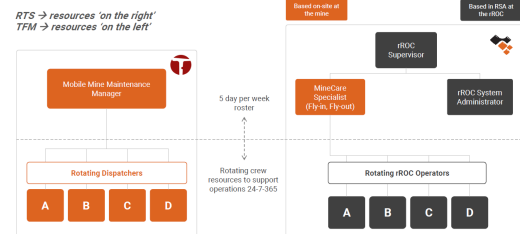
CHALLENGE

TFM employs a large, diverse staff, operating a sizable load/haul fleet. They run the Modular MineCare system for predictive maintenance capabilities, but wanted to maximise the use of the MineCare data to build best practices in responding to frequent alerts and alarms, transform their maintenance processes, as well as streamline operator behavior.

Their solution was to partner with Ramjack to get sustainable value from their real-time data.

Objective

Run Modular's MineCare system to guarantee sustainable value generation for TFM



HIGH-LEVEL SOLUTION

The teams at TFM and Ramjack kicked off a programme to leverage action from their data by implementing the rROC as a contracted service that uses data science to empower mines to optimise the performance of their real-time production and safety systems.

TFM selected Ramjack to run this programme due to their ongoing success in collaborative projects. Ramjack agreed to monitor their mission-critical data 24/7, in real-time. It is common for the rROC to set out to solve one challenge, and uncover multiple secondary improvements as well, compounding success. They knew that it would empower their team with a cyclical, continuous improvement process to monitor, manage and optimise their data with the potential to see the following outcomes, and possibly more:

- Improve overall equipment effectiveness
- Reduce operational delays and increase productivity
- Increase machine availability through reduced downtime
- Enhance data quality and improve trust in reported results
- Improve operator behaviour to elevate safety
- Improve job performance and knowledge transfer

The rROC programme provided these dedicated resources to TFM:

- specialised mining technology experts, data scientists
- integrated remote operations facility with state-of-the-art technology proprietary processes and workflows to improve KPIs for desired outcomes

SOLUTION DETAILS

The rROC was selected by TFM because it would open up lines of communication, improve operational effectiveness and give control back to leadership. Here are some factors that went into their decision making.

TFM weighed the benefits of hiring a contract data center vs hosting it in house. These benefits influenced their decision to utilise Ramjack's rROC programme:

- Ramp-up and initial investment would be a fraction of the cost of doing it in-house
- Full operational costs would be fixed and affordable
- The rROC operations would be scalable over time as needed
- It would be fully operational in only 3 months
- The opportunity for rapid ROI gave the potential for pay back in just months
- The service level agreement ensured expectations would fall on Ramjack's shoulders

- Having an extended technical team with diverse training and resources would not only maximise insight into operational data, but provide training for TFM staff and ongoing support
- Lower risk and investment when not done in-house, and could cancel with no commitment

rROC introduced mandated structure and attention, with required activities, reports and meetings. Here is the schedule of project activities that was selected:

1. Every Shift / Day – Shift handover, real-time event analysis
2. Every Week – Operator performance feedback report
3. Every Month – Monthly Management Report
4. Every Quarter – Steering Committee Meeting; alternate between on-site and at the rROC facility
5. Every Year – Site Audit; Technology Review Workshop; Project Charter

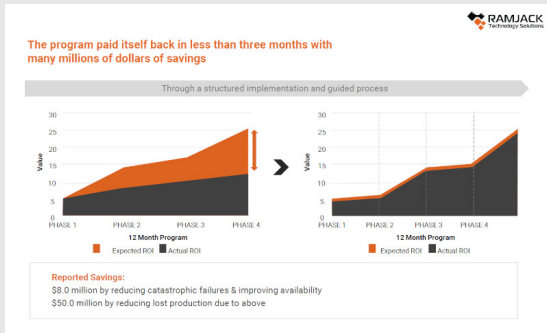
The following protocol was put in place:

1. The rROC office was implemented in Johannesburg
2. MineCare data began to be monitored at both locations – TFM and the rROC (insert screenshot)
3. Training and ongoing mentoring was provided to TFM techs, including real-time feedback on the quality and appropriateness of their decisions (photo of staff working together)
4. Key Performance Indicators and methods of evaluating the TFM techs were implemented and their progress monitored
5. A proactive, ongoing communication process was implemented for all stakeholders and equipment operators
6. Proactively assisting TFM in data analysis and actionable insights provided by MineCare to support effective maintenance planning
7. Providing full benefit of TFM's MineCare system with methods and reports to empower operations and maintenance teams
8. Providing oversight and direction to the MineCare team(s) to ensure they perform their duties to the highest level of performance
9. Assisting TFM operations and management in making good decisions regarding the use of MineCare



RESULTS

- Value from rROC was generated almost immediately – improvements were visible in under 2 weeks
- ROI was achieved in less than three months
- In one year, reported savings of \$8M were attributed to reduction in machine failure and improved availability
- In one year, the mine avoided lost production equal to \$50M



Secondary results achieved during first 3-6 months of implementation

- Lower trend of MineCare alarms
- Machines had less wear, inappropriate braking was reduced as operator training was improved through visibility into their behaviors
- Increase in machine availability, decrease in mean time between failure
- Improved DISPATCH and MineCare best practices
- Decreased time spent during shift change with better operator compliance
- Monitoring practices were focused on machines with highest risk of failure
- Notifications and alerts were better understood, avoiding extra downtime
- Quicker response and resolution of tickets between the site and the supplier with Ramjack as the middleman
- Component lives more accurately monitored with engine hours tracked
- Increased network uptime and improved communication site wide

This case study demonstrated how the rROC worked in partnership with TFM to significantly improve its operational performance and move more material per month.



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