

Project Abstract



Kobus West

Professional in Training – Industrial Engineering

Belfast Coal

Belfast Export Yield Optimisation

Introduction

Exxaro Belfast Coal is an opencast mining operation situated 20 km South West of Belfast in a high-yield coal deposit in Mpumalanga. Belfast Coal produces A-grade thermal coal and primarily supplies to the export market. As an export mine, achieving the budgeted plant yield is critical as it directly influences the amount of product produced and in turn the mine's EBIT performance.

Problem Statement

At the start of 2021, Belfast Coal transitioned from producing an RB1 (6000 kcal/kg) to an RB2 (5700 kcal/kg) export product, with the expectation of achieving higher plant yields. The achieved yields however were significantly lower than expected. In the first month of the transition, an export yield of 71% was achieved against a planned yield of 77%.

The goal of the project was to assist and enable Belfast Coal to reach optimised yield targets through stabilising the value chain throughput performance and reducing the variance between the actual and planned yield to as close to zero as possible.

Method of Investigation

Developing a solution to eradicate the variance between actual and planned yield is very complex as it can be influenced by a wide variety of factors. An integrated approach between the different departments at Belfast Coal was followed to ensure that a holistic value chain view was achieved. The following tools and techniques were utilised to identify the root cause of the Belfast Coal yield performance:

- 5W1H – The 5W1H is a questioning tool that asks What, Who, When, Where, Why and How. This technique allowed the team to understand the situation and to discern the problem by analysing all the aspects.
- Cause-and-Effect Diagram – A cause-and-effect diagram is a visual tool used to logically organize possible causes for a specific problem by graphically displaying them in increasing detail. This tool allowed the team to identify the main causes for concern and deep dive into each one.
- 5Why's – The 5Why's is an iterative questioning technique used to explore the cause-and-effect relationships underlying a particular problem. This technique allowed the team to find the root cause for every identified cause for concern.

With a clear understanding of the problem at hand, the team identified 10 KPI's to measure and drive improvement. A baseline study for each of the KPI's was conducted.

Solution

A total of 37 actions was identified for the project life cycle which ranged from short term actions, to stabilise the value chain performance, to long term actions that ensures sustainability. The following main actions was driven by the selected departments to enable the success of the project:

- MRM
 - Introduction of grade controllers
 - Implementation of a weekly forum between the Geology and Metalurgical departments
 - Implementation of a cut point prediction model
- Plant
 - Implementation of a revised filtercake blending strategy
 - Optimisation of export CV targets
 - Recalculation of moisture adjustment on plant scales
- Mining
 - Implementation of in-pit demarcation boards
 - Revised strategy to reduce the occurrences of mining in benches
- Engineering
 - Adjustment of samplers to reduce sampler bias
 - Scale recalibration strategy adjustment

Results achieved

The project focused on reducing the variation between the actual and planned yield. In the first month of 2021 a negative yield variation of 6% was achieved. Since the implementation of the project a positive yield variation was achieved in four of the six months with a near miss on the target for April, as can be seen in the figure below:

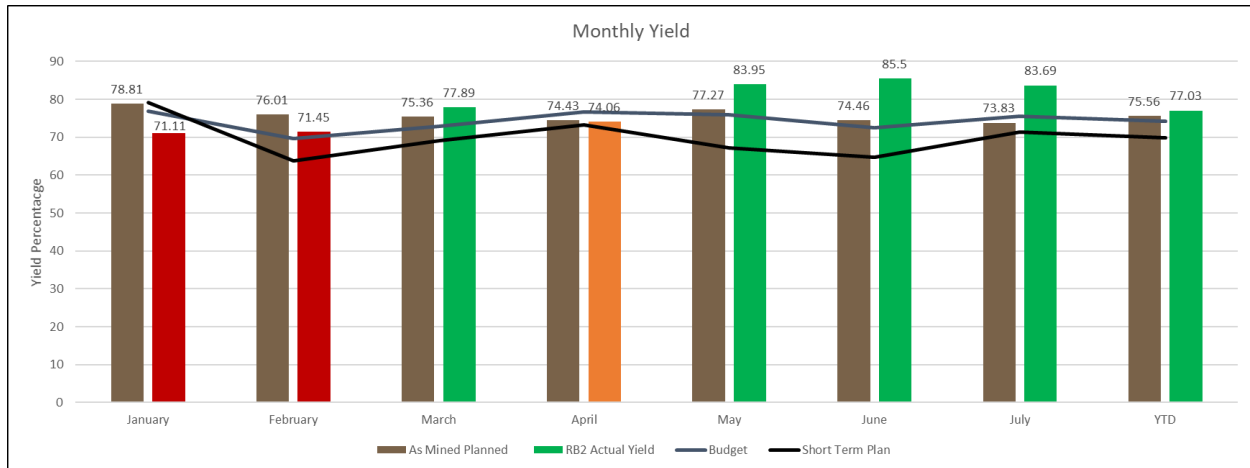


Figure 1 Belfast Export Yield Monthly Trend

In the month of January, the daily yield target was only reached on two days of the 21 days of production which resulted in a loss of 20 502 tons for the month. The table below shows the increase of daily targets achieved for each month. In June and July, the yield targets were achieved on each day of production.

Table 1 Monthly Target Achievement

Month	Nr of Days	Nr of Days Below Yield Target	Target Achieved %	Monthly Tons Lost
January	21	19	10,52	20 502
February	28	23	17,86	13 736
March	29	16	55,17	8 386
April	27	7	74,07	2 749
May	28	1	96,43	78
June	28	0	100,00	0
July	25	0	100,00	0
YTD	186	66	64,52	45 451

Role of PIT

The PIT was selected to be the project owner who was responsible to drive the progress throughout the life cycle of the project. The PIT's responsibilities included the following:

- Development of Project Charter
- Facilitation of Root Cause Analysis Sessions
- Facilitation of Weekly OE Sessions
- Preparation of Weekly Slides
- Driver of Registered Actions
- Value Quantification of Improvement Achieved
- Tracking yield performance after project closure in the GeoMet Forum

Conclusion

A total of 45 451 tons was lost in the duration of the project which can have a considerable impact of the EBIT performance of Belfast Coal depending on market demand and pricing. The project achieved the goal of stabilising the value chain process performance and reducing the daily yield variation to zero. A post implementation strategy was derived to ensure the sustainability of the project, as well to assist the value chain if similar problems occur.

Acknowledgements

- Belfast Management Team
- Belfast Mining Department
- Belfast MRM Department
- Belfast Plant Department
- Belfast Engineering Department