FOUR STEPS TO CREATE A SEAMLESS MINE OPERATION

How to establish a single source of truth for material flow data to boost productivity

INTRODUCTION:

DISCONNECTED DATA

STEP 1:

BREAK DOWN DATA SILOS

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DASSAULT SYSTEMES

INTRODUCTION

Disconnected Data

In a world where mining companies are at the heart of combatting climate change through more sustainable practices, data is key. Today at many mines, data management is fragmented. Production information is with the Mine Engineers. Block model data is with the Geologists. Budget forecasts are with the Mine Planners. And when another department needs this data, it's often shared via email in static documents like Excel worksheets. As soon as the original database is updated, those shared documents become outdated. In other words, there's no single source of truth that's accessible to everyone at all times. This leads to several challenges.

For one, outdated information paints an inaccurate picture of the mine site. In some instances, problems may go undetected and cause challenges further down the value chain. In others, erroneous data may cause operators to waste precious time and resources trying to fix a problem that doesn't exist.

Furthermore, if a discrepancy between the mine plan and the data is incorrectly identified, it can be extremely difficult to track down the source and calibrate the mine plan. With material coming in from different areas of the mine and blending in the stockpile, the reconciliation process can become highly complex.

So what can mines do to overcome these challenges and set themselves up for success? In this ebook, we'll explore how to automate the collection of material flow data into a unified data platform for enhanced confidence, simpler analysis, improved collaboration, and better decision-making.

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STEP 1:

BREAK DOWN DATA SILOS

The first step toward streamlining mine operations is to facilitate the free flow of information between departments. Imagine if the latest haulage and assay data was accessible alongside planned volume and grade within the same system.

A unified data platform allows users to connect directly into instrumentation & real time control solutions (ISA-Level 2) as well as geology, planning and engineering applications (ISA-Level 3) to automate data collection and display it all within one platform.

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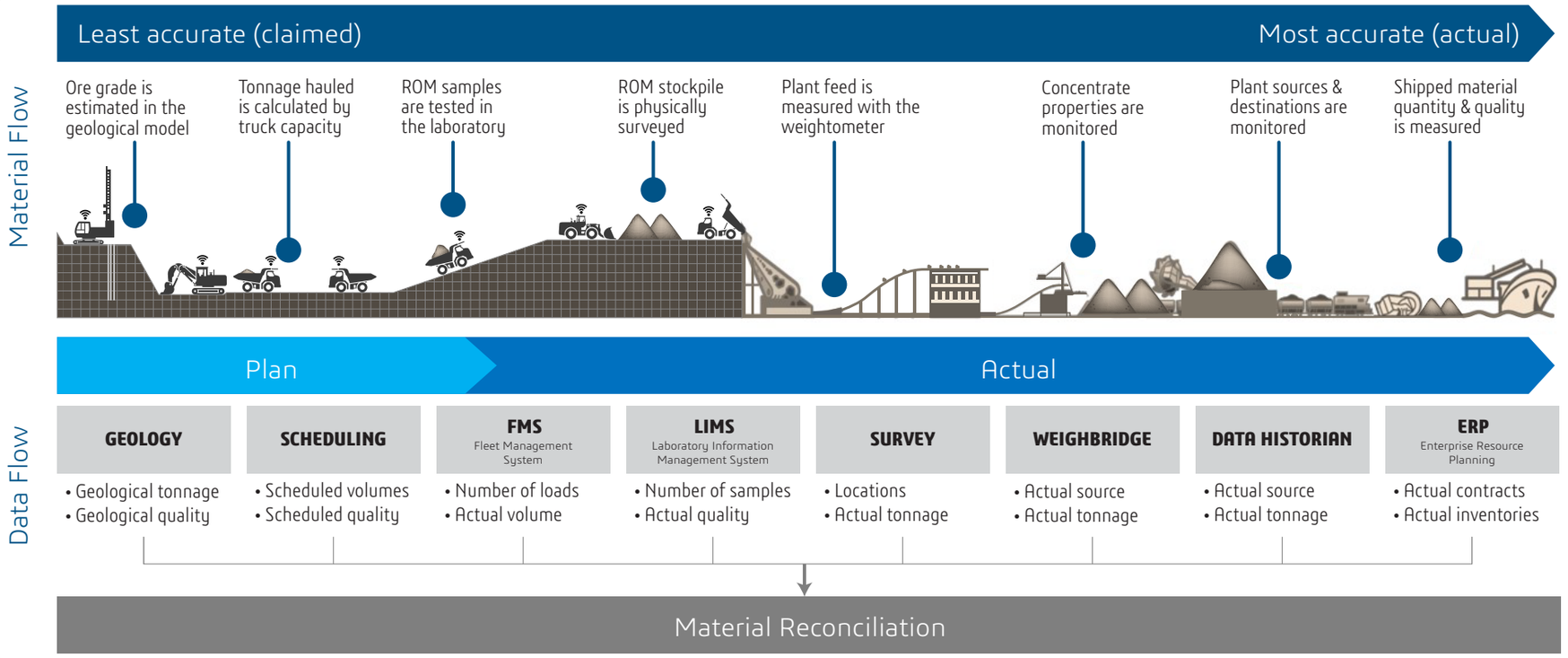
COLLECT DATA FROM ALL KEY STEPS IN THE MINING PROCESS



Not only does this eliminate data entry, storage, and sharing challenges, it also drastically reduces data fragmentation. By creating a single source of truth with all the latest information available to everyone throughout the mine site, a unified data platform improves visibility, agility, and productivity. Not only does this make the mining operation more efficient but also by reducing wastage and energy consumption it makes the operation more sustainable.

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STEP 2:

VALIDATE THE DATA

High-quality data leads to high-quality decision-making.

It's essential that on-site operators have confidence in the numbers that are being reported to know if their operation is adhering to the mine plan. If it's not, they need to understand exactly how and where to adjust.

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MINE OPERATIONS MANAGEMENT SOLUTION

To improve the quality of the data it's collecting, a unified data platform filters out low-quality data with an automated validation system using custom parameters established by on-site operators. This further reduces errors and increases operator confidence when responding to issues. It allows a flexible configuration where system administrators can create sets of rules for each mining activity through the Mine Operations Management screen. The idea is to have the data filtered based on the rules before it is loaded to the Mine Operations Management Solution. Data that failed the validation will not be loaded and the users will need to review and fix the data before it is re-processed.

When highly specific and complex validation is required, the tool enables system administrators to build a process model with highly customized and complex algorithms.

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STEP 3:

SIMPLIFY THE RECONCILIATION PROCESS

For some mines, the end-of-month reconciliation process can take weeks to perform as operators track down the necessary data and crunch the numbers. However, if they can access a single source of truth and have a high level of confidence in the quality of the data, the reconciliation process becomes much easier.

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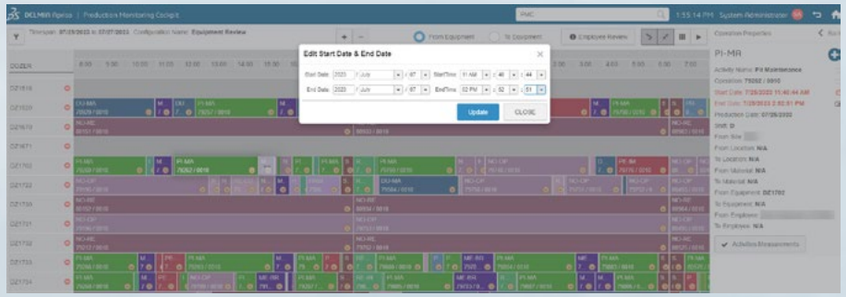

MATERIAL RECONCILIATION

With a unified data platform, users can run reconciliation in a day or less. The data is already collected within the system, and the program can automatically perform any necessary calculations. It also helps users easily identify the source of any discrepancies between the mine plan and what was actually achieved, simplifying and optimizing the calibration process.

Material reconciliation identifies errors from four main sources:

Resources modeling: Inaccuracy in the estimation of mineral resources resulting in the over or under-estimation of ore tonnage, grade, or both. This is true for both long- and short-term (or grade control) models.

Reserves models and mine plans: The deficient or non-existent setting of operational factors of dilution and mining recovery of the mine plan.

Mining operational practices: Operational inefficiency in extracting and segregating ore and waste according to short-term planning and ore control guidelines.

Geo-metallurgical models: Deficient modeling of geo-metallurgical variables or absence of them during the mine planning optimization and scheduling process.

A simplified reconciliation process enabled by a unified data platform helps to easily identify any of these issues, thereby increasing productivity and freeing up operators to focus their time and attention elsewhere.

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WHY RECONCILIATION IS KEY TO A SEAMLESS MINE OPERATION

Corporate auditability

A reliable reconciliation process helps mining companies demonstrate resources, reserves, and operational performance statements released to the market and shareholders are precise, accurate, and auditable.

Financial accuracy

An efficient reconciliation process determines the capability of a mining operation to effectively produce the tonnage, grade, and contained metal estimated in the ore reserve and make it available to market in time.

Operational reliability

Reconciliation allows for the detection and elimination of the main causes of discrepancies (or errors) between expected reserves and actual production by improving resources estimation and reserves calculation accuracy that allows for more reliable decision-making and predictability.

Continuous improvement

The reconciliation system is not intended to correct estimation practices but rather it uses and compares data collected from independent sources by means of ratios or factors to adjust the production processes in a timely manner to maintain consistent outputs (or production) within an acceptance level.

HOW EVERYONE ON SITE CAN BENEFIT FROM A STREAMLINED RECONCILIATION PROCESS

Mining Engineers and Mine Planners

Application:

Generate mine plans

Benefit:

Analyze production outcomes against planned models (i.e., forecasts and budgets) to adjust and calibrate mine plans

Geologists and Resource Estimators

Application:

Update and estimate resource models

Benefits:

Calibrate estimation parameters and improve block model accuracy by using data from independent sources

Processing Engineers and Geo-metallurgists

Application:

Control and model metallurgical recovery

Benefits:

Calibrate geo-metallurgical models and processing settings to adjust predict-ability, metallurgical performance, and supply needs

Production Engineers and Mine Managers

Application:

Control the correct extraction and delivery of material

Benefits:

Trace material quantity, quality, and recovery in real-time to take rapid corrective measures if necessary

Surveyors

Application:

Control volumetric changes in the mine and stockpiles

Benefits:

Simplify and speed up end-of-month process due to full traceability of volumetric changes, including operational factors (i.e., density)

Grade Control

Application:

Control the correct extraction of ore from different areas

Benefits:

Reduce ore grade and quantity deviation, control dilution, and activate feedback to calibrate mine plans and correct operational practices

Logistics

Application:

Control and optimize resource needs to delivery of final product

Benefits:

Increase accuracy of logistics plans and predictability of delivering product according to client requirements (i.e., quality and quantity) on time

Finance

Application:

Provide accurate financial and saleable product outcomes

Benefits:

Increase accuracy of financial forecasting and reduce uncertainties of product delivery variability (e.g., penalty and primes)

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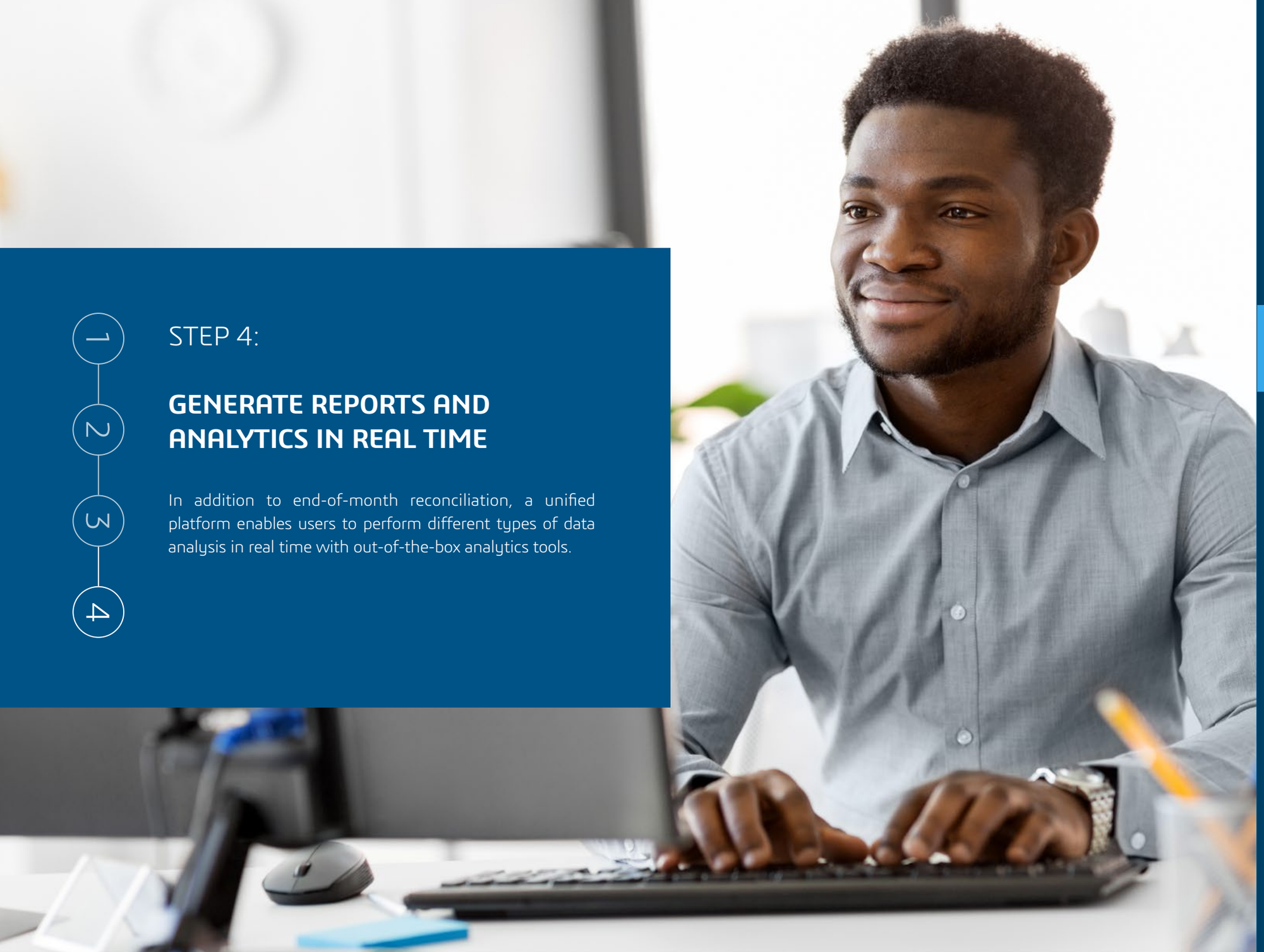

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In addition to end-of-month reconciliation, a unified platform enables users to perform different types of data analysis in real time with out-of-the-box analytics tools.

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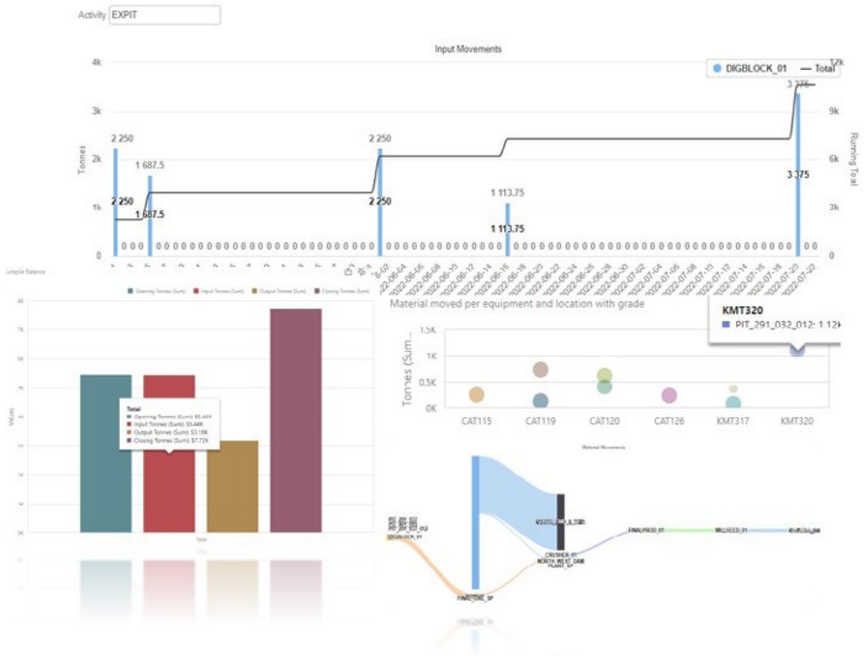
DATA DRIVEN DECISIONS

Comprehensive computational settings facilitate the tracking and reporting of all activities and outputs of the mine plan for further analysis and improvement. This allows teams to run scenario-based analysis or automate the calculation of production statistics using existing data.

Furthermore, end users can customize their data exports and reports, and configure multiple drilldowns, making it simple to generate and share reports highlighting specific KPIs. This improves transparency and communication between departments, and helps management better understand the actual situation on the ground, as well as how to respond to any potential issues.



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The Mine Operations Management solution from Dassault Systèmes provides a portfolio of end-to-end applications across the mining value chain to manage production performance in real time and ensure compliance to plan. The solution allows users to capitalize on operational data and produce actionable insights for faster and more informed strategic decision-making.

Data Management:
Automate the flow of data without human intervention with system integration

Material Reconciliation:
Standardize the procedure for performing month-end reconciliation across the company in an open and documented fashion

Operational Control:
Maximize operator efficiency by detecting and analyzing underperforming crews, shifts, and equipment operators

Asset Performance:
Optimize equipment efficiency by analyzing haulage actuals to detect any problems

Sustainability Objectives
Improve visibility, control, and synchronization of mine production, which in turn reduces waste and delivers a more sustainable operation.

To learn more about how to leverage the Mine Operations Management solution for seamless mine operations, contact GEOVIA.info@3ds.com.

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