Building Better Sustainability for Industrial Minerals Mining Operations:

An insider's look at the 5 major challenges to sustainability and how to solve them

In Industrial Minerals Mining, one of the greatest hurdles is uncertainty. Understanding the geology – where the highest quality ore sits and where the worst impurities reside – can mean the difference between a sustainable operation and one that is unable to meet customer needs. The goal of sustainable mining is to mine the ore body in the most effective and efficient way possible, reduce waste, and provide customers with a consistent product now and for the long term. But first, there are many challenges to overcome.

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5 Major Challenges to Sustainability

1. Challenge: Reactive Mining

When mining for industrial minerals, the relationship with the rock is often a reactive one. You know there will be impurities and contaminants existing in different forms, but you may not know where. Ultimately, this can lead to issues with stock management, waste control, and supply consistency.

When you work in an industry that is market and customer driven, you need to be able to deliver on your supply promises. Contracts are specific and relationships are built on the reliable supply of material to meet customer needs. You can't change the natural variability of a deposit, but by increasing the knowledge of your resource base, you can reduce uncertainty and mine efficiently.

Solution: Geological Certainty

An innovative approach to understanding deposits and defining materials is enabling customers such as the Lhoist Group to produce a consistent product and ensure customer confidence. Before implementing Seequent's solution, they found they were reacting to the geological variations and defining rock quality after the extraction had taken place. Today, they are able to better define their product and clearly understand its chemical makeup. A Lhoist Group Production Engineer comments, 'To know exactly what we can supply to our customers puts our business in a position of strength.' Geological certainty also enables organisations to find markets for material they may have previously considered waste – optimizing material usage and increasing revenue.

Our software can help you to better define the chemical and physical characteristics of your deposit and integrate the geological information into one universal source of truth. This will help you to optimise operations, create an executable mine plan, and avoid quality issues at the source. While any samples you collect are unlikely to have a dramatic impact on your overall geological interpretation, they can reveal changes to the boundary or location of some contaminant materials. This insight can be invaluable in shaping your mining plan for maximum sustainability.

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2. Challenge: Outdated Data and Knowledge Lag

Whether time is a constraint or a lack of data is the issue, geological models are often out of date and do not reflect the latest understanding of the deposit. The underlying cause can be linked back to the time and complexity involved in updating the geological interpretation and resource estimate in an explicit modelling package.

Working in 2D, explicit modelling uses a painstaking wireframing process whereby you digitise every single data point and connect them to create a 3D volume. This exercise must be carried out for each domain, and you must make sure that each volume fits the one next door perfectly to create an airtight model without intersections. Once new data is added to the model, the whole process starts over, and not just for one volume, but for all the adjoining ones as well. A significant amount of work and time is spent just trying to get the software to produce a valid model, rather than on interpreting the data. It isn't surprising that explicitly derived models tend to contain only one level of geological interpretation that may or may not respect other collected data such as structural, geochemical, or geophysical measurements. The sheer scope of the job of updating the model almost guarantees that it is out of date upon completion, and the results commonly do not accurately reflect the geological know-how of the person driving the model.

Solution: Implicit Modelling

Imagine if you could update your resource model, accurately predict product quantity, and improve product consistency in hours rather than weeks. When the inclusion of new data into a model is no longer the bottleneck, it presents opportunities to work differently. If interpretations can be updated daily, it significantly increases the value of data collection. Increasing the frequency of sampling, running drill campaigns differently, or targeting data collection in areas of high risk allows this valuable information to inform both the long- and short-term planning process.

With implicit modelling software such as Seequent's, you have full control to make the changes necessary to develop a true geological interpretation. It enables on-demand 3D modelling that takes advantage of a statistically sound base model. In addition, it allows you to integrate more than one data set and quickly develop several levels of interpretation within one project.

Whenever there is a new stream of data coming in, the dynamic link between data source and final model allows for your interpretation to be updated and shared instantly, without the painstaking process of digitising every new data point. In short, in the implicit world, one of the fundamental differences is that you don't just wireframe and force a model into an interpretation; you work with the data to make the best decisions possible using both statistics and geological expertise.

3. Challenge: Communication Barriers

In mining operations, the path to improving resource knowledge is often obscured by communication silos, multiple data sources, and different phases of geological interpretation. Whilst the challenge is to collaborate across departments to ensure a sustainable business, many organisations use outdated and inefficient communication channels.

For many operations, communicating changes to the geological and resource models is conveyed via PDFs, PowerPoints, or hardcopies. Highlighting impacts to production and ultimately product quality is a laborious effort, hindering a site's ability to react. Approvals could take days whilst information is distributed, and feedback collated. Reviewing past decisions and key learnings is impossible as information is poorly archived.

Solution: Dynamic Collaboration

With Seequent's software, you can rapidly update and dynamically collaborate on a 3D model. The multiple technical disciplines and business units can meet regularly – either in person or remotely – and hold discussions around the live model, while capturing opinions, decisions, and knowledge in 3D. Through this, you can adjust your short-term plan to account for changes in the resource base, ensuring you are extracting maximum resource value.

The more you can improve collaboration between geologists, mining engineers, and planners, the better your chances of driving efficiency, profitability, and sustainability. The browser-based capabilities of Seequent Central empower teams to easily view 3D models and have online discussions on what's changed and why, what the ramifications are, and the best practice processes that will profit the most from the data. Being able to talk about the potential benefits, share the impacts, and keep all stakeholders up to date with how the mining can be optimised is a major advantage in controlling costs. By improving the short-term planning, you pave the way for being able to extend the life of the mine and ultimately improve sustainability.

4. Challenge: Managing Waste

A few years ago, the Industrial Minerals Association Europe 2050 Roadmap declared that the minerals sector was driven by resource efficiency and that waste reduction was a key part of this ambition. New technologies would increase the rate of marketable materials whilst saving energy and water, predicted the report. These efficiencies and the boost to sustainability they bring, 'will trickle down through the value chain reducing consumption by improving the performance of the end product.' When a mine isn't efficiently managing resources and reducing waste – whether in materials, energy, water, or even human effort – they are jeopardizing sustainability.

Solution: Using Agile Data to Reduce Waste

Where Seequent's solution differentiates itself, particularly in the operational environment, is its ability to update data dynamically thanks to the implicit nature of its modelling. You can incorporate data back into the geological model at a much higher cadence than if you were modelling explicitly.

Take a pit, blast, or a post-crusher sample, Seequent's collaborative tools enable you to get that data back into your model and flow it through rapidly enough to influence your short-term mine plan and schedule. You can show the impact of new information in the same day – perhaps within hours – using all that new mine geology data as it becomes available. When you have a greater understanding of your product, you can be more certain of the grades you can achieve and have less waste.

5. Challenge: Inefficient Workflows

Inefficient workflows complicated by communication silos and incomplete or out-of-date data are the enemies of a sustainable business. It becomes difficult to estimate confidently how much and of what quality mineral reserves are available to mine. The forecast for your production budget becomes less accurate too, leading to a less profitable mine.

Solution: Optimised Workflows to Enhance Sustainability

Seequent's software covers all aspects of the exploration and production mine lifecycle. The integrated nature of our products and ease of use will help to break down barriers across your operations. The software doesn't require years of experience to drive the desired result. It follows a logical workflow that has been designed by geologists and in partnership with major industry customers.
(See our solution workflow below.)

Maximise the Industrial Minerals Value Chain with Seequent's collaborative tools and technology

- Faster data updates – new data automatically updates model and informs mine plan
- Better defined variability for greater accuracy of material concentrations
- Extending life-of-mine through better material management
- Better standardisation and processes across all operations
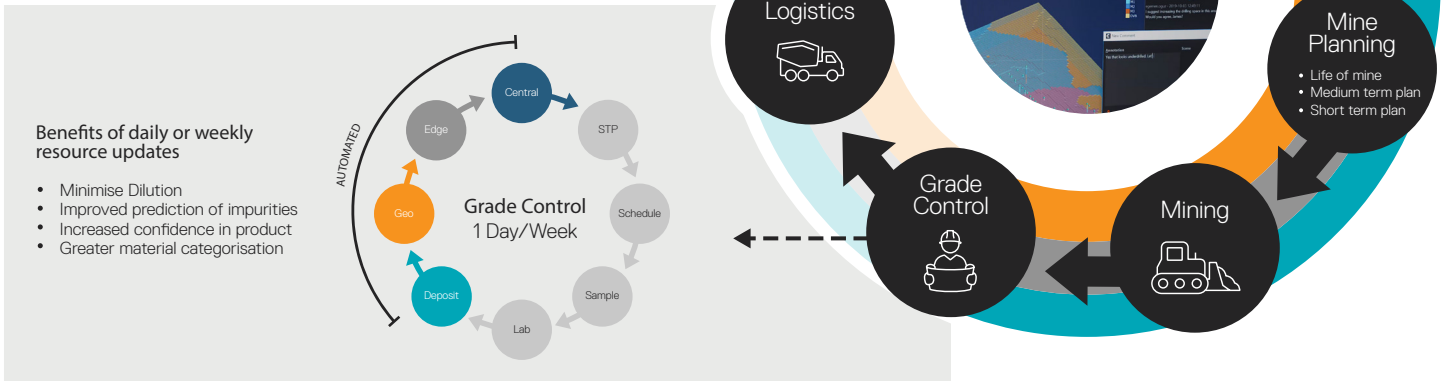
Benefits of daily or weekly resource updates

- Minimise Dilution
- Improved prediction of impurities
- Increased confidence in product
- Greater material categorisation

Grade Control
1 Day/Week

AUTOMATED

Central · STP · Schedule · Sample · Lab · Deposit · Geo · Edge

Exploration · Resource Development · Mine Planning
- Life of mine
- Medium term plan
- Short term plan

CENTRAL
Data Management Platform

Market Sales · Logistics · Grade Control · Mining

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leapfrog GEO
A workflow-based 3D geological modelling tool with an advanced implicit modelling engine bypassing time-consuming wireframing. Models update dynamically when new data is added.

A data and model management solution that helps to visualise, track and manage geological data from a centralised, auditable environment. Remote teams can collaborate on the same data and models.

leapfrog Edge
A resource estimation tool arranged in a streamlined workflow. Refine or add data at any stage and changes flow downstream from the geological model to the resource model.

Simplifies how drill hole and point sample data is collected, managed, and shared. Deposit can be used across the mining value chain: Exploration, field sample collections, grade control drilling and environmental remediation.

Industrial minerals companies – unlike other sectors in the mining industry – may have a very large number of pits globally, varying significantly in size from the tiny to the vast. Standardising processes and workflows across such a diverse set of operations is enormously challenging, yet it's in such standardisation that many of the most advantageous operational efficiencies lie.

Seequent's solution helps you standardise processes across all operations, achieve a greater understanding of your product and be more certain of the grades achievable. Some industrial minerals customers will have a very tight set of specifications that need to be met. The better your teams can define the variability, the more accurate they'll be on where certain concentrations of material are, and the tighter the specifications your business can deliver to.

A better understanding of your mineral resource also leads to a lower cost of operation. No more chasing the grade. Instead, you can confidently budget and plan for the optimal application of resources, both mechanical and human, to extract the ore and manage waste.

Logistically, you will also expend less energy moving mining equipment to another part of the pit when you unexpectedly hit a pocket where the quality drops. You can be more proactive in how you distribute your resources rather than shifting trucks around in pursuit of the next piece of ore to take. With a clearer idea of the waste involved, there is less risk of bringing in more trucks than required, and the operation can maintain tighter control over equipment and fuel costs.

Seequent's ability to help you optimise workflows is the key to improving sustainability, extending the life of the mine, and delivering on promises to customers.

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The Benefits of Seequent for

Your Sustainable Operation

Seequent's software brings all disciplines of Geology, Mine Planning, and Production together to enable the dynamic updating of resources in a connected environment.
This enables customers to:

- Create and update geological models on demand
- Accurately predict material quantity and quality faster than ever before
- Extend life of mine through better material management
- Standardise processes and collaborate across all operations
- Dynamically update, manage, track, and share data in a single environment
- Make data-informed decisions
- Satisfy customer needs
- Exceed budgets

Understanding the characteristics of your minerals and being able to predict the quantity and quality of products before extraction are essential for profitability and sustainability. But first you need to eliminate any knowledge and communication barriers. Seequent's solution enables you to rapidly update your model and collaborate across business units as fast as new data comes in. Such dynamic collaboration increases data certainty to help you reduce waste, grow customer confidence, encourage longer-term contracts and improve sustainability. If you would like a demonstration of what Seequent can do for you, let's talk.

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VISIT US ONLINE for more information about Seequent's Solution for your sustainable operation.