



## WHITTLE CONSULTING

BUSINESS OPTIMISATION FOR THE MINING INDUSTRY

### Australia's Mining Monthly

#### A new era for strategic mine planning process – Part 1

Monday, 1 October 2001

**During the past year or two, we have witnessed some major corporate consolidations within the mining industry, writes Gerald Whittle.**

Consolidation is easy to justify on the grounds of operational synergies, rationalisation of overheads and other economies of scale. Examples that affect this region include Rio Tinto and North, BHP and Billiton, and the Anglo group's increasing spread.

However, looking more closely at how some of the post consolidation organisations are structured reveals a less operational emphasis. Rio Tinto units Hamersley Iron and North have maintained separate operational management groups and not (yet) taken the "one-mine" approach that has taken Hamersley so far. BHP Billiton has split the management of its coal assets between energy coal, and coking coal, the latter being combined with iron ore into its new "carbon steel" division.

Surely there are more similarities between mining the two types of coal, than with iron ore? Certainly, but the issue here is not mining, it is the desire to face the steel mill customers with a single and united front. This may be a genuine effort to become more customer-focused, but perhaps it is a response to the "divide and conquer" tactics the Asian steel mills have practiced so adeptly and blatantly in the past.

Whatever the interpretation, these developments herald a change from the traditional operational focus of mining companies, towards becoming more market-driven organisations. This will have significant implications for mining company management, and the analytical support they rely on.

#### Developments in analytical approaches/tools

Fortunately, developments in computing have made great progress for the planning and management of mining operations. As well as the ability to handle large amounts of information using databases, the mining industry has benefited from specific developments in modelling and optimisation mathematics, particularly applicable to a business involving large volumes, masses of data and great economic sensitivities.

All industries benefit from the ability to simulate their operations in computer models. Some industries benefit from software that goes on to optimise these models.

In an optimisation, the computer uses complex mathematics to control one or more of the variables in the model to maximise the simulated performance of the system. Furthermore, if the optimisation runs are short enough, it is feasible to iterate through possible values of other factors, quickly homing in on the combinations that give the best result. Even further, scenario analysis can provide great insight into the robustness and sensitivities of particular plans by a wide range of criteria, leading a path towards best plans as opposed to just mathematically optimal plans.

Mining optimisation technology is constantly developing in terms of what it can simulate, optimise, and therefore what can be considered through iteration.

For Example, using conventional methods it takes a mine planner weeks (or months) to develop a viable long-term schedule in a multi-pit, multi-product blended coal or iron ore scenario. In a single cycle, using Whittle Consulting's approach to multi-pit blending scheduling, the software may evaluate several million feasible life-of-mine schedules, discarding combinations of variables returning good results, homing in on and refining combinations giving good results, until it can find no more room for improvement.

Within a run, it is possible to optimise:



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- \* The long-term schedule.
- \* The timing of major mine expansions.
- \* The percentage of material to washed/beneficiated.
- \* The "negotiation" of processing plant grades.

By iteration it is possible to evaluate:

- \* Alternative plant configurations/expansions.
- \* Different cost scenarios.
- \* Alternative product mix/specification.
- \* Various projected market environments.

In a complex blending situation the orebody is actually capable of producing a wide range of product volumes and mixes, each with its own combination of cost and commercial consequences and implications for the ultimate use and life of the resource. This has always been apparent at a conceptual level, but now it is possible to address these dimensions as a practical component and fundamental dimension of the planning process.

The level of discussion can now reach new levels. The developments in optimisation tools and techniques can provide the analytical foundation for a new paradigm in the scope, complexity and performance of the mine planning process.

### **Market driven strategic mine planning: management implications**

However, it is not going to be that simple. Running some reports and performing some analysis, even if brilliant, does not mean that the organisation is instantly focused on the strategic agenda and works cohesively as a unit in the pursuit of its objectives. That involves people, not just computers, and people need managing.

To become market-driven, the departments of marketing and mining operations are going to have to learn to talk to each other better, and while they are at it they should learn to include finance, human resources and anyone else who is around. There are barriers to cross-functional dialogue, stemming not only from the different job descriptions, but also from the different education, mindsets, logic (or lack of), jargon, personalities and even appearances of these groups.

People tend towards the functions that suit them, and pointing out the stereotypes can be fun, and frightening!

## **A new era for strategic mine planning process - Part 2**

Monday, 1 October 2001

**Organisations approach the complexity of their worlds by dividing up responsibilities, by function (as if functional integrity was more important than cross-functional co-operation) and by project (as if decisions about one project can be made independent of the rest of the system of which they are a component).**

This departmental approach is the start of an organisational solution, but also the start of many of its problems.

So far, mining organisations have been forced to simplify their lives. "Operations" tends to make simple statements of how many tonnes of a certain grade they can produce and "marketing" about what they can sell. It is common to work with fixed stripping ratios, cut-off grades, beneficiation rules and product specifications. We have been forced to pretend that the truth is so basic, because attempts to take the dialogue to the next level have been frustrated by the lack of the analytical support and management processes to do so.

The market-driven approach can now be supported analytically, but is still going to strain the organisations that go down this path. It is going to highlight weak cross-functional relationships, stretch poorly developed communication channels, and test the organisations ability to recognise and



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deal with the complexities of the opportunities that have always been there, but have been bypassed due to the practical barriers.

Mining company corporate strategists have set the scene, by bringing together some magnificent collections of assets. The challenge is now for mining organisations to see how quickly they can step up their management processes to see just what their resources are actually capable of.

## **Model of an ideal strategic planning program**

Strategic mine planning is too important to be left to the mine planner. It must be embraced across the organisation. It is also an ongoing activity, not something you do once a year to meet a deadline.

The steering group has a representative from each major function: geology, mining operations, finance and marketing, and do not forget human resources, and the head of each major project group. A company's organisation chart makes it clear who should be there.

The CEO has divided the organisation up, and this is the point where he puts them back together. As "executive sponsor" the chief executive officer charges the group with exploring the strategic alternatives facing the company, and to evaluate them by a broad and balanced range of criteria. The sessions are run with open communication, all perspectives are given a fair hearing, and consensus is reached. The detailed work and analysis goes on outside these sessions, which are designed to direct and evaluate the outcomes presented.

A good CEO will provide guidance and support, but not dominate with his own opinions, nor abdicate from responsibility for the end result.

The reasons for such involvement include the requirements:

- \* To get all perspectives on an issue.
- \* To harness all the talent in the organisation.
- \* To ensure the plan, and the reasons for it, are widely understood.
- \* To ensure involvement, buy-in and commitment from all parts of the organisation to the implementation.

It sounds like a lot of work, but it is not really in practice if managed effectively. It is actually a minor investment, when compared to the time and effort wasted and opportunity cost of having a sub-optimal plan, or poor execution of a good plan. If the functions within an organisation get together on one issue only, it must be the strategic plan, because that sets the framework within which everything else will happen.

The developments in strategic mine planning tools and techniques will have little impact if they are not applied within a well managed integrated planning process. Put the right elements together and a mining organisation can really reach its full potential.

\* Gerald Whittle is managing director of Whittle Consulting.