Coal is a continually dominant element of the energy supply mix, and its importance is growing due to rapid population and income growth in developing Asian countries. Whilst increased demand is presenting big opportunities for the mining industry, it is also presenting great challenges due to the vast complexity of the global mining supply chain.

Mining companies that fail to optimize an end-to-end supply chain by integrating and automating operations, logistics, and marketing functions subject themselves to significantly heightened risks that can erode profits, impede productivity, and compromise product quality. Companies that want not only to remain competitive, but to thrive in our current and future economy must take steps to implement a technology infrastructure that optimizes the supply chain from “pit” to the point of export, import, or consumption.

Author: Guy Isherwood, Editor, Commodities Now
Coal is a continually dominant element of the energy supply mix, with demand surging in recent years primarily due to rapid population and income growth in developing Asian countries. China and India alone are doubling their per capita incomes at approximately 10 times the rate and 200 times the scale achieved by Britain’s Industrial Revolution in the 1800s [1].

This massive growth has fueled explosive demand for resources including energy, food, and raw materials that will continue into the foreseeable future. And underpinning the accelerated resource production needed to meet this increased demand is the mining industry. Coal and other minerals are needed to produce steel for new buildings, generate heat and electricity for new homes, run factories manufacturing consumer goods, and power locomotives transporting raw materials and finished products across the supply chain.

According to the International Energy Agency (IEA), coal consumption increased by more than 70% from 3,700 million tonnes (Mt) in 2000 to an estimated 6,300 Mt in 2010 [2]. China and India account for 90% of this increased demand. Over the past decade, China’s consumption has more than doubled, turning it into a net importer despite its own huge reserves. India’s hard coal imports grew by 70% between 2006 and 2010, and the rapidly developing nation continues to have large and growing energy requirements.

All of this surging demand has made coal the second most important energy source behind oil, presenting big opportunities for mining companies worldwide. However, with big opportunities come big challenges, especially related to the supply chain. Increased demand and higher commodity prices makes for a more competitive marketplace, and the companies that will come out on top will be the ones that address their supply chain challenges head-on to achieve maximum efficiency. Those companies that continue to make-do with spreadsheets and other antiquated methods for managing the supply chain are subject to lower profit margins and will likely compromise product quality, among other things.

Understanding the challenges of optimizing an end-to-end mining supply chain and how to address them is critical to ensuring efficient, streamlined operations that maximize profit.

Mining Supply Chain Challenges

The mining supply chain consists of a complex series of interrelated activities spanning operations, logistics, and marketing functions. Planning, budgeting, and executing activities across these functions is critical to ensuring maximum efficiency and profit. In order to successfully accomplish this Herculean task, it is imperative to address the major challenges associated with optimizing the supply chain from “pit” to the point of export, import, or consumption.

Lack of Visibility

The importance of having a crystal clear view of operations across the entire mining supply chain cannot be overstated. Three out of four mining and metals supply chain executives cite supply chain visibility as their top challenge [3]. If the right hand doesn’t know what the left is doing, it becomes virtually impossible to make sound business decisions, achieve efficient operations, generate accurate forecasts, and respond to supplier, market, and customer events in a timely manner.

Supply chain visibility often eludes mining companies because they are using disparate systems for planning, production accounting, and other purposes which are either poorly integrated, or worse, not integrated at all. Visibility can also be elusive due to organizational structure. Mining companies are typically “silied” – with individual mines and facilities functioning autonomously. Furthermore, operations, processing, transportation, and marketing functions often reside within different divisions of a company or business unit. This fragmentation is not at all conducive to cross-collaboration and planning – if anything, it discourages it.
Inaccurate Data

Mining companies are adept at leveraging advanced technology for geological modeling, plant control, and other important functions. However, many mines are still using archaic spreadsheets to track the tonnage, quality, and value of their products from the point of extraction to the point of export or consumption.

Spreadsheets are not appropriate for managing and optimizing the complex activities across an end-to-end mining supply chain. Studies by independent academics show that as many as 94% of complex spreadsheets contain errors including input errors, logic errors, interface errors, and incorrect cell range errors. These errors, even significant ones, often go undetected because spreadsheets are usually created by non-programmers who don’t perform formal testing. Because of this, many mining companies using spreadsheets function without the knowledge that a problem even exists, giving them a completely inaccurate picture of day-to-day operations and affecting all aspects of the supply chain. Without the necessary data validation and control, errors spread throughout key corporate processes that control hundreds of millions of dollars of inventory, putting the entire company at significant operational risk.

Furthermore, these companies are unknowingly putting themselves at considerable risk for regulatory non-compliance. Just one instance of a company having an error in its reporting system will require independent auditors to give the company a negative rating. This can result in lower stock prices, considerable damage to the company’s reputation, and, in some cases, significant financial penalties.

“Three out of four mining and metals supply chain executives cite supply chain visibility as their top challenge.”
Managing High Volume Throughputs

As throughput volume grows, so do the challenges associated with maintaining a streamlined supply chain. Insufficient infrastructure and process management systems that are not equipped or optimized to handle high volume throughputs can cause supply chain bottlenecks that impede fulfillment of contractual requirements.

Producers, logistics service providers, port operators, and generators all need to synchronize their operations in order to reduce bottlenecks and ensure that the right product gets to the right place at the right time at the right cost. Enterprise systems and processes must be in place to facilitate the flow of information across all supply chain partners.

In a market where each incremental tonne of throughput makes a big difference to the bottom line, supply chain inefficiencies can result in a significant amount of lost potential profit. Technology solutions designed to optimize and streamline mining operations from pit to port are critical to effectively balancing supply and demand while managing quality, stockpiles, logistics, and a myriad of other complexities.

Ensuring Grade Control

Implementing a grade control system across the entire supply chain is critical to ensuring optimal resource utilization and minimizing contractual quality penalties. However, many mining companies forego these systems, relying instead on spreadsheets that are scattered throughout various departments to try and figure out what grades exist where, and how much of each grade is scheduled to be produced. This makes it extremely difficult to determine with any accuracy what will end up shipped to the customer, resulting in considerable contractual quality penalties - penalties which, in some instances, can amount to tens of millions of dollars per year.

Grade control systems enabling bulk material packet tracking, blend planning, and blend optimization enable miners and traders to deliver on-specification material to customers without incurring contractual quality penalties. Additional benefits include increased process plant yields and efficiency, as well as minimized transportation costs/demurrage due to improvements in supply chain visibility and control from a tonnage and grade perspective.

On the customer side (generators, mills, smelters, etc.) adopting a grade control system for inbound bulk material deliveries and plant stockyard operations can improve plant yields and help reduce plant emissions, maintenance, and consumables.

Despite all of these benefits, many mining companies fail to deploy grade control programs. It is imperative to deploy an enterprise-wide grade control system and adopt a grade optimization mentality from pit to customer in order to maximize resource utilization across the supply chain, which in turn will maximize profits.

Addressing Supply Chain Challenges ... From Pit to Port

As previously stated, all aspects of the mining supply chain must be seamlessly integrated in order to fully capitalize on the opportunities for increased profits that today’s market offers. It is especially critical to overcome challenges associated with enterprise-wide visibility and inaccurate data, along with the more “physical” challenges they help spawn related to high volume throughputs and grade control. If not addressed, they can result in significant risk that erodes profitability and ultimately the viability of the business itself.

Fortunately, there are technology solutions that are specifically designed to overcome these challenges by optimizing an end-to-end mining value chain. Triple Point Technology in particular offers an innovative, comprehensive, and unique platform that may very well be the only true end-to-end supply chain optimization solution, because it optimizes the trading side of the business along with the more “traditional” aspects of the coal and mineral supply chain. This platform includes Triple Point’s flagship trading and risk management product, Commodity XL™, and its QMASTOR mining solution suite.
Commodity XL, used worldwide by hundreds of companies spanning many industries, is a multi-market Commodity Management solution that meets requirements for supply, trading, marketing, logistics, scheduling, shipping, risk management, and accounting. With Commodity XL, mining companies can see their total position, and analyze the market for various grades of coal to determine what to buy and sell, when to buy and sell, and how much to buy and sell. Powerful decision support tools enable companies to perform accurate forecasting that drives optimized resource allocation across the entire supply chain.

Triple Point’s QMASTOR solution suite complements Commodity XL by driving bottom line improvements to coal and mineral supply chains. Used by companies including BHP Billiton, Rio Tinto, Vale, Anglo American, Exxaro, Xstrata, and Peabody Energy, QMASTOR products manage the tonnage, quality, and value of coal and minerals from pit to the point of export, import, or consumption. These products help companies reduce operational, logistical, and marketing costs by automating and optimizing the management of complex supply chains that include multiple mines, stockpiles, transport legs/modes, and ports.

QMASTOR solutions are developed by specialists with years of mining experience. They include extensive integration capabilities to ensure they work seamlessly with numerous third party solutions including enterprise resource planning (ERP) and control systems, as well as transportation, laboratory, truck dispatch, and geological modeling systems. The QMASTOR solution suite includes:

- **QMASTOR Pit to Port™** – A decision support system enabling management to plan, record, track, optimize, account, reconcile, and report the tonnage, quality, and value of materials from the mine to the point of export or consumption. Pit to Port synchronizes operations, logistics, marketing, and commercial functions to eliminate bottlenecks and provide a transparent view of export, import, and domestic supply chain operations across the enterprise. Pit to Port also automates key processes such as invoicing, eliminating error-prone spreadsheets.

- **QMASTOR PortVu®** – An award-winning integrated bulk terminal management system that automates and manages the complexities of stockyards, inter-modal transportation, and vessels while ensuring equipment is scheduled and utilized efficiently. PortVu integrates terminal operations with suppliers, customers, transport providers, agents, laboratories and other partners through the use of a common platform. PortVu can be interfaced to a terminal control system to provide necessary information on stockpile position for yard equipment instructions, task and route management, vessel load and hatch plans, and belt weightometers for accurate data reconciliation and reporting.
• **QMASTOR Horizon™** – An advanced planning and scheduling optimization system enabling complex supply chains to be modeled, planned, and scheduled simply and efficiently. The solution utilizes a business rules-based engine coupled with manual and automated scheduling mechanisms for optimized planning and scheduling based upon site-specific sets of strategies and weighted key performance indicators. Horizon can be used across the entire supply chain, or for specific processes and functions including terminal stockyard asset utilization and inventory management.

• **QMASTOR SMS3D®** – A stockpile management solution that tracks and visualizes parcels of material in three dimensional space. SMS3D dynamically models stockpile tonnage, grade, and value in real-time to enable proactive grade management and optimize process plant configuration, blend planning, and reclamation/load planning. SMS3D delivers extremely accurate tonnage and quality forecasts, and simplifies blend planning to ensure deliveries are within specification.

These solutions help mining companies gain market share in today’s increasingly competitive environment by providing sustainable improvements across the extended supply chain, and facilitating capital efficiency. One company that has realized significant benefits from implementing Triple Point’s QMASTOR Pit to Port solution is Exxaro, one of South Africa’s largest coal producers. Exxaro sought a supply chain management solution to ensure it could efficiently meet the growing demand for coal, and selected Pit to Port for its comprehensive automation, integration, and optimization capabilities. Within the first few months of using the solution, Exxaro identified a miscommunication between Marketing and Finance, which led to substantial savings.

According to Melanie Steyn, Exxaro’s Coal Export Manager, “QMASTOR [Pit to Port] brings many benefits to Exxaro: top of the list is saving money and increasing productivity. Our supply chain is now fully prepared for the future when we start producing substantially more coal and generating more revenue.”

**Summary**

Whilst the increased global demand for coal presents a wealth of opportunities for mining companies, it also presents great challenges. The mining supply chain is comprised of a multitude of complex elements spanning operations, logistics, and marketing functions. Fully understanding the challenges associated with these elements and how to address them is critical to ensuring efficient, streamlined operations that ensure maximum profit and mitigate risk.

The companies that will come out on top will be the ones that address their supply chain challenges head-on by implementing a technology solution specifically designed to integrate, automate, and optimize all elements of the mining supply chain. Those companies that continue to make-do with spreadsheets and other archaic systems and processes for managing the supply chain are subject to lower profit margins and will likely compromise product quality and customer service, among other things.

Having the right technology infrastructure in place to support current and future market demands and business needs can make or break a company. Triple Point Technology’s comprehensive platform empowers companies to address a lack of visibility, inaccurate data, and the more “physical” challenges they spawn related to high volume throughputs and grade control by optimizing the entire mining supply chain from pit to port. With Triple Point, companies can be confident that they will be prepared for whatever the future holds.

“Our supply chain is now fully prepared for the future when we start producing substantially more coal and generating more revenue.”
About Triple Point Technology

Triple Point Technology® is the leading global provider of cloud and on-premise Commodity Management software that delivers advanced analytics to optimize end-to-end commodity and energy value chains. The company provides real-time, innovative solutions to competitively address the complex and volatile commodities supply chain: buying, selling, trading, and procurement; enterprise risk management; scheduling and logistics; storage; processing; and settlement and accounting.

Triple Point’s Commodity Management platform enables over 400 customers in 35+ countries to profitably manage exposure to energy and raw materials across industries, including energy, metals, minerals, agriculture, transportation, shipping, consumer products (CP), industrial manufacturers, and big box retailers. Triple Point was named a “Leader” in Gartner’s ETRM Magic Quadrant for its completeness of vision and ability to execute in 2009, 2010, 2011, and 2012. Founded in 1993, the company employs over 800 staff in 14 offices and support centres around the globe. www.tpt.com.

Notes

About the Author

Guy Isherwood is Publisher and Editor of Commodities Now; the global magazine for the traded commodity markets covering energy, metals, agriculture, regulation and specialist technology.
E: gish@commodities-now.com