

# IBM Maximo Asset Management for the mining industry

*Solving industry challenges with Visibility. Control. Automation.*



## Executive Summary

The mining industry is a very asset-intensive industry and as the pace of change continues to accelerate, organizations face a number of significant challenges. The mining “asset portfolio” is becoming increasingly diverse with assets including mobile, fleet, fixed plant and infrastructure including rail, roads and ports. Other assets such as pipelines, drilling machines and transportation vehicles require tremendous amounts of capital and skilled resources to be maintained and managed, while newer production assets are growing increasingly complex as they rapidly become digitized or “smart” devices.

At the same time, the current mining workforce is transitioning from a retirement-age workforce to a younger and less experienced one. As such, safety, security, health, environment, asset reliability, standardization of systems and cost containment become increasingly important. With most equipment continually running at or near capacity, any downtime can quickly erode already tight margins, with revenue irrevocably lost as a result.

With all of these changes and challenges occurring, many organizations in the industry are increasingly looking to information solutions to help maximize asset utilization, to improve asset management best practices, to control escalating capital and operating costs, and to improve operating margins.

Typically, however, most organizations have numerous disparate applications deployed across the enterprise at both the business and production level, each with its own unique reference and data model. The result is an incomplete view of operations, which can make the task of ensuring assets are efficiently managed and maintained that much more challenging. To drive profitability, mining companies need innovative processes and business models—with shared data, processes and workflows—to help improve operational efficiencies and reduce the cost of doing business. By bringing the disparate systems into a unified structure, enterprise asset management (EAM) software enables the type of business innovation that allows organizations to increase production yield while lowering maintenance costs and achieving operational excellence.



To provide a fully functional mining operation with optimized information, organizations need end-to-end visibility and control of all critical assets across the enterprise—their preventive service histories, measures and calibrations, and real-time information about how equipment is operating. EAM provides a unified solution that can offer mining companies a way to understand and control how their systems are operating and to meet demanding security, safety and compliance requirements. As part of an effective business and IT integration strategy, EAM focuses on the visibility, control and automation functionality needed to answer the challenges of providing superior operations.



## Trends and drivers in the mining industry

### Global demand for energy, minerals

The most important activity impacting coal mining—global energy demand—will continue to be influenced by the current global desire to diversify away from excessive reliance on oil. Key to satisfying the increased demand is the development of cleaner coal technologies, which is expected to take another four to five years.

Recently mining production in the United States has declined, however the increase in global demand is anticipated to be satisfied by double-digit growth in emerging markets such as China in addition to strong performances from Brazil, Vietnam, Russia, Malaysia, India and parts of Eastern Europe. In addition, developing economies in South America and Asia have had higher consumption of mineral materials as political regimes have liberalized their economies to meet demands for higher standards of living.

### Increasing environmental regulations

The mining industry faces increasingly stringent environmental regulations, and companies are under pressure to develop cleaner and more efficient, sustainable technologies. Recent years have seen an increase in punitive action for violation of environmental regulations which has threatened margins. In some jurisdictions this has led to the inclusion of criminal penalties. Regulations pertaining to the industry are numerous. Emphasis is placed on point source discharges to waters, although air and environmental impacts are also regulated.

Developed countries have higher regulatory pressure than emerging economies, partially driving mining companies to invest in mining operations in emerging economies. Also there is an increasing emphasis on social behavior or to manage the impact of mining activities on the community, the environment and the people.

### Industry consolidation

A key characteristic of the mining industry in the last few years is a surge in mergers and acquisitions, with the drive to maintain international competitiveness seen as an important factor pushing companies to consolidate. This industrial consolidation requires adjustments in the business model and flexible information systems to support operations in a global scale.

### Aging workforce and skills shortage

The mining industry continues to see the number of skilled resources decline, while costs are increasing. A globally dispersed workforce is challenged to apply expertise locally and regionally. Newer employees have different expectations and generation gaps must be considered to incorporate the new workforce.

### Information technology adoption

With respect to technology adoption, the mining industry has generally trailed similar industries such as the oil and gas industry. However, there are signs that the industry is investing

in information technology to support automation, primarily for safety and cost reduction purposes. Sensors and controls are increasingly being incorporated into mobile and stationary mining equipment. Despite this trend, much of the existing mining information technology infrastructure is fraught with closed, proprietary systems.

### High fixed cost structure, high energy costs

The mining industry is also characterized by high fixed costs and the two largest variable cost components (transportation and energy) have both been subject to increasing costs. Large companies tend to dominate mining of such metals as copper, silver, and gold, while more diverse mine operators may be involved in mining lead, zinc, and iron metals.



### Globalization

To address rising transportation and energy costs, and the shift in demand from developed economies to emerging ones, many mining companies are shifting investments to the emerging regions. For example, the number of companies that have shifted portions of their exploration budgets to Latin America is growing. Many mining exploration companies in North America, are now active in Latin America, especially Mexico and Chile.

Among the forces driving companies abroad is the recent privatization of world-class mineral deposits, the presence of rich overseas ore deposits, depletion of prime domestic ore sources, labor costs, and the lack of significant regulatory pressure in the developing world.

Continuously changing market conditions in the mining industry—combined with mounting pressures from traditional and nontraditional stakeholders and increasingly rigorous compliance requirements—have challenged progressive corporations to drive sustainable behavior to the core of their business.

To lead in this world of increasing complexity, mining companies must provide shareholder value while delivering on commitments to the communities in which they operate, the employees that are the engine of their business, the regulators that demand a greener world. They must do this by:

- Facilitating sustainability and accountability.
- Increasing individual performance by managing service agreements and rewarding sustainable improvement.

- Notifying environmental health and safety (EHS) and corporate communications of potential impact to employee safety and community stakeholders.
- Enabling customers and suppliers to discover incidents that can reduce throughput and profitability and damage trust.
- Providing “roll-up” and sustainable performance reporting capabilities for the corporation and stakeholders.

### Delivering business value for mining companies

A robust EAM system offers support for as-installed and as-maintained asset management requirements while providing its users full asset and work management support as well as solutions for managing IT infrastructure assets or systems and inventory procurement management. In addition EAM can provide mining companies with an end-to-end view of each asset, to show how key business processes are operating from a safety, security, health, maintenance and asset point of view—as well as the production and maintenance process itself—and optimize them to increase efficiencies.

In an environment where tough economic conditions prevail, organizations are increasingly challenged with providing assurance to their stakeholders that corporate obligations are being met in all areas of operations. Effective management of the mining operations’ physical assets is an essential element in the delivery of stakeholder value.

The mining asset portfolio is becoming increasingly diverse, with assets such as mobile mining fleet, fixed plant and infrastructure, including rail, roads and ports. Asset managers are challenged with ensuring an organization's assets are managed effectively, with a focus on optimum performance while minimizing costs and mitigating risk, and while aligning to its organizational strategic plan.



## IBM Maximo Asset Management

Maximo® Asset Management is the solution of choice for a growing number of companies in mining offering rich functionality to help optimize core and strategic assets and services. Maximo Asset Management is comprised of six key management disciplines: work management, asset management, inventory management, procurement management, contract management and service management. Maximo Asset Management integrates with most business information systems, helping users work in ways they are comfortable and productive with.

### Integrated solution

Seamless integration across the Maximo Asset Management suite of modules or applications supported by a powerful *workflow engine* promotes *operational excellence* through streamlined processes that eliminates process bottlenecks and supports the effective execution of work. Maximo Asset Management supports the breadth of EAM business activities across the asset lifecycle encompassing the six asset management activities, presented via a role-based and user-friendly interface.

The integrated platform reduces the number of standalone applications and redundant data stores required across the operation, which helps reduce costs while enabling a solid foundation for asset information management and analysis. Also, as it supports all activities associated with the *asset lifecycle model*, Maximo Asset Management delivers a process-centric capability with a foundation based on the management of all physical assets. This capability provides asset managers with complete lifecycle visibility of all asset information including specifications, parts, work history and complete costs, thereby enabling the efficient and effective management of all types of assets that are aligned with the organization's overall strategy.

## Asset Lifecycle Model



Maximo Asset Management also provides asset managers with accurate, real-time information that increases productivity, delivers cost savings and influences return on assets (ROA) and improves operational equipment effectiveness (OEE) through improved equipment reliability, optimization of inventory investment and effective utilization of both internal and contract resources. Productivity benefits can be sustained by leveraging the Maximo Asset Management powerful workflow engine to drive key business processes for planning, scheduling and the execution of work.

Management decision-making is enabled through the presentation of role-based key performance indicators (KPIs), complemented by specific EAM-related analytics that drive ongoing improvement initiatives.

### Asset lifecycle model

Supporting the activities associated with the asset lifecycle model, Maximo Asset Management delivers a process-centric capability with a foundation based on the Management of Physical Assets (MPA). In addition, Maximo Asset Management offers a consolidated platform for managing all types of assets—from the smallest tools and parts, to highly complex and digitized business-critical assets, to the largest production and maintenance facilities—to help reduce costs and drive operational excellence. Through the concept of visibility, control and automation the Maximo Asset Management solution supports all

requirements in all phases of the asset lifecycle, helping to address some of the biggest issues in the industry today—and prepare for the challenges of tomorrow.

While these processes can sometimes be complex, the seamless integration offered by Maximo Asset Management underpinned by role based user profiles ensures business activities are undertaken in an efficient and effective manner. The outcome is reliable, accurate and timely information to support management decision making and to drive future business improvements. In addition, by utilizing the powerful integrated workflow engine of Maximo Asset Management, organizations can lock in the value of these processes, which sustains productivity by eliminating bottlenecks and also mitigates risk associated with safety and business compliance.

### Key business drivers

Maximo Asset Management provides process based capability that influences key drivers associated with strategic, operational and compliance business issues thereby mitigating risk and delivering tangible and sustainable value to an organization's bottom line.

The integrated suite of Maximo Asset Management modules provides deep functionality always associated with key asset management activities ensuring that seamless processes are enabled in the execution of work practices.

### Open standards-based architecture

Maximo Asset Management is built on a standards-based, open, service-oriented architecture (SOA) which integrates with modern technology infrastructures. The business and infrastructure functions required to build distributed systems are provided as services that deliver application functions individually or collectively to either user applications or to other services to better enable integration with enterprise resource planning (ERP), customer relationship management (CRM), performance monitoring, supply chain management (SCM) and many more applications. Additionally, integration with other IBM solutions, including business intelligence (Cognos®), advance or complex planning (ILOG®), business and analytical statistics (SPSS) and document management (FileNet®) is possible to achieve greater benefit.

The Maximo Asset Management software architecture enables simple and seamless integration with a range of other operational systems such as:

- Plant control systems (DCS, SCADA, PLC, etc.)
- Fleet and haul truck monitoring systems
- Remote operations for telemetry and condition monitoring devices
- E-commerce and business-to-business capabilities
- Spatial or geographical systems
- Calibration
- Real time asset location systems
- Financial systems

This capability further leverages investments across disparate systems and delivers value by eliminating redundancy and enabling the reliable sharing of key business information for timely decision making and effective work execution. This exceptional level of capabilities and flexibility helps to configure Maximo Asset Management around key business requirements that are important in the mining industry.

### Reporting and analysis

The demand for accurate, timely and meaningful information is a fundamental requirement that enables managers to monitor, influence or initiate actions that have impact on the performance of their business. The Maximo Asset Management solution provides a full set of tools which can deliver comprehensive information including:

- Daily operational reporting utilizing its embedded Business Intelligence Reporting Tool (BIRT) to deliver real time information for line of business management, including rich text editing and formatting capabilities combined with embedded graphical content.
- Performance management capability using role-based start centers that provide real time insight into business performance leveraging specific industry key performance indicators (KPIs).
- Extensive analytical capabilities that enable visualization, data analysis and optimization of key business data that gives management the necessary information to initiate effective business improvement initiatives.

### Maximo Asset Management—delivering value for the mining industry

The mining industry is constantly challenged by key issues that have impact on the competitive performance of the business. The integrated suite of Maximo Asset Management applications helps provide mining companies with sustainable business value and reduced costs which in return delivers a higher return on assets (ROA) to shareholders.

Maximo Asset Management provides capability across the organization to ensure the necessary information is available in a timely manner to affect management decision making processes, mitigate risk, drive productivity and ensure optimized performance of all critical assets within the organization.



	<b>Executive Management</b>	<b>Asset Manager</b>	<b>Maintenance Manager</b>	<b>Supply Manager</b>	<b>Contract Manager</b>
<b>Business Issue</b>	<b>Business Value</b>				
<b>Safety</b>	Corporate governance, environmental, social responsibility obligations are achieved	Effective asset registration ensures all relevant information, including specifications, procedures, job plans, parts, warranties are captured and leveraged across the asset life cycle	Reactive work is minimized through effective job plans, procedures, competencies, resource availability and parts Workflow enabled processes ensure compliant safe working practices	Accreditation of vendors and asset spares to ensure performance is aligned to business needs Workflow enabled processes ensure compliant safe working practices	Accreditation of contractors to ensure performance is aligned to business needs
<b>Capital Spend</b>	Capital investment is aligned to budget (ROA input) Assets performance aligns to corporate strategy	Asset reliability capability to ensure asset lifecycle is optimized Planning for capital spend	Optimize maintenance practices and mitigate need for capital replacement/refurbish	Inventory optimization Effective vendor relationships to leverage pricing arrangements	Effective management of contracts for cost reduction and price leveraging Warranty management in line with asset strategy and spend
<b>Resource Management</b>	Accurate projection of labor costs Employee retention	Resource projections overheads/shortfalls	Optimum resource utilization for maintenance, operations, shut downs Skills, competencies are aligned to operational need	Streamlined processes for procurement, inventory and storekeeping	Contractor performance aligned to business need
<b>Cost Management</b>	Cost management is aligned to budget (ROA input)	Visibility of total asset lifecycle costs Cost projection and analysis Projection of OEE	Management of maintenance budgets Predictive job planning and scheduling Elimination of reactive work	Optimization of inventory levels Alignment of materials for forecasted work Effective vendor/OEM relationships to support pricing and service level expectations	Management of enterprise pricing agreements Execution of warranty agreements to mitigate cost leakage
<b>Asset Reliability</b>	Underpins return on asset and minimizes capital replacements	Visibility of asset reliability across all operations	Effective and efficient management of maintenance effort and performance	Sourcing of preferential parts to ensure reliability objectives are met parts management housekeeping	



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## Summary

For mining companies, economic uncertainty, environmental and safety requirements and new global business models are putting increased pressures on an already complex industry.

Mining companies who are leaders are successful at finding competitive strengths. Asset expertise, delivered via services supported by integrated information frameworks, provides broad visibility, control and automation to asset and safety performance. Leaders are positioned to make changes as needed in response to changing conditions.

A comprehensive asset management strategy and software should support this in such a way that it is scalable across the globe and sustainable as new strategies evolve. Integrated asset lifecycle management and transparent information frameworks

are a critical element of the solution market leaders are using to optimize asset and service management for production and operations.

IBM is committed to support mining businesses in their realization of sustainable performance and actively working to understanding the complex and evolving issues facing this industry. A variety of programs help shape the direction and details of Maximo Asset Management, including IBM Services Research, which works with metals companies to deploy production design and scheduling to improve capacity utilization applying optimization techniques.

Mining organizations throughout the world can rely on Maximo Asset Management solutions to help optimize their asset management organizations, decrease the amount of time it takes to schedule and assign work, enhance their efforts to meet safety, security, health, environment and quality requirements, and reduce risk and administrative time.



## For more information

To find out how you can leverage integrated asset and service management solutions from IBM for the mining industry, contact your IBM representative or IBM Business Partner, or visit: [ibm.com/tivoli](http://ibm.com/tivoli)

Additionally, financing solutions from IBM Global Financing can enable effective cash management, protection from technology obsolescence, improved total cost of ownership and return on investment. Also, our Global Asset Recovery Services help address environmental concerns with new, more energy-efficient solutions. For more information on IBM Global Financing, visit: [ibm.com/financing](http://ibm.com/financing)



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