Industrial Minerals Equipment
Product Overview
Industrial minerals equipment

Joy Global has more than 90 years’ experience as a global leader in the development, manufacture, distribution and service of underground mining machinery for the extraction of coal and other bedded materials. With this experience, Joy Global offers the underground mining industry the most reliable and technologically advanced products available. Fully mechanizing the extraction of industrial minerals has eliminated the need for the use of explosives. The removal of the storage and control aspects associated with using explosives, and the elimination of the vibration effects from explosives, have greatly improved safety. Also, additional roof control that is sometimes required after blasting may not be needed.

Joy Global offers a range of equipment that is designed specifically for the rock densities of salt, potash, gypsum, trona and other industrial minerals. This equipment includes continuous miners, haulage systems and longwall systems, both batch and continuous. Customers are achieving up to a 40% cost savings using Joy Global equipment versus the traditional drill and blast method.

Longwall systems

Globally recognized as the leading manufacturer of complete longwall systems, Joy Global provides its customers with a single, accountable source for shearers, roof supports, face conveyors, stageloaders, crushers and mobile belt tail pieces. All of the elements of modern, high production longwall systems are provided in an integrated manner for maximum productivity gains and lowest cost per ton. In addition to developing the most technologically advanced products, Joy Global provides professional project management capability to deliver an integrated system on-time, to specification and on-budget.

Joy Global complete Longwall Systems represent the ultimate solution for high production longwall mining. Incorporating the best-of-breed shearers, roof supports, face conveyors, stageloaders, crushers and mobile belt tailpieces, Joy Global delivers a complete longwall system that is in a class of its own.

Continuous miners

Over the last six decades, the Joy continuous miner product line has been developed to meet the high productivity requirements of today’s underground mining industry. Joy continuous miners provide the ideal combination of cutting power, proven components and reliability in a variety of materials. Built to withstand rigorous conditions, the product line offers optimum service life and return on investment.

The basic elements of each continuous miner are similar in design, following field-proven philosophies perfected by Joy Global. Each machine employs Joy Global’s multi-motor concept with outboard access to motors, gearcases, controllers and other major components. The philosophy calls for the isolation of major components for easier troubleshooting and maintenance. The Joy continuous miners use individual motors with direct drive transmissions to power the cutter, traction, gathering and hydraulic systems. This permits quick and easy service or repair, thus reducing downtime and maintenance costs. Joy Global’s answer to hard rock mining applications is the 12HM series of continuous miners. These machines are successfully operating in gypsum, potash, salt and trona mines around the world.

Haulage systems

The role of haulage equipment is to efficiently remove the cut material from the working face in such a manner as to enhance the performance of the continuous miner and maximize the productivity of the overall section. Joy Global fully understands this role and proactively works with the mining industry to provide comprehensive “system” solutions to suit individual application needs.

Delivering world-class mine performance

At the core of our commitment to customers is providing world-class solutions through our unique direct service network. This allows us to collaborate with customers, developing innovative parts, products, consumables and systems that lower their total cost of ownership while safely maximizing production.

Joy Global offers complete longwall systems designed specifically for the rock densities of salt, potash, gypsum and trona. Fully mechanizing the extraction of industrial minerals improves safety while increasing productivity. Customers utilizing these advancements have seen up to 40% cost savings versus the traditional drill-and-blast method.
Continuous miners

For the industrial minerals market, Joy Global offers the 12HM (Heavy-duty miner) series continuous miner. Within this series is the 12HM46, the largest and most powerful drum-type continuous miner manufactured. Utilizing common continuous miner components, but designed to meet specific applications, 12HM continuous miners are successfully operating in trona, gypsum, potash and salt mines around the world.

The basic elements of each continuous miner are similar in design, following field-proven philosophies perfected by Joy Global over the years. Each machine employs Joy Global’s multi-motor concept with outboard access to motors, gearcases, controllers and other major components. The philosophy calls for the isolation of major components for easier troubleshooting and maintenance. The continuous miners use individual motors with direct drive transmissions to power the cutter, traction, gathering and hydraulic systems. This permits service or repair quickly and easily, thus reducing downtime and maintenance costs.

Cutting system

As the 12HM continuous miners are the largest manufactured by Joy Global, the cutting systems have been designed to match the machine mass. This series of miners is available either with chainless 1310 mm (51 ½ in) or 1367 mm (53 ¾ in) cutter head drum diameter or with Ripperveyor cutter head drum diameter of 1475 mm (58 in). Depending on the cutter head design, the cutting horsepower can be as much as 570 kW (764 HP). Through Joy Global’s experience in this market, we also realize that all applications are different and therefore, we provide a number of different cutter bit spacing configurations.

Bolted construction

Due to shaft restrictions at many industrial mineral mines, access is often limited. With this in mind, the 12HM series has been designed in several bolted configurations to allow for such restrictions. After complete assembly and testing at a Joy Global facility, the machine is disassembled to the required size, shipped to the mine and reassembled with technical assistance from Joy Global. The machines are designed to be reassembled without, or with limited, welding of components.

High capacity conveying system

The conveying system on the 12HM features a 965 mm (38 in) conveyor for increased production capability. In addition to the dual gathering head system, the machine is equipped with single rear conveyor drive or optional dual rear conveyor chain drive. A cam style take-up automatically provides proper conveyor chain adjustment as the conveyor swings.

Advanced diagnostics

The Faceboss control platform has an on-board graphical display which includes a log of events, messages and alarms. All key machine operating parameters are continuously monitored and recorded during machine operation. By using the on-board trending and graphing capability on this stored information, the root cause of machine failure can be more quickly and easily determined.

For immediate reference, service manuals are accessible through the on-board display. Supplementary to the service manual are step-by-step instructions for regular maintenance operations and help text for systematic troubleshooting.
Haulage systems

**Shuttle cars**

The role of haulage equipment is to efficiently remove the cut material from the working face in such a manner as to enhance the performance of the continuous miner and maximize the productivity of the overall section. Joy Global fully understands this role and proactively works with the mining industry to provide comprehensive "system" solutions to suit individual application needs.

Since the introduction of our first shuttle car in 1938, Joy shuttle cars continue to be the mainstay of the industry for batch haulage vehicles. Their exceptional reliability, low operating cost and sustained high levels of productivity are unmatched. Through the extensive use of sophisticated computer-aided design systems, Joy shuttle cars continue to develop, evolve and improve.

**Battery haulers**

A Joy battery hauler benefits from a variety of innovative technologies that contribute to extended battery life and/or improved maneuverability and operational flexibility. This makes the Joy battery hauler the market leader in battery-powered underground haulage machines for room and pillar applications.

The AC-Variable Frequency Drive Control System (AC-VFD) is a proven system that enhances and maximizes the efficiency and operational performance of all Joy battery-powered haulage vehicles. Having an independent traction drive design, the AC-VFD control system provides the reliability and availability benefits that customers have come to value in the DC control system.

Advanced diagnostics on all AC-VFD models can be queried directly from the machine display to reduce the time required to troubleshoot and repair a machine. Data logging and data acquisition allow for enhanced machine diagnostics as well as providing more user-friendly and focused preventative maintenance programs.

**Flexible conveyor trains**

The Joy Flexible Conveyor Train (FCT) is a truly continuous haulage system that eliminates haulage-related bottlenecks from typical underground continuous miner operations. By removing this restriction, the FCT allows today’s high-production continuous miners to operate at their maximum capacity.

The key to the effectiveness of the FCT is its patented flexible conveyor and traction system that permits the FCT to be operated as one single unit. The ability to continuously convey material along its length while simultaneously tramming to follow the continuous miner’s every move, all with only one operator utilizing radio remote control, is a distinct advantage over all other types of haulage.

The productivity benefits of the FCT are equally applicable to coal-producing room and pillar and longwall development operations, as well as operations utilizing continuous miners to extract industrial minerals, such as salt, trona, potash and gypsum.

**FCT/DMU configurations**

Each FCT system includes a DMU (Dynamic Move-Up) unit. The DMU is the interface between the FCT and the mine’s panel belt. The FCT and DMU are available in two configurations. The Side-Discharge configuration is applicable to low seam heights and wide entries whereas the Over-The-Top (OTT) configuration is more suited to higher seams with restricted entry width. The OTT system is a self-advancing unit with remote-controlled panel belt move-ups. This system can also be designed for retreat mining. The side discharge design must be advanced using the continuous miner to pull up.
Chain Haulage and Feeder-Breakers

Recognized as the most efficient method of moving mined material from the mine face for specific applications, the Joy Chain Haulage System (CHS) provides significant improvements in the areas of durability and reliability.

The Joy Chain Haulage system consists of four basic units: A breaker car module (BCM), conveyor bridge module (CBM), mobile bridge module (MBM) and rigid haulage system (RHS) or low frame. The system configuration and number of these units depends on individual mine application and production requirements.

High performance operation
Incorporating Joy Global proven design and construction techniques, the Joy Chain Haulage system is the most rugged continuous haulage system available and features quality components for the highest level of reliability. New maneuverability and mechanical improvements provide increased production across all applications.

Feeder-breakers
Joy Feeder-Breakers, designed for low-to-high seam applications, provide high productivity and reliability in the most rigorous of conditions. Each feeder-breaker is designed to work as an integral part of your total mining operation. It allows mining, haulage and conveying systems to work at their most efficient rates to maximize mine production.

Increase your mining efficiency
- Surge capacity allows the feeder-breaker to discharge mined material at the maximum capacity of the haulage equipment
- Material throughput is fully variable up to 1814 tonne (2,000 TPH)
- Powerful rotary pick breaker reduces mined material to a consistent, easily handled size
- Mined material is discharged at a steady rate, virtually eliminating spillage and reducing belt wear

Due to application requirements and heavier designed machines, UFB-14 and UFB-17 feeder-breakers are available with reversed crawler designs. The crawler assemblies are more robust and include higher rated planetary drives and idler take-ups. Crawler pads are now available in 457 mm (18 in) pad widths to reduce ground pressures in varying bottom conditions. Draw bar pull has been increased to 64,410 kg (142,000 lbs) by reversed design. Optional frame speeds 9.14, 12.8 and 15.2 mpm (30, 42 and 50 fpm) are available per customer requirements.

Longwall systems

Joy Global built the first all-electric shearing machine in 1976. Today, Joy Shearers are utilized around the world by the most productive mines, in the most demanding environments. A wide range of shearer models is offered to accommodate seam ranges from one and a half to seven meters. The advantages of the modular design, OptiDrive variable frequency drive and new Advanced Shearer Automation system provide high productivity with lower costs and a focus on a zero harm mentality.

Rugged, reliable and easy to maintain
The modular construction of Joy longwall shearers allows for efficient manufacture and rebuild. The Joy shearer is designed to be as simple and easy to maintain as possible with special tools rarely required. Joy Global also integrates the coal turning mechanisms into the ranging arm design creating rugged components that require little maintenance.

AFC system
Joy Global manufactures all the key elements for the armored face conveyor (AFC) including the head and tail frames, line pans, gear boxes, sprockets, couplings and shearer haulage systems.

The design of the Joy AFC uses cast steel sigma sections with exacting tolerances. This casting technology eliminates the weld fabrication of clevis and pan connections, which are less reliable. The cast design provides tighter tolerance assurance which is essential in today’s marketplace. Joy Global’s high specification abrasion-resistant upper deck plates, selected to meet pan life requirements, result in maintenance free, long life fabrications.

Broadband long life chain
Available in five sizes from 38mm up to 60mm diameter, Joy Broadband long life chain provides proven extended wear resistance without detriment to chain weight and conveying characteristics. This chain delivers new levels of conveying efficiency and reduced operating cost.

User friendly interface
Graphical onboard interface with intuitive screens simplifies initial machine setup. These same screens make it easy to adapt to changing mining conditions without the need to open an XP enclosure. In addition, preset tram functions can be selected from the remote control to allow the operator to make on-the-fly cutter feedback adjustments as conditions dictate. The roof and floor cutting limits used with automation sequences are conveniently adjusted via the remote control.
Roof supports
Joy Global has over 60 years of experience designing and manufacturing longwall roof supports and has achieved ISO 9001 2000 approval from the UKAS Accreditation Testing Laboratory. With installations around the world, Joy Global has met or exceeded the customer's rigorous requirements with ratings up to 1750 tonne (2000 tons); in widths of 1.5, 1.75 and 2.05 meters; for height ranges from 0.8 up to 7.8 meters.

Structural design is a particular strength of Joy roof supports. The design and the attention to detail of the structures has been recognized throughout the mining industry. These detailed and controlled fabrications enable Joy roof supports to provide reliable service with a lower cost of ownership and fewer rebuilds required during their service life.

Roof support electronics
Joy roof supports are controlled using the Faceboss electronic control system which integrates into the longwall and mine-wide system to enable automatic control of the longwall operation, including fully automatic shearer and roof support gate end turn arounds. All the information from the longwall system can be transmitted to the surface and viewed throughout the mine network, and with the mine's agreement, relayed in real-time back to Joy enabling utilization of our “JoySmart Services.”

Compak valve system
Compak, Joy Global’s hydraulic control system, is a well established, proven and reliable valve system for controlling modern automatically-operated longwall roof supports. The system provides multifunctional control with solenoid-actuated pilot circuits receiving instructions either by operator push button or more typically, automatically from the Faceboss electronic control system.

JoySmart Solutions

JoySmart Solutions help solve customers’ toughest challenges using data-driven intelligence, collaboration and technology.

JoyGlobal service facilities have given world-class service a new home.

through partnership and experienced-based service execution. They are a way of partnering with customers to help reduce costs and increase productivity, in line with customers’ operating and financial goals.

JoySmart Service Centers are strategically located around the world in order to conveniently serve our customers. With each new service center built, Joy Global products and people are becoming more connected, allowing for expanded benchmarking. Located strategically in zones of mining activity, each service center brings local support that is world-class. Services offered are structured to fulfill the lifecycle of mining equipment, optimizing equipment for productivity and safety.

JoySmart Solutions are integrations of smart connected Joy Global products and systems, advanced analytics and direct services customized to solve customers’ toughest challenges.

JoySmart Solutions at work:

Costs
• Lower cost per unit produced by reducing overall parts and consumables expenditures
• Optimize costs for power/fuel, labor and rebuilds

Safety
• Automate processes and controls
• Increase awareness through training and standard setting

Productivity
• Improve system availability, performance, utilization and consistency
• Leverage extensive Joy Global engineering knowledge to solve problems

JoySmart Solutions

Integrated JoySmart Solutions help solve customers’ toughest challenges using data-driven intelligence, collaboration and technology.

JoyGlobal service facilities have given world-class service a new home.

through partnership and experienced-based service execution. They are a way of partnering with customers to help reduce costs and increase productivity, in line with customers’ operating and financial goals.

JoySmart Service Centers are strategically located around the world in order to conveniently serve our customers. With each new service center built, Joy Global products and people are becoming more connected, allowing for expanded benchmarking. Located strategically in zones of mining activity, each service center brings local support that is world-class. Services offered are structured to fulfill the lifecycle of mining equipment, optimizing equipment for productivity and safety.

JoySmart Solutions are integrations of smart connected Joy Global products and systems, advanced analytics and direct services customized to solve customers’ toughest challenges.

JoySmart Solutions at work:

Costs
• Lower cost per unit produced by reducing overall parts and consumables expenditures
• Optimize costs for power/fuel, labor and rebuilds

Safety
• Automate processes and controls
• Increase awareness through training and standard setting

Productivity
• Improve system availability, performance, utilization and consistency
• Leverage extensive Joy Global engineering knowledge to solve problems

JoySmart Solutions

Integrated JoySmart Solutions help solve customers’ toughest challenges using data-driven intelligence, collaboration and technology.

JoyGlobal service facilities have given world-class service a new home.

through partnership and experienced-based service execution. They are a way of partnering with customers to help reduce costs and increase productivity, in line with customers’ operating and financial goals.

JoySmart Service Centers are strategically located around the world in order to conveniently serve our customers. With each new service center built, Joy Global products and people are becoming more connected, allowing for expanded benchmarking. Located strategically in zones of mining activity, each service center brings local support that is world-class. Services offered are structured to fulfill the lifecycle of mining equipment, optimizing equipment for productivity and safety.

JoySmart Solutions are integrations of smart connected Joy Global products and systems, advanced analytics and direct services customized to solve customers’ toughest challenges.

JoySmart Solutions at work:

Costs
• Lower cost per unit produced by reducing overall parts and consumables expenditures
• Optimize costs for power/fuel, labor and rebuilds

Safety
• Automate processes and controls
• Increase awareness through training and standard setting

Productivity
• Improve system availability, performance, utilization and consistency
• Leverage extensive Joy Global engineering knowledge to solve problems

JoySmart Solutions