KOMATSU

JOY

12HM and 14HM Series

Continuous Miner

Product Overview

Who we are:

Since 1921, Komatsu has stood for unrivaled quality and reliability. Our enduring global success stems from the principles of our founder, Meitaro Takeuchi, who envisioned a sustainable future built through globalization, quality first, technology innovation and talent development. These defining principles, along with an emphasis on safety and compliance, remain part of our Komatsu DNA. With each brand and company added to the Komatsu family, we expand our capabilities, leveraging our global teams to push beyond what can be done and create what can be imagined. We believe partnering directly with our stakeholders and being in the workplace (gemba) is the best way to gain insight into their challenges, win their trust and develop cutting-edge solutions.

What we do:

Komatsu is an indispensable partner to the mining, forestry, industrial and construction industries that maximizes value for customers through innovative solutions. With a full line of products supported by our advanced IoT technologies and global service network, we help customers safely and sustainably optimize their operations. Our **Komatsu, P&H, Joy** and **Montabert** equipment and services are used to extract fundamental minerals and develop modern infrastructure.

12HM and 14HM series

The Joy continuous miner product line has been developed to meet the high productivity requirements of today's underground mining industry. It provides the ideal combination of cutting power, proven components and reliability for lower to mid-seam applications in a variety of materials. Built to withstand rigorous conditions, both the 12HM and 14HM continuous miners offer optimum service life and return on investment.

Built to withstand rigorous conditions.

Wethead cutterhead systems

The Wethead continuous miner cutterhead from Komatsu incorporates a fine water spray behind each cutting bit on the cutter drums. Acting as both a cooling and wetting agent, the water reduces the potential for frictional ignitions and reduces respirable dust levels. The sprays also provide lubrication that substantially improves bit life. The Wethead cutterhead does all this while potentially consuming less water than the standard miner dust sprays. The heart of the system is a back-to-back carbon-face water seal designed to last from rebuild to rebuild before refurbishment is necessary.

Application specific cutting

A wide variety of cutting options...

The 12HM is available in solid head or Ripperveyor models and in drum diameters ranging from 51.5 to 58 in or 1200 to 1475 mm. With this availability, the cutting system can be sized to match seam conditions. Rated cutting power as high as 764 hp (570 kW) is available within this product line.

Proven conveyor system

The conveying system loading arms and chain offer reliable, time-tested transmissions. The conveyor chain includes universal links to prolong chain life, and the cam style adjusting mechanism automatically compensates for chain slack as the conveyor swings. Recent enhancements to the system include increased abrasion-resistant material use along the chain path and loading arms.

Now enhanced by the addition of a dual-sprocket conveyor chain, this latest innovation is driven on either side by two parallel eight-tooth sprockets. The conveyor system provides a chain that is 50% stronger while reducing total noise exposure up to 3dB, as compared to the conventional chains.

Optimized hydraulic system

The Joy hydraulic manifolds, a standard feature on all Joy continuous miners, reduces hose assemblies and fitting counts by over 30% from previous manifolds. And theysignificantly reduce leak points. Additional benefits realized with Komatsu's designs include the following all: serviceable parts for a hydraulic circuit are now in one common location; all pressure check points allow gauge connection and disconnection while the pump is running; bolt-on caps permit easy access for troubleshooting, or individual replacement of hydraulic or water segments on the water manifold; Komatsu's new main control valve design has 25% higher flow and 30% higher pressure capability; screw adjusted relief cartridges are now standard; improved sealing in all areas means significantly less oil leakage; a proportional control valve option is available that interfaces with the Faceboss control platform to optimize cutter motor current draw using a feedback control loop.

Total control

The latest in VFD technology...

Today's traction system builds on years of field-tested performance to offer even more durability and continous miner maneuverability. Patented Optidrive AC electronics are coupled to a compact all-gear transmission to provide smooth and reliable performance. Cutter motor feedback control loops and an electronic traction motor differential optimize sump performance in even the most demanding of applications. Various track frame widths are available to suit specific floor conditions and entry widths.

Komatsu history

Tradition in quality and pride...

With over 6,000 continuous miners shipped since 1948, Komatsu leads the mining industry with innovations that increase productivity and improve operator safety. Innovations such as air scrubbers, Wethead cutterhead drums, AC traction motors, noise reducing conveyor systems, and hydraulics manifolds are just a few examples. All are industry firsts from Komatsu, the world leader in underground mining innovations.

12HM and 14HM series

The basic elements of each continuous miner are similar in design, following field-proven philosophies perfected by Komatsu over the years. Each machine employs Komatsu'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.

Following field proven philosophies perfected by Joy.

Cutting system

As the 12HM continuous miners are the largest manufactured by Komatsu,

the cutting systems have been designed to match the machine mass. This series of miners is available with a chainless cutter head with drum diameters from 1118mm to 1320mm. Depending on the cutter head design, the cutting horsepower can be as much as 520kW. Through Komatsu'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.

Haulage system compatibility

The 12HM series continuous miners can be designed to match mine specific haulage systems. Different conveyor lengths and conveyor chain speeds are available to optimize the haulage system performance, whether it is batch or continuous haulage. For continuous haulage capability the conveyor can also be supplied to match up with an attached haulage system.

Traction system

VFD traction system

The Optidrive system from Komatsu provides efficient speed control from zero to maximum speed. The variable speed control provides the operator the ability to smoothly and accurately move the machine short distances when maneuvering the machine during tramming in a typical room and pillar type mining lay-out.

The Optidrive system from Komatsu also provides increased traction torque, which delivers more power and control. In addition, the cutter motor feedback, linked with the Optidrive system results in increased sump performance no matter the underground mining conditions encountered.

Bolt-on traction reducer

The bolt-on traction reducer, exclusive to the South African market, provides a full bolt-on solution, which now includes the planetary as part of the assembly. The traction reducer and planetary are pre-assembled in a clean and controlled environment. This makes the bolt-on traction reducer more maintenance friendly in a demanding mining environment.

Addressing corrosion
Pin and bushing design...

Through years of mine experience and in-house testing, Komatsu is able to provide a pin and bushing design that can withstand the often corrosive environments of industrial mineral applications. This significantly extends component life, making the machine more productive.

Engineered for perfection
Why high voltage...

The potential for increased machine performance is due to the decrease in percent voltage drop (for a given current) occurring in a trailing cable when higher voltage is induced on that cable. Since motor torque varies with the speed of the voltage, any decrease in machine voltage has a drastic affect on motor performance.

Multilingual display
On a standard control platform...

The Faceboss control platform can be configured to display a variety of languages. In combination with local field personnel, this multilingual control platform helps Komatsu underground equipment to achieve the goal of operating at the lowest cost per ton, regardless of where the equipment is located.

This platform is standard across all Komatsu underground equipment, reducing inventory to support a typical fleet. Common practices reduce training burdens and overall knowledge required for electrical maintenance personnel. This enables maintenance and trouble-shooting performance to rise to a more productive level.

12HM and 14HM automation

The Faceboss control platform enables operators to consistently operate at the optimal balance of production rate and cost.

Competitive and market pressures require that Komatsu's customers produce product at an ever increasing rate and at an ever decreasing cost per ton. These objectives are made all the more challenging by the worsening attributes of available reserves and the ever deteriorating operating conditions in which machinery must operate.

Using a combination of operator assistance tools, automated sequences, advanced diagnostics, machine performance monitoring and analysis tools, the Faceboss control platform enables operators to consistently operate their Komatsu underground machinery at the optimal balance of production rate and cost.

Product optimization
The Faceboss control platform can maximize continuous miner productivity in a variety of ways:

- **Optimized cutting**
  Rate of cutting is automatically maximized during sump and shear cycles by ensuring optimal cutter loading through the control of the traction motor speed and hydraulic shear rate respectively
- **High availability feedback**
  Control loops protect all electric motors on the continuous miner from jam and thermal overloads, ultimately extending motor life and minimizing machine downtime

Automated sequences
Consistent operation is now possible, even while changing operators or across multiple shifts. For example, one-touch-shear automatically controls the position of the cutter boom, which ensures the floor and roof levels are properly maintained while reducing operator fatigue

- **Maximum flexibility**
  Different operating parameters for the typical cycle cutting requirements (e.g., full pass, half pass, cross cut, etc.) can be pre-defined, and are easily and quickly selected via the continuous miner remote station to prevent unnecessary delays

Reliability through design
All Faceboss hardware has been designed and tested specifically for underground applications. Testing at extreme temperatures and vibration levels ensures that each component can stand up to harsh conditions. Further testing to destruction in a typical conditions allows Komatsu engineers to better understand the failure modes of each component in order to improve the overall design and reliability.

Outby communications
With the Joy continuous miner connected to a surface computer, the Faceboss control platform enables the real-time monitoring of the machine from remote locations (Remote Machine Monitoring - RMM).

In addition to RMM, the Faceboss control platform continuously buffers and streams operating data to the surface computer. The surface computer, installed with Joy Surface Reporting Software (JSRP), interprets this data and generates value-added production reports directly following each shift and emails the report to the appropriate mine/Komatsu individuals. This feedback mechanism allows management to intervene where required to make positive change. Similarly, monthly production and engineering reports are generated and communicated to provide a higher-level interpretation of the operation.

Advanced diagnostics
The Faceboss control platform includes an on-board graphical display which includes a log of events, messages and alarms. 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 quickly and easily determined.

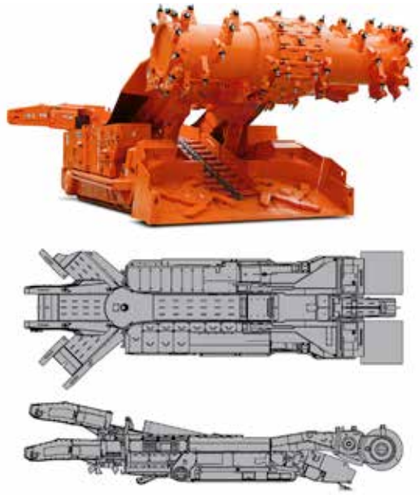
For quick and easy reference, on-board service manuals are accessible through the on-board display. Supplementary to the service manual are step-by-step instructions for regular maintenance operations and help text for systematic trouble shooting.

User friendly interface
Machine setup/configuration...

Graphical on-board 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 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.

General Specifications

Joy 12HM continuous miner

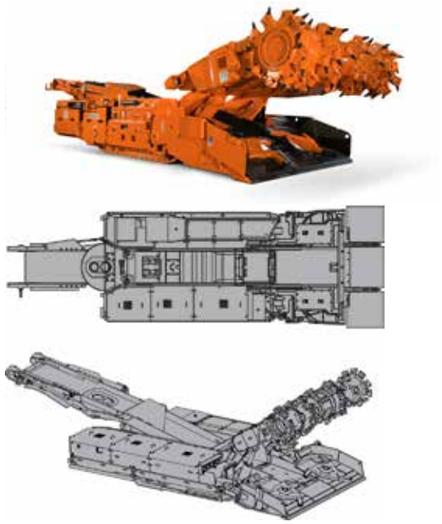


		12HM31 - AAA 950V Optidrive, mini-megahead	12HM31 - B 950V Optidrive, mini-megahead	12HM31 - B 950V Optidrive, megahead	12HM31 - B MKII megahead	12HM37- A 950V Optidrive, mini-megahead	12HM37- B 950V / (3.3kV) Optidrive, megahead	12HM37 - C 950V / 3.3kV Optidrive, megahead
Cutting rate (tonnes per minute)		up to 20	up to 20	up to 20	up to 20	up to 30	up to 30	up to 30
Mass (estimated)		87 tonnes	105 tonnes	110 tonnes	113 tonnes	90 tonnes	130 tonnes	132 tonnes
Ground pressure Ground clearance		205 kPa 250 mm	200 kPa 285 mm	295 kPa 285 mm	304 kPa 285 mm	230 kPa 250 mm	270 kPa 350 mm	270 kPa 350 mm
Cutter head diameter Cutting width		1118 mm (44") 3600 mm	1118 mm (44") 3600 mm	1320 mm (52") 3600 mm	1320 mm (52") 3600 mm	1118 mm (44") 3600 mm	1320 mm (52") 3600 mm	1320 mm (52") 3600 mm
Maximum cutting height Minimum cutting height		3200 mm 1600 mm	4620 mm 2400 mm	4800 mm 2300 mm	4800 mm 2300 mm	3800 mm 1600 mm	4500 mm 2400 mm	5100 mm 2900 mm
Height over scrubber Main frame height		1450 mm 1420 mm	2500 mm 2000 mm	2500 mm 2000 mm	2500 mm 2000 mm	1590 mm 1590 mm	2200 mm 2150 mm	2200 mm 2150 mm
Cutter speed Bit trip speed		50 rpm 2.93 m/sec	50 rpm 2.93 m/sec	42 rpm 2.92 m/sec	42 rpm 2.92 m/sec	50 rpm 2.93 m/sec	42 rpm 2.92 m/sec	42 rpm 2.92 m/sec
Conveyor	Width Chain pitch Speed Footshaft drive Taildrive Dualdrive	965 mm (38") 82 mm (3 1/4") 2.05 m/sec Available Available N/A	965 mm (38") 82 mm (3 1/4") 2.04 m/sec N/A Available N/A	965 mm (38") 82 mm (3 1/4") 2.04 m/sec N/A Available N/A	965 mm (38") 82 mm (3 1/4") 2.04 m/sec N/A N/A Available	965 mm (38") 82 mm (3 1/4") 2.04 m/sec Available Available N/A	965 mm (38") 82 mm (3 1/4") 2.04 m/sec N/A Available N/A	965 mm (38") 82 mm (3 1/4") 2.04 m/sec N/A N/A Available
Chassis depth		305 mm (12")	406 mm (16")	406 mm (16")	406 mm (16")	305 mm (12")	406 mm (16")	406 mm (16")
Sump range		0-75 mm/sec	0-75 mm/sec	0-75 mm/sec	0-75 mm/sec	0-75 mm/sec	0-75 mm/sec	0-75 mm/sec
Tram speed	Slow Intermediate High	7.2 m/min 14.4 m/min 21.6 m/min	7.2 m/min 14.4 m/min 21.6 m/min	7.2 m/min 14.4 m/min 21.6 m/min	7.2 m/min 14.4 m/min 21.6 m/min	7.1 m/min 14.6 m/min 20.0 m/min	7.1 m/min 14.6 m/min 20.0 m/min	7.1 m/min 14.6 m/min 20.0 m/min
Motors (water cooled)								
	Cutter - 2 Pump - 1 Gathering head - 2 Conveyor - 1 Traction - 2 Total power (excl. scrubber)	140 kW 85 kW 45 kW 37 kW Taildrive 60 kW 612 kW	140 kW 85 kW 45 kW 37 kW 60 kW 612 kW	175 kW 85 kW 45 kW 37 kW 60 kW 682 kW	260 kW 85 kW 45 kW 37 kW (2 off) 60 kW 889 kW	140 kW 100 kW 45 kW 37 kW 60 kW 627 kW	175 vW / 260 kW 85 kW / 100 kW 45 kW 37 kW 60 kW 682 kW / 697 kW	175 vW / 260kW 85 kW / 100 kW 45 kW 37 kW (2 off) 60 kW 889 kW / 904 kW
Scrubber								
	Engart Type 24" Dual Engart Type 24" Joy Integrated	37 kW N/A N/A	N/A 37 KW (2 off) N/A	N/A 37 KW (2 off) N/A	N/A 37 KW (2 off) N/A	N/A N/A 30 kW	N/A N/A 37 kW / 45 kW	N/A N/A 37 kW / 45 kW
Supply voltage		950V	950V	950V	3300V (3.3kV)	950V	950V / 3000V (3.3kV)	950 / 3300V (3.3kV)

*In South African mining conditions

General Specifications

Joy 14HM continuous miner



		14HM15 (38" and 44" cutterhead)	14HM27 (44" cutterhead)
Cutting rate (tonnes per minute)		up to 20	17-36
Mass (estimated)		55 tonnes	72 tonnes
Ground pressure		216 kPa	270 kPa
Ground clearance		160 mm	273/349 mm
Cutter head diameter		965 mm (38") 1118 mm (44")	1118 mm
Cutting width		3600 mm	3510 or 3810 mm
Maximum cutting height		2500 mm	3400 mm
Minimum cutting height		1350 mm (38") 1460 mm (44")	1330
Height over scrubber		1160 mm	1200 mm 26 kw
Main frame height		1160 mm	1200 mm
Conveyor	Max. height	2868 mm	2130 mm
	Max. clearance (under conv.)	2469 mm	1745 mm
	Min. height	962 mm	1130 mm
	Min. clearance (under conv.)	598 mm	710 mm
	Width	965 mm	965 mm
	Chain pitch	82 mm	83 mm
	Speed	2.04 m/sec	2.04 m/sec
	Conveyor depth	150 mm	300 mm
Sump range		0-75 mm/sec	0-126 mm/sec
Tram speed	Slow	7.2 m/min	4.6 m/min
	Intermediate	14.4 m/min	9.1 m/min
	High	21.6 m/min	19.8 m/min
Cutter speed		55 rpm (38") 50 rpm (44")	50 rpm
Bit tip speed		2.77 m/sec (38") 2.93 m/sec (44")	2.93 m/sec
Motors (water cooled)			
	Cutter - 2	140 kW	220 kW
	Pump - 1	85 kW	55 kW
	Gathering head - 2	45 kW	45 kW
	Conveyor - 1	N/A kW	N/A kW
	Traction - 2	60 kW	60 kW
	Total power (excl. scrubber)	575 kW	705 kW
Scrubber			
	Engart type 610 mm tapered	37 kW	N/A kW
	Ventserve T7	22 kW	N/A kW
	Joy intergrated	N/A kW	26 kW

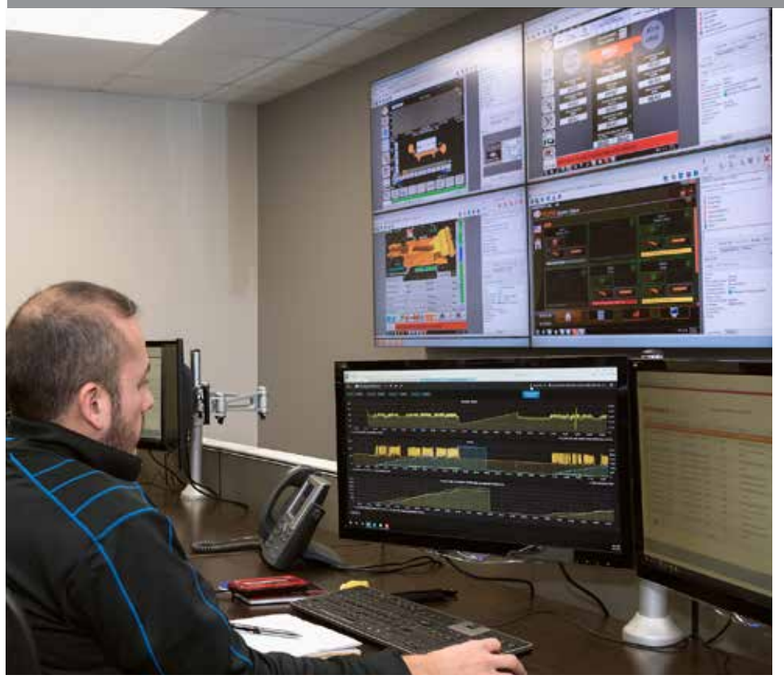
Smart Solutions

Integrated Smart Solutions help solve customers' toughest challenges using data-driven intelligence, collaboration through partnership and experience-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.

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

Smart Service Centers are strategically located around the world in order to conveniently serve our customers. With each new service center built, Komatsu 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.

Our commitment to world-class service is delivered through world-class processes and metrics. Our Joy OpEx processes bring operational excellence by prioritizing the elimination of waste, simplifying processes, automating and removing people from harm's way. We leverage those principles throughout our network, with the ability to rapidly customize locally, helping customers work smarter, worldwide.



Smart Solutions are integrations of smart connected Komatsu products and systems, advanced analytics and direct services customized to solve customers' toughest challenges.

Smart 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 Komatsu engineering knowledge to solve problems

Smart Solutions

Komatsu Mining Corp. Group

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ENA4-12HM14HMCM01-1118-V1