

KOMATSU

P&H

Electric Mining Shovels 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.

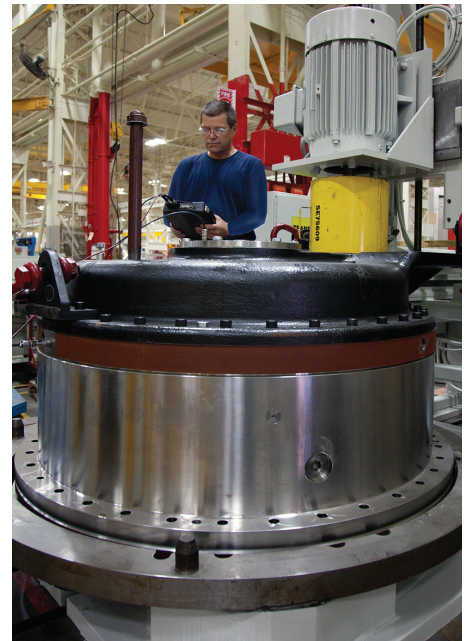
What we do:

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.

Global reach

We have facilities and service centers that span six continents and more than twenty countries. But our focus remains local, with people and services close to the mines to provide better support. Around the world, Komatsu boasts more than 10,000 employees in over 135 facilities. Through our worldwide service centers and highly trained field technicians, Komatsu Mining provides year round, 24 hour service to thousands of customers.

- Every installation is a reference
- Most advanced engineering
- Built on operational excellence
- Largest direct service network





Hour after productive hour, P&H shovels were inspired by you.

You manage a large mining operation focused on the most efficient extraction of valuable commodities like copper, coal, iron ore, petroleum or gold.

Your mine plan changes daily or perhaps hourly as complex factors interplay.

You require highly reliable and productive equipment to help ensure your ability to obtain sustained throughput rates – and optimized production costs.

You have invested in the very best available mix of capital equipment — including your P&H electric shovels — to help realize your operations management objectives.

You helped inspire us to design, build and support these exceptionally tough, smart loading machines. We have transformed your ideas and your insights into best-in-class P&H electric mining shovels for the cost and safety-focused mining industry.

Productive solutions for all mine types



	1900XPC	2300XPC	2800XPC	4100C
Nominal pay load	18 mt	45.4 mt	59.0 mt	81.6 mt
	20 st	50 st	65.0 st	90 st
SAE struck	9.9 m ³	18.3 - 25.5 m ³	26.8 - 33.6 m ³	42.8 - 47.7 m ³
	13.0 yd ³	24.0 - 33.0 yd ³	35.0 - 44.0 yd ³	56.0 - 62.0 yd ³
Nominal dipper capacity – SAE 2:1	10.7 m ³	20.2 - 27.8 m ³	29.2 - 36.6 m ³	47.4 - 52.5 m ³
	14 yd ³	26.7 - 36.7 yd ³	38.1 - 47.9 yd ³	62.0 - 68.6 yd ³
Truck class match				
360 mt (400 st)			6 Pass	5 Pass
300 mt (330 st)		7 Pass	5 Pass	4 Pass
218 mt (240 st)		5 Pass	4 Pass	3 Pass
181 mt (200 st)	10 Pass	4 Pass	3 Pass	2 Pass
154 mt (170 st)	9 Pass	3 Pass	3 Pass	
136 mt (150 st)	8 Pass	3 Pass	2 Pass	
109 mt (120 st)	6 Pass	2 Pass	2 Pass	

* All weights subject to 5% variation



1900XPC

P&H 1900XPCs utilize the Centurion electrical control system to develop exceptional bail pull in the hoist function when encountering extremely heavy digging. The result is smooth, rapid passage of the dipper through the bank for increased dipper fill factor without stalling.



2300XPC

The P&H 2300XPC provides a 45.4 metric tonne (50 short ton) nominal payload capacity specifically designed to operate in mines for high production loading of 109 to 218 metric tonne (120 to 240 short ton) and larger haul trucks. This proven series of shovels can be found digging in coal, copper, iron ore and gold mines around the world.



2800XPC

The P&H 2800XPC provides a 58.9 metric tonne (65 short ton) nominal payload capacity specifically designed to operate in mines for high production loading of 172 to 300 metric tonne (190 to 330 short ton) haul trucks and larger; it is the industry's best-selling shovel model due to its durability and versatility.



4100C

The P&H 4100C provides a 81.7 metric tonne (90 short ton) nominal payload capacity specifically designed to operate in mines for high production loading of 172 to 363 metric tonne (190 to 400 short ton) haul trucks. First introduced in 1990, the 4100 series shovels are the benchmark of reliability and high productivity.



	4100XPC AC-90	4100C BOSS	4100XPC	4800XPC
Nominal pay load	81.6 mt	90.7 mt	108.9 mt	122.5 mt
	90 st	100 st	120 st	135 st
SAE struck	42.8 - 47.7 m ³	44.3 m ³	52.8 - 61.2 m ³	65.7-70.3 m ³
	56.0 - 62.0 yd ³	58.0 yd ³	69.0 - 82.0 yd ³	86-92 yd ³
Nominal dipper capacity – SAE 2:1	47.4 - 52.5 m ³	48.4 m ³	58.3 - 67.6 m ³	72.5-77.6 m ³
	62.0 - 68.6 yd ³	63.0 yd ³	74.4 - 88.4 yd ³	92.7-99.1 yd ³
Truck class match				
360 mt (400 st)	5 Pass	4 Pass	4 Pass	3 Pass
300 mt (330 st)	4 Pass	3 Pass	3 Pass	
218 mt (240 st)	3 Pass	2 Pass	2 Pass	
181 mt (200 st)	2 Pass			
154 mt (170 st)				
136 mt (150 st)				
109 mt (120 st)				



4100XPC AC-90

The P&H 4100XPC AC-90 provides an 81.7 metric tonne (90 short ton) nominal payload capacity with an AC electrical system. The machine is built as a combination of the 4100XPC DC and AC structures while maintaining the capability of being upgraded to a full 4100XPC AC in the future if truck fleet composition changes. Extremely high dig forces, given the dipper size, help give this machine benchmark production capability within this loading segment.



4100C BOSS

The P&H 4100C BOSS provides a 90.8 metric tonne (100 short ton) nominal payload capacity specifically designed to operate in mines for loading of 218 to 363 metric tonne (240 to 400 short ton) haul trucks. With its 3505 mm (138 inch) wide crawler shoes, the P&H 4100C BOSS is specifically designed for operations that require low ground bearing pressure and high digging forces.



4100XPC

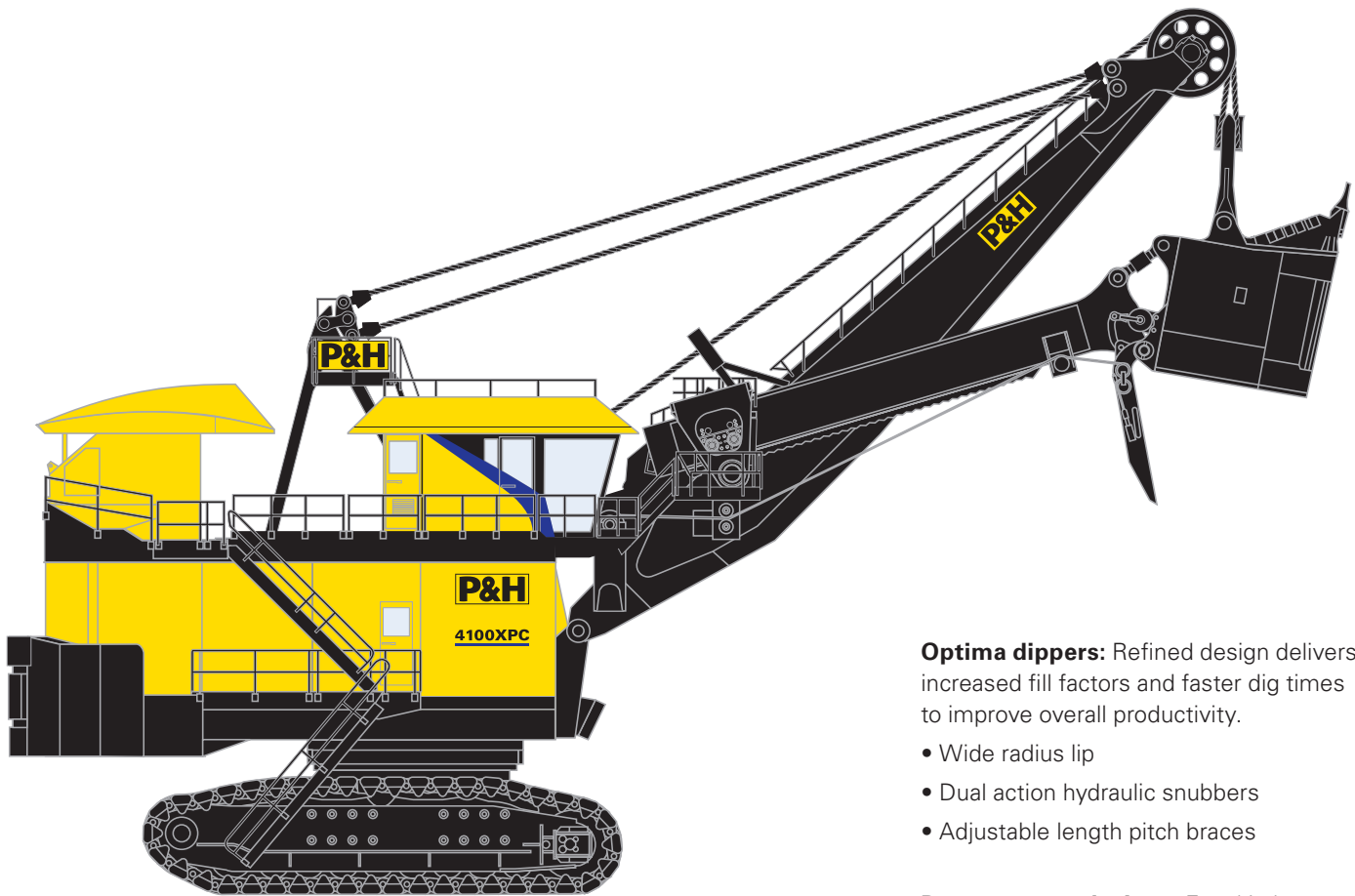
The P&H 4100XPC is the preferred ultra-class shovel choice for high production mines around the world, providing a nominal 108.9 metric tonne (120 short ton) capacity for loading of haul trucks up to 363 metric tonnes (400 short tons) as well as in-pit crusher-conveyor systems.



4800XPC

The P&H 4800XPC is a breakthrough addition to the P&H shovels, providing a 122.7 metric tonne (135 short ton) nominal payload capacity specifically designed to operate in mines for 3 pass loading of 363 metric tonne (400 short ton) ultra-class haul trucks. Built upon the great foundation of the 4100XPC AC, the 4800XPC features new Adaptive Controls technology which increases shovel digging power without sacrificing life.

The drive towards a lower total cost of ownership (TCO)



Key aspects to lowering TCO

Attachment: Robust design delivers increased productivity in varying bank conditions. Consistently high machine availability supported by our proven track record.

- Wide twin leg handle for stability throughout the dig cycle.
- Robust electric driven rack and pinion crowd system
- Geometry optimized for fatigue resistance in shock and high load conditions
- Maximizes cutting forces to improve fill factors and cycle times.

Electrical systems: Rugged Centurion-based compact-design ABB drives provide highly precise motor control. Centurion monitors and controls a neural network of over 500 Input/Output nodes through a fast, high-capacity Profibus fiber-optic cable network for optimized systems health management and performance.

- Centurion control
- ABB partner – AC or DC
- Integrated by Komatsu
- Full Komatsu electrical engineering/electrical service team
- Optimized shovel performance for maximum production rates

Optima dippers: Refined design delivers increased fill factors and faster dig times to improve overall productivity.

- Wide radius lip
- Dual action hydraulic snubbers
- Adjustable length pitch braces

Proven motor designs: Excel in heavy-duty and severe-duty mining applications, providing robust speed, lower inertia and peak HP.

- Komatsu designed and built
- Mining duty shovel motors
- Experience in both DC and AC motors since 1893
- Combined with P&H gearing and transmissions for a totally integrated system application

Structures: Heavy duty designs provide stable platform for maximum shovel productivity. Stability benefits operators with less fatigue over a shift.

- Geometry optimizations for improved load flow and overall shovel stability.
- Weld joint refinement for increased fatigue resistance
- Impact resistant steel throughout

P&H shovel: The TCO advantage

Safety

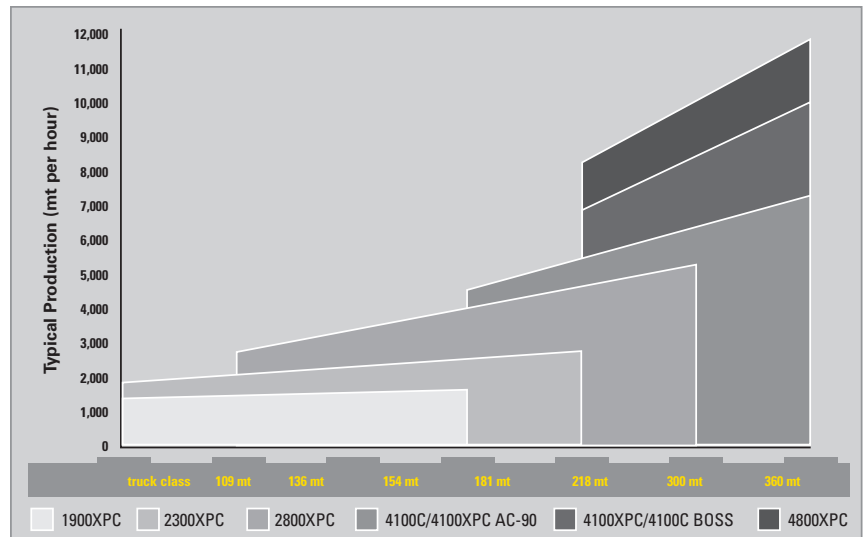
- Collaborative development process leverages input from multiple sources ranging from baseline codes to industry forums such as EMESRT (Earth Moving Safety Round Table)

Productivity

- Attachment utilizing a rigid twin leg handle design to deliver maximum cutting force to the dipper lip
- Optimal dipper geometry to support maximum fill factor efficiency
- Latest mining duty drive technology for faster cycle times

Reliability

- Consistently achieves over 90% mechanical availability
- Proven P&H mining duty motors and gearboxes for extended component lives
- Robust structural designs utilizing high strength low alloy steels for improved fatigue lives



Maintenance and support

- Integrated systems and support: from design to field support
- PreVail: Remote health management for data analysis and diagnostics
- Life Cycle Management (LCM) programs available

Operator efficiency

We understand that a high level of operator efficiency equals higher productivity. The operator cab is the loading control center, which means your operator is now equipped with exceptional, unprecedented levels of communication, command and control over the loading operations process in your mine. We are committed to the ease of operation through a series of design characteristics incorporated into every P&H shovel:



- Responsive control system provides operator confidence throughout the dig cycle leading to improved cycle times and fill factors for overall increased productivity.
- Graphical User Interface (GUI) serves as portal for shovel systems operation and health information.
- A stable, optimized structural platform in conjunction with efficient sight lines and refined ergonomics contribute to improved operator effectiveness and reduced operator fatigue. Loading control seat: power controls for adjusting; heated seat with comforting massage; adjustable lumbar support; comfortable two position footrest; helps keep operator comfortable and alert during long shifts for safer operation.
- Loading control joysticks: ergonomically improved over previous designs; reliable Hall Effect technology; brake and propel transfer function at operator's fingertips; dipper trip and signal horn use trigger switch - reduces fatigue and repetitive strain.

Delivering innovation that will revolutionize mining



Track Shield is available on P&H 2800, 4100, and 4800 shovel models enabled with the Centurion electrical control system.

Komatsu is proud of its investments in advanced technology. Our resources are committed to developing methods and solutions focused on higher productivity and reliability and safer operations.

P&H shovels come standard with an array of control technologies, including:

- Temperature monitoring system
- Drive programming and analysis software
- Control logic software
- Input/Output (I/O) device monitoring and fault detection
- Remote health management
- Extended speed range in hoist and crowd
- Automatic Boom Soft Setdown (ABSS) and boom profile protection envelope
- Anti-swing-in-bank system
- Hoist, crowd and retract limits
- Automatic lubrication and compressed air systems control
- Centurion electrical control system





P&H shovel training simulator

Realistic virtual training simulators allow operators to learn a machine's controls quickly and safely, as well as master the entire operator process from start to finish, before they ever step foot into a real-world piece of machinery. Training simulators lead to less machine downtime and a safer, more efficient and productive operation.

The Series I shovel training simulator provides a real world feel in a very compact package. The simulator uses a 17" laptop, HDMI cable included for connection to a large screen monitor, and real world joystick controllers that clamp to almost any table top making it easy to set up in any environment.

The Series II shovel training simulator is made to be set up easily yet gives the operator a more realistic feel for the machine. To provide the operator with the same comfort and control used on the actual equipment, the simulator uses a PC computer, real world joystick controllers and operator seat to run the simulation. This, combined with three 46" HD monitors, delivers a realistic experience for any new or experienced operator trainee.

PreVail remote health management system

Prevail remote health management (RHM) technology assists the mines providing timely, efficient machine health and performance knowledge. The PreVail RHM system taps into the powerful communication, command and control capabilities of the electrical control system,

transforming the data and information it produces into more refined knowledge of great value to your operations and maintenance management teams. That knowledge is available in several forms including KPI (key performance indicator) dashboards, graphical analysis tools, predictive modeling and reporting tools.

With PreVail RHM installed on your P&H shovels, you have access to:

- Increased asset performance visibility to help you determine when to intervene – and position you to minimize corrective action cost
- Valuable risk management tool to help reduce troubleshooting time and mean time to recovery.
- Benchmarking of key performance indicators to make performance gaps more visible and set in motion corrective measures to maximize productivity
- Operating practices analysis to allow for review and correction of operators not following best practices for optimal productivity

Bottom line: PreVail RHM helps improve your operations productivity performance via increased equipment availability.

For more information about PreVail RHM and our other technology and service offerings, contact your local Komatsu Mining service center.

Smart Solutions service centers



Smart Solutions

Komatsu recognizes the diversity of our customers, allowing them to select from flexible service offerings that are designed to help maximize performance and productivity of P&H and Joy mining equipment. Customers are served directly by Komatsu Mining service centers and distribution facilities that are regionally located and globally linked. The following service offerings are designed to help achieve each customer's unique objectives:

Service products and consumables

Our service products and consumables (SP&C) are engineered and specifically selected to meet application and design standards. With dedicated regional warehousing and computerized inventory systems, we can assure timely and cost effective SP&C delivery to our customers anywhere in the world.

Machine assembly and rebuild

Our service teams are structured to be the preferred resource for every machine rebuild by applying new machine assembly factory best practices culminating with our Flawless Start Up process. Our assembly and rebuild program is backed by a complete range of OE services including SP&C, Component Exchange Program (CEP), on-site project management, labor, shop services, as well as a wide range of technical support.

Component exchange program

Production goals will only be achieved if machines remain in operation. Minimizing machine downtime during planned and unplanned outages is critical to maintaining production goals. Our Component Exchange Program provides a ready supply of like-new, remanufactured components incorporating the latest design improvements, available from regional warehouses for same day or next day delivery.

Technical and field services

We offer factory-trained service technicians and skilled tradesmen

to maintain and repair customers' equipment 24/7, 365 days/year. These regional service teams are regularly trained and recertified to maintain high proficiency standards.

Service center repair

Our unique direct service business model enables customers to deal directly with Komatsu Mining service centers offering expedient turnaround time and high-quality service repairs based on OEM specifications. Each service center is staffed with experienced and well-trained technicians committed to delivering quality and reliability.

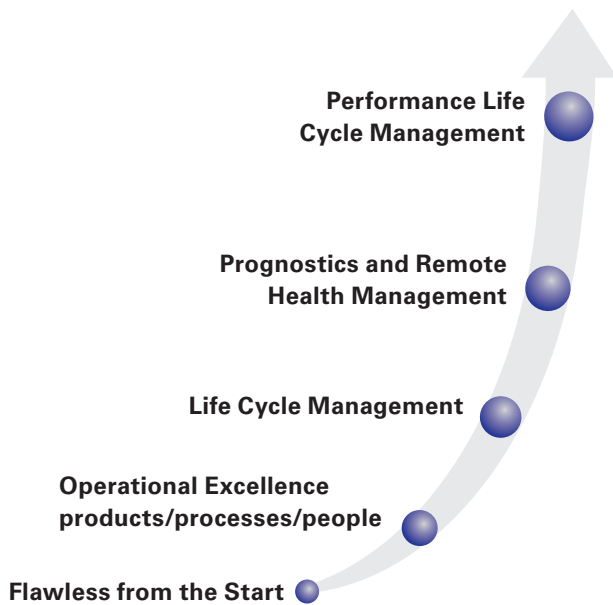


Life cycle management

Through collaboration, operational excellence and integrated technology solutions, we partner with our customers to provide the asset management strategy needed to achieve desired results. Customers can select from LCM options that complement their support structure to reduce costly downtime, optimize equipment performance and take the uncertainty out of maintenance, repair and rebuild management.

Prognostics and remote health management

Leverage predictive, prescriptive and real-time operational analytics to transform that data and information into actionable knowledge for production and maintenance teams. Integrated services and technologies enable customers to achieve increased production, higher availability, better utilization and improved profitability.



At Komatsu we believe the difference is in the details. From advanced structural designs to state-of-the-art Centurion electrical control systems, it all adds up to lowest cost-per-tonne loading solutions for high performance mining operations.

Contact your Komatsu Mining service representative for more information on P&H electric mining shovels or visit <https://mining.komatsu>

Komatsu Mining Corp. Group

mining.komatsu



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