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, Joy Global boasts more than 14,000 employees in over 120 facilities. Through our worldwide service centers and highly trained field technicians, Joy Global 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

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.

Our commitment to quality and reliability is supported by our focus on Operational Excellence. We use Joy OpEx principles to eliminate waste, simplify the process, automate and remove people from harm’s way.

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

You manage a large production landscape focused on the most efficient possible production of a valuable commodity 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 look across your production landscape and see that you have invested in the best available mix of capital equipment – including your P&H electric shovels – to help realize your operations management objectives.

You helped inspire Joy Global to design, build and support these exceptionally tough, smart loading machines. Joy Global has 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

<table>
<thead>
<tr>
<th>1900XPC</th>
<th>2300XPC</th>
<th>2800XPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pay load</td>
<td>18 mt</td>
<td>45.4 mt</td>
</tr>
<tr>
<td></td>
<td>20 st</td>
<td>50 st</td>
</tr>
<tr>
<td>SAE struck</td>
<td>9.9 m³</td>
<td>18.3 - 25.5 m³</td>
</tr>
<tr>
<td></td>
<td>13.0 m²</td>
<td>24.0 - 33.0 m²</td>
</tr>
<tr>
<td>Nominal dipper capacity – SAE 2:1</td>
<td>10.7 m³</td>
<td>20.2 - 27.8 m³</td>
</tr>
<tr>
<td></td>
<td>14 m³</td>
<td>26.7 - 36.7 m³</td>
</tr>
<tr>
<td>Truck class match</td>
<td>360t - 400t (400 mt)</td>
<td>6 Pass</td>
</tr>
<tr>
<td></td>
<td>300t - 330t (330 mt)</td>
<td>5 Pass</td>
</tr>
<tr>
<td></td>
<td>218t - 240t (240 mt)</td>
<td>4 Pass</td>
</tr>
<tr>
<td></td>
<td>181t - 200t (200 mt)</td>
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<td></td>
<td>136t - 150t (150 mt)</td>
<td>6 Pass</td>
</tr>
<tr>
<td></td>
<td>109t - 120t (120 mt)</td>
<td>2 Pass</td>
</tr>
</tbody>
</table>

*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 ton (50 short ton) nominal payload capacity specifically designed to operate in mines for high production loading of 109 metric ton to 218 metric ton (120 ton to 240 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 ton (65 ton) nominal payload capacity specifically designed to operate in mines for high production loading of 172 metric ton to 363 metric ton (190 ton to 400 ton) haul trucks and larger; it is the industry’s best-selling shovel model due to its durability and versatility.

4100XPC

The P&H 4100XPC provides a 81.6 metric ton (90 ton) nominal payload capacity specifically designed to operate in mines for high production loading of 172 metric ton to 363 metric ton (190 ton to 400 ton) haul trucks. First introduced in 1990, the 4100 series shovels are the benchmark of reliability and high productivity.

4100C

The P&H 4100C provides a 81.6 metric ton (90 ton) nominal payload capacity specifically designed to operate in mines for high production loading of 172 metric ton to 363 metric ton (190 ton to 400 ton) haul trucks.

4100C BOSS

The P&H 4100C BOSS provides a 90.8 metric ton (100 ton) nominal payload capacity specifically designed to operate in mines for loading of 218 metric ton to 363 metric ton (240 ton to 400 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 ton (120 ton) capacity for loading of haul trucks up to 363 metric tons (400 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 ton (135 ton) nominal payload capacity specifically designed to operate in mines for 3 pass loading of 363 metric ton (400 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 Profbus fiber-optic cable network for optimized systems health management and performance.
- Centurion control
- ABB partner – AC or DC
- Integrated by Joy Global
- Full Joy Global electrical engineering/electrical service team
- Optimize shovel performance for maximum production rates

Proven motor designs: Excel in heavy-duty and severe-duty mining applications, providing robust speed, lower inertia and peak HP.
- Joy Global designed and built
- Mining duty shovel motors
- Experience in both DC and AC motors since 1893
- Combined with Joy Global’s 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

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.
- Joy Global designed and built
- Mining duty shovel motors
- Experience in both DC and AC motors since 1893
- Combined with Joy Global’s gearing and transmissions for a totally integrated system application

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 horn use trigger switch - reduces fatigue and repetitive strain.
Delivering innovation that will revolutionize mining

Joy Global 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 (except P&H 1900AL)

**Track shield collision detection and mitigation system**

The Track Shield collision detection and mitigation system was developed with extensive shovel operator input and is the only automated operator-assist technology on an electric mining shovel that will detect and help prevent a dipper from striking the crawler. The Track Shield system is available on P&H 2800 and 4100 shovel models enabled with the 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, fewer accidents, and a 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 Joy Global Service Center.
Joy Global service

Joy Global 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 Joy Global 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 exacting 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 the Joy Global 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. The Joy Global 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 Joy Global 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, Joy Global partners 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.

Contact your Joy Global service representative for more information on P&H electric mining shovels or visit www.joyglobal.com.