

KOMATSU

P&H

Generation 2 Wheel Loader 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.

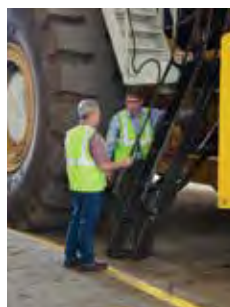
What we do:

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.

**Storied past.
Strong future.**

Longview, Texas (USA) is home to one of Komatsu's oldest and most innovative mining manufacturing facilities. Wheel loaders have been designed and built there for decades, and continue to set the standard for efficiency and sustainability. It all began with R.G. LeTourneau, the earthmoving industry pioneer who introduced the first rubber-tired front end loader, and led the way in development of diesel / electric design. It was this forward-thinking tradition which inspired the Longview team to introduce SR technology on wheel loaders in 2002, and continues today with the SR Hybrid Drive system now being used around the world.

With a footprint of over one million square feet, our Longview facility is dedicated to building the most technologically advanced mining equipment in the industry. By investing in our people and empowering them to continuously improve all aspects of the manufacturing process, we continue to point the way toward the mine of tomorrow.



P&H wheel loaders:

- The primary loading tool in a variety of applications including coal, iron ore and other hard rock mining
- Do not require ancillary equipment for floor clean up. This task can be performed by the same wheel loader used as the primary mine loading tool
- Increased mobility when compared to competitive primary loading tools and well suited for blending applications
- Operations that require equipment relocation or frequent moves to an alternate site during blasting or the mining process benefit from the mobility offered by wheel loaders because they can resume production much quicker

**Need to increase productivity?
Versatility? Fuel efficiency?
There's a Generation 2 for that.**

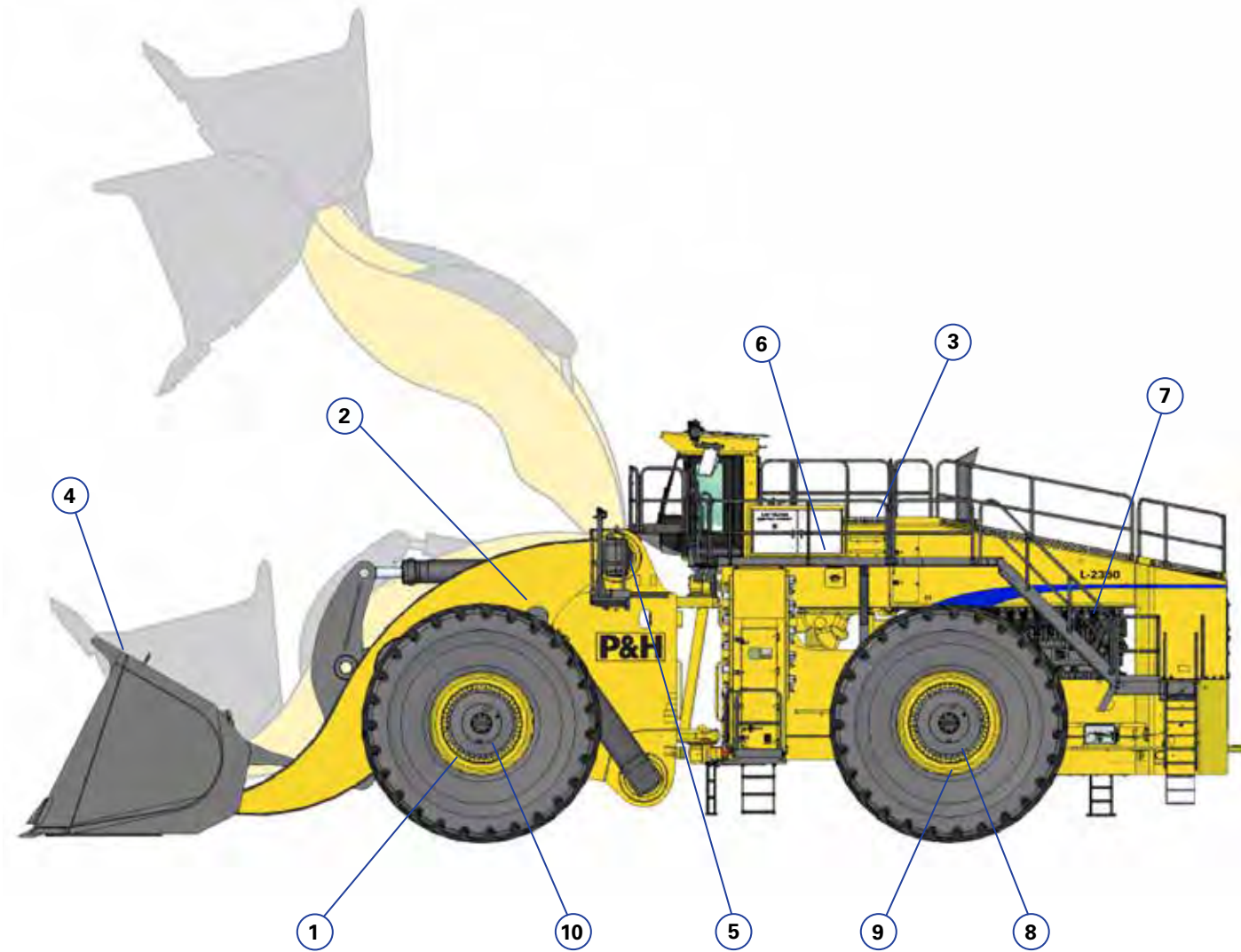
Simply stated, you won't find a more comprehensive line of technologically advanced wheel loaders than P&H Generation 2 wheel loaders.

More choices, more payloads, more versatility assures that with P&H wheel loaders, you're getting the absolute best match of machine to mine. From the nimble L-1150 to the L-2350, the world's largest wheel loader, Komatsu has a Generation 2 wheel loader to fit your specific mining requirements.

Generation 2 machines are designed to achieve greater operating hours due to their robust structural design and modular components. The SR Hybrid Drive technology offers power regeneration resulting in lower fuel consumption levels. The loaders also offer the latest safety features that meet global requirements that are recognized by leading mining industry safety councils.

That's why we say P&H wheel loaders are made for the mine and why they are your best choice for any mining challenge.

Features that assure the P&H Generation 2 wheel loader is the right machine for the mine.



Easy access maintenance

Unlike other wheel loaders, P&H wheel loaders offer multiple maintenance-friendly access points all around the machine. Our design offers easily accessible maintenance to the engine, radiator, KLENZ™ filtration system, hydraulic pumps and hoses, air compressor, and the machine's SR power conversion system and traction motors.

In addition to these easily accessible modular components, Generation 2 machines features a separated high voltage and low voltage electrical cabinets along with a centralized cabinet that contains the air system controls for ease of maintenance and safety. All of these features translate to valuable time saved and increased productivity.



1. SR Hybrid Drive system

The SR drive system with independent wheel speed control at all four positions is standard on all Generation 2 wheel loaders. Simple and reliable motors/generators are extremely efficient and maintenance free. No brushes, no commutators and no copper windings on the rotor.

2. Frame and lift arms

The frame structures are fabricated from high-strength, low-alloy steel with excellent weld characteristics and low temperature properties throughout. High strength castings and forgings are used in key areas of fabricated structures to reduce stress and improve structural life. The front axle is an integral, fixed part of the frame. The rear pivoting axle is designed to oscillate eleven degrees (11.0; 12.50 on the L-2350). The independent power module mounting system is cradled within the rear frame by a three-point isolation system.

3. KLENZ™ air filtration system

The KLENZ™ air filtration system is the world's most efficient and money-saving air filtration system. The design is 99.9% effective in removing air particles as small as 0.3 microns. The self-purging design can stretch filter life to 5,000 hours and beyond, up to 15 times longer than conventional filtration systems.

4. Buckets

All P&H buckets are SAE rated, which means that they can achieve the rated capacity of the bucket and ultimately provide the full payload in accordance with SAE standards. A wide variety of bucket sizes are available: whether for coal, rock or combo, in addition to several lip and GET options

5. Ball and socket joints

P&H wheel loaders utilize ball and socket joints for frame articulation joints, lift arm attachments, lower hoist cylinder support and rear axle oscillation pivot points. This long life and low maintenance attachment system is used exclusively on all P&H wheel loaders to absorb and distribute multidirectional stresses significantly better than traditional, higher maintenance pin and clevis systems. Long life is assured through our continuous automatic lubrication system.

6. LINCS II digital controls

The exclusive LINCS II control and monitoring system provides the operator with simple, highly responsive and semi-automated control interface and quick vehicle troubleshooting. Maintenance personnel are provided with an interactive off-line tool that provides unparalleled machine downloads for diagnostics.

7. Diesel electric drive constant RPM

In addition to assured longer engine life and reduced fuel economy, operating the engine at constant RPM also favorably impacts the performance of the hydraulic pumps and assures that full hydraulic flow is instantly available upon demand.

8. Hydraulic features

The hydraulic system employs variable displacement axial piston pumps, with flow and pressure compensation for optimum performance, economical operation, and high reliability. The hydraulic pump gearbox is shaft-driven and self-lubricating. The gearbox's inline filtration removes particulates down to 10 microns absolute, and a conservatively pressurized lubrication delivery network for the entire system promotes an extended, trouble free service life.

9. Planetary drives

Robust and durable, P&H four stage planetaries feature full synthetic lubrication and continuous recirculation filtration resulting in long, trouble-free life.

10. Pressurized axle housings

P&H pressurized axle housings enhance reliability by maintaining an air-cooled, dust-free environment for the traction motors and disc service brakes.



Operator comfort

The importance of the human element

We understand that a high level of operator comfort equals higher productivity. We are dedicated to ease of operation through a series of thoughtful ergonomically designed cabin features in every Generation 2 wheel loader:

- Ergonomically designed joysticks
- Two door ingress and egress
- Simplified dash layout
- LCD screen that is readily visible and easily readable
- Insulated cab that provides temperature protection and additional sound dampening
- Eleven-way adjustable air ride seat
- Unmatched visibility for operators
- Pressurized and filtered cab air
- Air-conditioning and heating system maintains interior cab comfort under the harshest conditions



SR Hybrid Drive: the heart of every Generation 2 machine.

P&H Generation 2 wheel loaders deliver outstanding fuel efficiency – in some cases up to 45% less fuel consumption than comparably sized mechanical drive wheel loaders – because they are engineered for the most fuel efficient operation possible. The exclusive SR Hybrid Drive system is the key.

Utilizing proven switched reluctance technology, SR Hybrid Drive is a reliable system that allows power generation to be fully regenerative, resulting in very efficient wheel loader operation. During braking or retarding, electrical motors become generators and feed power back into the generator that is connected to the engine. Ultimately, this causes the generator to operate as a motor and turn the diesel engine. Major components of the SR Hybrid Drive system include power electronics, motor/generator, control system and gear train.

Designed to save you time and money

- Reduced fuel consumption during braking or regenerative mode
- Advanced system that allows the engine to operate at a constant rated rpm
- High torque capability down to and including zero speed, with full control at zero speed
- Inherent low center of gravity and superior stability of electric drive
- Reduced operator fatigue and quicker cycle times
- Significantly quicker response for improved traction control and reduced tire slip for extended tire wear
- Best in class horsepower-to-weight ratio

Designed to outperform the competition

Unlike competitive machines which are required to accelerate and decelerate through the engine RPM range with gear changes during the loading cycle in order to follow the engine torque curve, P&H wheel loaders have:

- No power robbing torque converter
- No three speed transmission
- No transfer cases
- No differentials
- No power transferring universal joints
- Requires far less fluids on board

The result is greater productivity, lower maintenance costs and superior reliability.



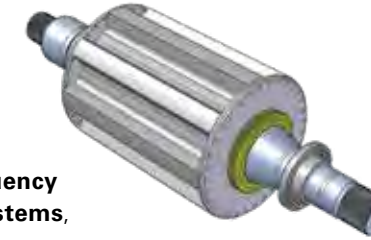
A typical wheel loader loading cycle is ideal for capitalizing on capturing regeneration power with multiple braking occurrences during each loading cycle. Only electrical drive affords itself to power regeneration and the Generation 2 SR Hybrid Drive allows for one-hundred percent (100%) capture and utilization of all braking energy during the loading cycle.

Not just moving earth. Moving the earth forward.

Our reliable line of wheel loaders consistently delivers the best fuel efficiency in the industry. That's not just good for your bottom line. It's good for the planet's future.

Rotor

- **Low inertia** – less impact stress on gearing. High torque to inertia ratio means faster response.
- **Lower switching frequency as compared to AC systems**, resulting in longer power electronics and motor insulation life
- **Simple rugged design** – purely a stack of electrical steel laminations
- **No windings, rotor-bars, magnets or contact of any sort**
- **Cool running** – losses are concentrated in the stator



Stator

- **Compact** – short end-turns permit very high torque/volume ratio for an electric drive
- **Reliable** – independently wound coils have no overlap area
- **Good thermal management** – losses are easily dissipated through the outer circumference



P&H Generation 2 wheel loaders have consistently delivered the industry's most fuel efficient and reliable performance in even the most demanding heavy equipment applications.

Komatsu is the only wheel loader manufacturer in the world to offer advanced electric drive across all wheel loader models. Each electric drive wheel is fully independent from the other positions, which results in the only true independent four wheel drive system in the wheel loader market.




The right size machine to match your vision.

In the mining business, one size definitely does not fit all. That's why Komatsu offers the broadest, most versatile and exclusive line of electric drive wheel loaders capable of loading 75 ton trucks all the way through 400+ ton haul trucks. In fact, P&H wheel loaders have proven their advantages, time after time, in coal, iron, copper and numerous other hard rock mining applications around the world. Each machine is an extraordinary marvel of engineering, providing the 21st century mining operation more versatility than ever before.

P&H L-2350




Engine		1715 kw (2300 hp)
Payload		
Standard	kgs	72,574
	lbs	160,000
High lift	kgs	68,039
	lbs	150,000
Super high lift	kgs	54,431
	lbs	120,000
Truck capacity (tons)		
375		
325		
275		
225		
175		
125		
75		
0		

Designed to center load ultra-class 400+ ton trucks with ease, the colossal P&H L-2350 is by far the world's largest wheel loader. P&H L-2350 provides remarkably fast cycle times with outstanding productivity at a fraction of the initial investment cost of large excavators. This super fuel efficient wheel loader provides the versatility and flexibility that customers have come to expect from a P&H wheel loader.

P&H L-1850




Engine		1491 kw (2000 hp)
Payload		
Standard	kgs	54,431
	lbs	120,000
High lift	kgs	49,895
	lbs	110,000
Truck capacity (tons)		
375		
325		
275		
225		
175		
125		
75		
0		

P&H L-1850 is the high-performance workhorse of the P&H wheel loader fleet. P&H L-1850 delivers exceptional productivity and outstanding reliability with low operating costs. Work-proven in coal and hard rock mines around the world, this machine sets the benchmark for wheel loader reliability, productivity and fuel efficiency.

P&H L-1350




Engine		1193 kw (1600 hp)
Payload		
Standard	kgs	40,823
	lbs	90,000
High lift	kgs	38,102
	lbs	84,000
Truck capacity (tons)		
375		
325		
275		
225		
175		
125		
75		
0		

P&H L-1350 wheel loaders are time-proven, work-hardened, fuel efficient machines and were the first P&H wheel loaders to utilize SR traction motors in 2004, and in every P&H L-1350 since. Fast cycle times and easy loading SAE rated buckets make this a superior production mining machine.

P&H L-1150



Engine		899 kw (1205 hp)
Payload		
Standard	kgs	34,473
	lbs	76,000
High lift	kgs	31,751
	lbs	70,000
Truck capacity (tons)		
375		
325		
275		
225		
175		
125		
75		
0		

P&H L-1150 with the advanced SR Hybrid Drive system features up to 45% fuel savings over comparable, mechanical drive competitors. P&H L-1150 delivers faster cycle times, superior productivity, lower operating costs and it requires less hydraulics/fluids. This is the most environmentally responsible wheel loader in its class.

Technology that will revolutionize your mine.

The LINC'S II network control system is designed to help operators meet the challenges of even the most demanding surface mining applications.

The center, dash mounted, LINC'S II interactive touch screen display provides:

- Instant, real-time feedback for operators with a wealth of information to adjust performance according to conditions
- Vital statistics such as bucket height and angle, individual bucket payload, cumulative truck loads, elapsed time per loading cycle, and total tons moved, available fuel, vehicle speed, coolant temp, etc.
- An easy-to-interpret graphic format that can be easily reconfigured to meet personal preferences using the touch screen display

In addition, LINC'S II increases safety by preventing the operator from executing inappropriate commands. For example, LINC'S II will stop an attempt to start a Generation 2 wheel loader with the parking brake released. LINC'S II will then explain why on the interactive data screen. This enables the operator to take immediate corrective action without confusion or wasted effort.

Data to Information to Knowledge:
The PreVail Remote Health Management (RHM) system taps into the powerful communication, command and control capabilities of the LINC'S II 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.



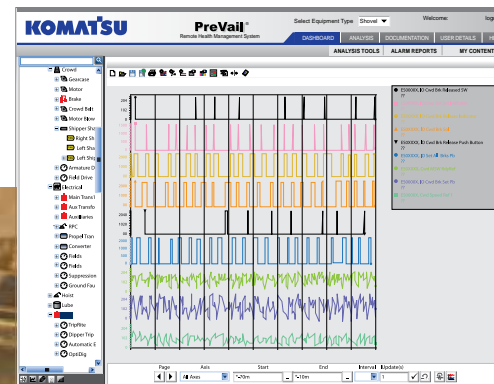
Knowledge is power.

Komatsu supports several hundred P&H machines placed into service worldwide. PreVail RHM system analysts have access to a worldwide fleet of P&H machines, which means that the PreVail RHM knowledge base is already substantial but growing and evolving rapidly.

Data is gathered and analyzed with greater speed. Solutions are being developed and applied with increasing efficiency. Performance benchmarks and "best in class" standards are undergoing continuous improvement.

Komatsu is investing in an expanded base of Smart Solutions centers worldwide, enabling us to provide our customers with consistently better machine monitoring, reliability and productivity.

More choices,
more payloads,
more versatility assures
that with P&H wheel
loaders, you're getting
the absolute best match
of machine to mine.



Virtual training, transformed into real world results.

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



Contact your Komatsu Mining service representative for more information on P&H wheel loaders or visit mining.komatsu

Komatsu Mining Corp. Group

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