

# KOMATSU

## Hybrid Shovel



**P&H**





Harnessing the power of industrial technology to support a sustainable, prosperous future for all.

### You move the minerals. We make the machines.

The essential minerals you produce power modern technology, facilitate community growth and move society forward. But these minerals are hard to find and tougher to mine.

Your customers trust you to deliver these resources, so you need an equipment, service and technology provider you can rely on to help keep your operation productive and efficient. Together we can focus on operating safely, productively and responsibly.

### Equipped for the surface. Designed for your bottom line.

#### Versatility delivers

Multiple dig paths provide optimal flexibility

- High initial breakout force using articulating clamshell bucket
- Flat floor clean-up reduces need to bring in dozers or loaders
- High selectivity to extract desired ore grades

#### Fuel efficiency matters

Lower fuel needs for digging reduces overall fuel consumption and costs

- SR Hybrid Drive switch-reluctance technology captures and utilizes regenerative power
- Fixed boom architecture reduces the mass to hoist

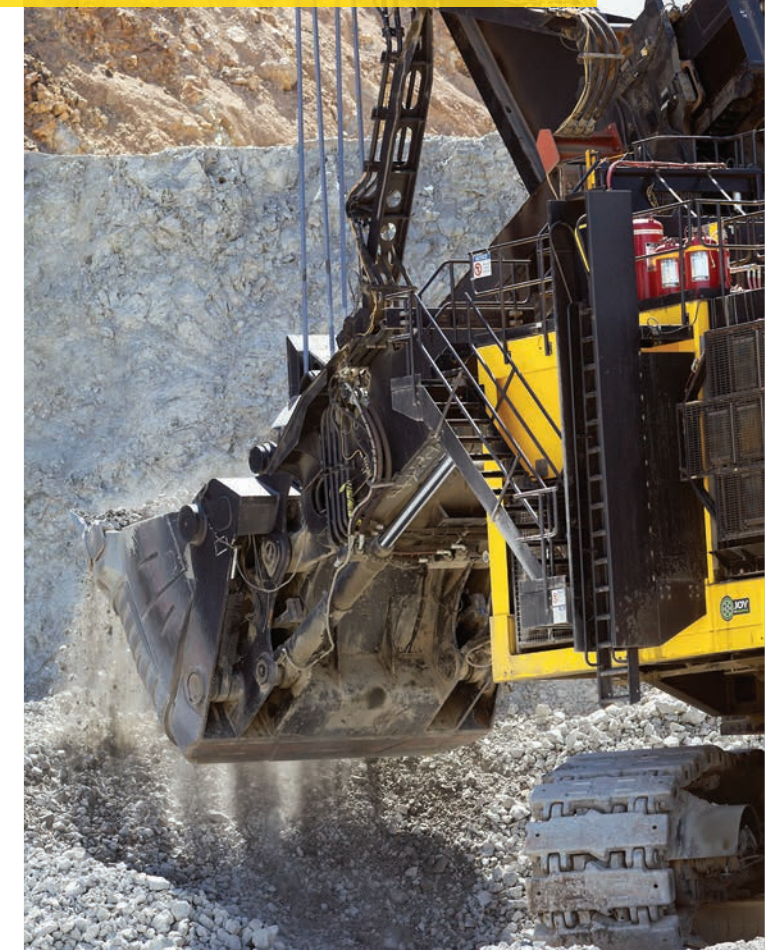
#### Convenience counts

Extended reach decreases cycle time, while twin diesel engines eliminate need for electric cable

- Enhanced safety through machine position relative to bank
- Increased truck-spotting range
- Capable of double-sided loading
- Reduced propel time

### Best of both worlds

Hybrid shovels provide a game-changing combination of diesel and electric power to optimize the best features of hydraulic excavators and electric mining shovels.



Experience up to a 15% TCO advantage  
over traditional hydraulic excavators.



## Factors that drive lower total cost of ownership (TCO)



Lower TCO is enabled in large part by the patented SR Hybrid Drive system's unique ability to capture regenerated energy for use in the machine's electrically controlled motions. This can reduce fuel consumption by as much as 50%.

The P&H® 2650CX hybrid shovel also lowers operating costs through advanced design and state-of-the-art technology that deliver up to a 3% availability advantage and a 5-10% reduction in maintenance and repair costs. Collectively, these factors represent up to a 15% overall TCO when comparing our hybrid shovel to traditional hydraulic excavators.

In addition, the 2650CX has been built with a host of robust features to provide your operators with comprehensive benefits they'll appreciate every day.

### Enhanced safety

- Fixed boom/handle attachment configuration provides extended reach and optimal height clearance to safely load ultra class haul trucks
- Cab equipped with features that contribute to a safer and more productive operator environment, including ergonomic controls and cab layout, intuitive displays and comfortable seat configuration
- High visibility interior and exterior LED lighting
- MGD-15 and MSHA standards used throughout the design

### Reliability

- Technology designed and manufactured in-house
- Proven fixed boom and twin handle systems for superior digging and reach capabilities
- Up to 50% fewer hydraulic components than traditional hydraulic excavators
- Electric motors control hoist, swing and crowd motions
- Smart Solutions enabled

### Flexibility

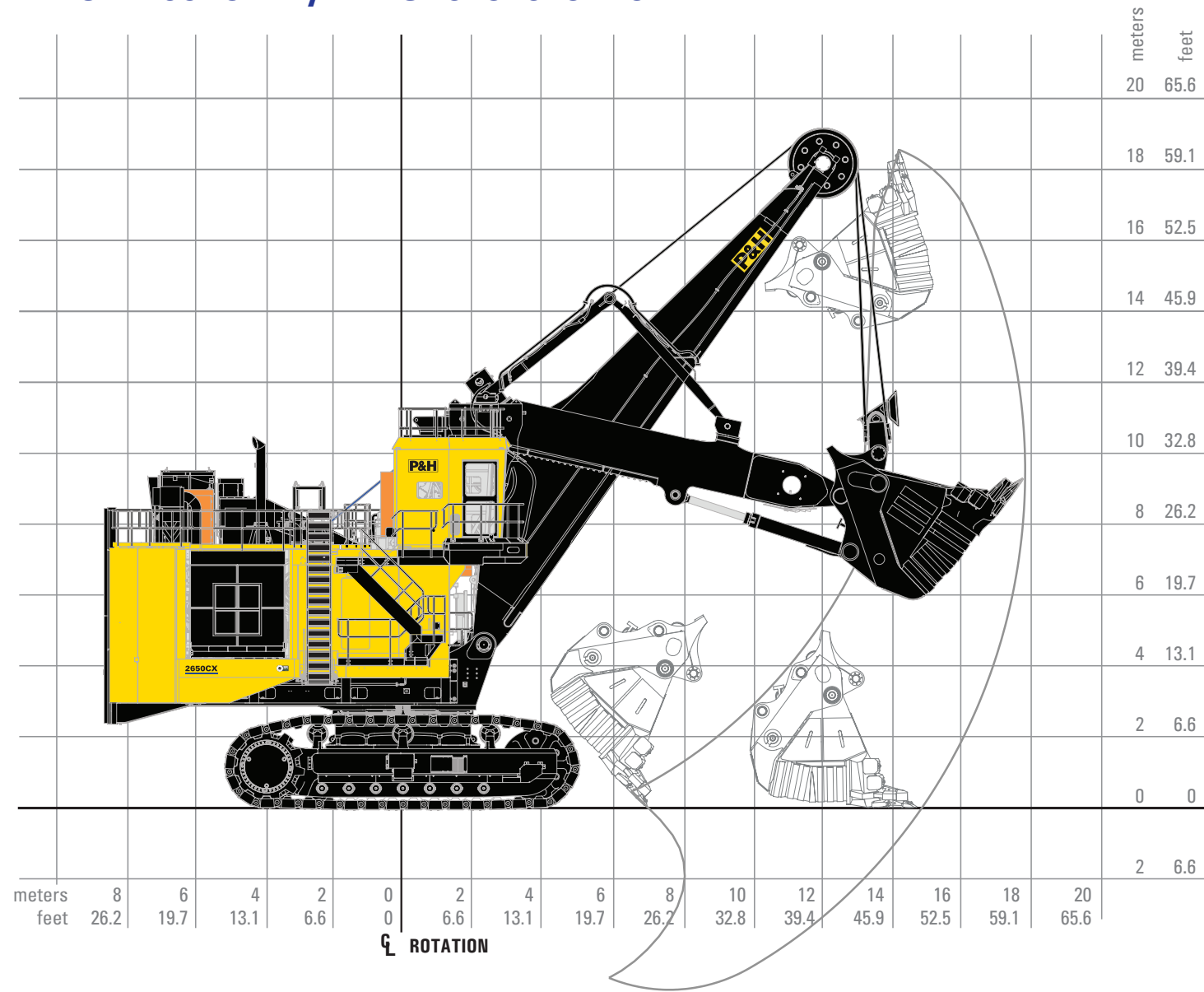
- Hydraulically articulated clamshell bucket for increased selectivity and breakout forces
- Accommodates bench heights from 6-16 m (20-50 ft)
- Twin diesel engines provide increased mobility and eliminate trail cable management activities
- Truck ranges 135-360 mt (150-400 st)

### Maintainability

- Boom struts aid in maintenance
- Improved access to systems on machinery deck
- Modular systems pre-assembled
- Internal access into major structures
- Shorter mean time to repair
- Reduces weight by removing gantry assembly and access systems
- Retractable service area for safe and easy fluid refills



### P&H 2650CX Hybrid Shovel overview



Operating weight	817,889 kg	1,803,134 lbs
Standard track pads	1626 mm	64 in
Ground bearing pressure	29.6 N/cm <sup>2</sup>	43 psi
Engine output	2,386 kW	3200 HP
Bucket capacity	@ 1.9 t/m <sup>3</sup> 31.1	@ m <sup>3</sup> 40.7 yd <sup>3</sup>
Rated suspended	127.5 mt	140.5 st

### The way it works

How does the SR Hybrid Drive system produce such an impressive reduction in fuel consumption and deliver other important operational benefits?

During braking, the SR motors become generators, transferring energy back into the SR drives. Those drives use the regenerated energy to turn the engine SR generator into a motor. With the generator acting as a motor, it triggers a variety of impacts throughout the machine.





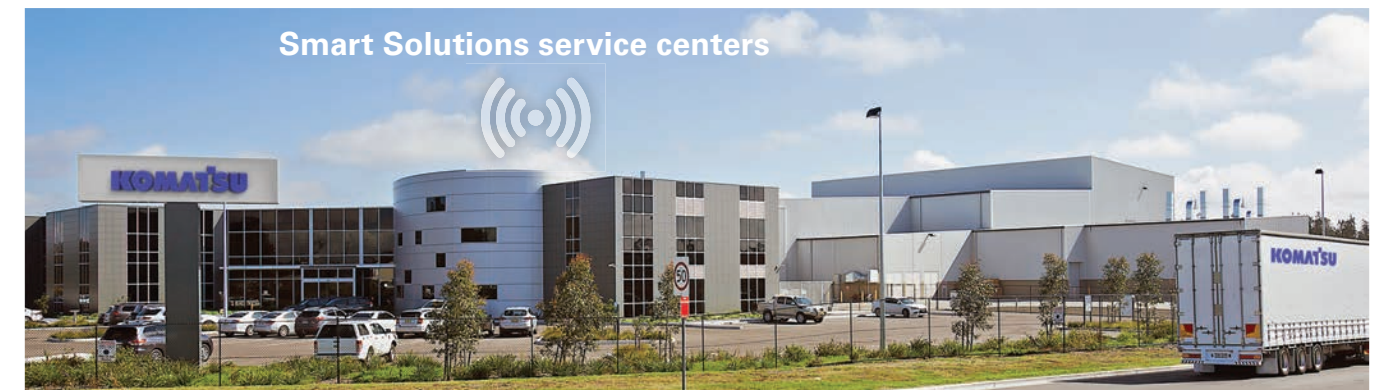
## Operational data at your fingertips

The LINC<sup>S</sup>® II network control system is designed to help you meet the challenges of even the most demanding surface mining applications. The interactive touch screen display provides:

- Real-time feedback so operators can adjust performance according to conditions
- Vital statistics such as individual bucket payload, cumulative truck loads, elapsed time per loading cycle and total tons moved
- Basic information such as available fuel, vehicle speed and coolant temperature

Prevail<sup>®</sup> remote health management (RHM) technology assists the mines providing timely, efficient machine health and performance knowledge. With Prevail RHM installed, 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



## 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.





## Supplies energy

In addition to supplying energy to satisfy parasitic/working loads (primarily hydraulics), it also provides energy to mitigate engine losses.

## Shuts off fuel supply

Fuel is cut off for an appreciable amount of time during the shovel load cycle, which significantly reduces fuel consumption and generates 0% engine load during this time, which also increases the useful life of the engine.

## Increases speed

Mass of the engine drive train acts as a flywheel for stored energy, increasing the engine drive train velocity.

## Optimizes energy

Any remaining excess energy is sent to resistor grids.

## Reduces ongoing costs

Because the SR motors and generators don't have a commutator, brushes or rotor windings to repair or replace, you'll spend less on maintenance.

## Equipping the world to empower a sustainable future together

Although we've been historically known for our superior equipment, we also provide comprehensive service solutions and fleet management technology. Committed to enhancing your entire ownership experience, we leverage the intelligence of big data to deliver actionable insights and provide the technology needed to make sure you have the service, tech tools and parts you need to reduce downtime.

### Komatsu: Leading the way >FORWARD

Tomorrow's mining will demand ever-evolving technology in order to lower costs, raise productivity and drive zero harm. With virtual work sites throughout the world, we're able to develop and deploy the right technology at the right time.

We are Komatsu. We are your global partner.



## Lower your TCO

Contact your local Komatsu account representative or visit [mining.komatsu](http://mining.komatsu) to learn how Hybrid Shovels can enhance your operation and reduce your maintenance costs.

## **Komatsu: Revolutionizing the mining industry for a sustainable future**

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