Autonomous Haulage System
Harnessing the power of technology to support a sustainable, prosperous future for all.

YOU MOVE THE MINERALS. WE PROVIDE THE SOLUTIONS.

The essential minerals you produce power modern technology, facilitate community growth and move society forward. But these minerals are getting harder 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. Our proven autonomous haulage system (AHS) offers a significant upgrade for mining operations that need:

- a next-level competitive advantage with cost savings up to 15%
- increased production with less risk
- consistent and worry-free operation
- optimized dispatching and real-time decision-making

Mine automation isn’t the future. It’s happening now.

Connectivity that counts
A single smart machine is limited to gains on that individual piece of equipment. But an open supervisory system enables fleets to communicate across the entire value chain to produce longer equipment life, increased productivity, improved safety and lower TCO.

And there’s good news! We already have the necessary technology to make these gains a reality.

Solutions for success
The Komatsu FrontRunner Autonomous Haulage System (AHS) has been helping surface mining operations around the world improve margins since our first commercial deployment in 2008.

The system leverages centralized control to manage your fleet at the enterprise level, optimizing your truck assignments to deliver greater uptime, safety and productivity.

Gains for today – and tomorrow
Forward-thinking operations proactively prepare current employees for new jobs or emerging skill sets, which positions them well for the future.

When you transition personnel from the field into new roles, it leverages their hands-on expertise, while also developing a pipeline of next-generation talent, preparing your operation for future improvements in productivity and safety.

ELEVATE YOUR DECISION-MAKING AND OPTIMIZE YOUR SURFACE MINING OPERATION WITH A Komatsu FrontRunner Autonomous Haulage System (AHS).

Are you ready?
Automation checklist:
- Commitment to safety throughout
- Mine can support technology at all levels and locations
- Change management plan and staff
- Modern communications infrastructure — outdoor wireless mesh or LTE
- Collaborative readiness assessment

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The benefits of AHS in your mining operation

Game-changing innovation and results

Komatsu’s FrontRunner AHS delivers more than a single smart truck. Instead, the intuitive autonomous system draws upon rich data to seamlessly optimize your haulage fleet across the entire value chain. Providing you with enterprise level visibility and central command control to maximize utilization and production 24/7.

Drive to zero harm

Each day, mines strive to remove workers from harm’s way. Komatsu’s FrontRunner AHS has helped customers like you drive production capabilities forward with the highest levels of safety and consistency for over 12 years.

Safety

Reliability

Quality maintenance matters

Autonomous operation of trucks within the design envelope results in an average:

- 40% improvement in tire and brake life
- 13% reduction in overall maintenance

In addition, Komatsu’s ultra-class electric drive trucks have the highest machine availability, increasing production at your lowest total cost of ownership (TCO).

Peak productivity

You need around-the-clock consistency and productivity you can rely on. Komatsu’s FrontRunner AHS has demonstrated more than 15% increased productivity over manned operations.

Safety

Performance

We’re committed to delivering autonomous solutions and support that help you achieve your goals.

Support for sustainability

Balancing the need for natural resource sustainability with the demands of societal growth can seem like a challenging proposition. Automation plays a critical role in the quest for sustainability in the mining industry, with advanced control technologies that reduce emissions, minimize tire wear and decrease fuel consumption.

Scalability suits your needs

When you decide you’re ready to shift your haulage fleet to autonomous operation, you want the transition to be seamless. We want the same thing. That’s why Komatsu electric drive trucks are now autonomous-ready, providing you with more options and a clear upgrade path at significantly reduced costs. Our flexible approach empowers you to transition your mine into an autonomous haulage fleet on your terms. Scalability makes it happen.

“Drive to zero harm”

“Peak productivity”

“Support for sustainability”

“Scalability suits your needs”

“Quality maintenance matters”

“Game-changing innovation and results”

“Results may vary by customer.”

“The move to AHS reduced the number of vehicle-to-vehicle incidences by 87%.”

– Iron Ore Mining Customer, Western Australia
Automation revolutionizes haulage safety and reliability

Do more with less

• Increased truck availability
• Greater uptime and utilization
• Optimized truck assignments
• Highly scalable solution
• Measurable operational efficiencies
• Lower total cost of ownership (TCO)

Achieve greater control over operations

• Predictable, consistent performance
• Drive to zero harm by eliminating dangerous variables
• Smart system delivers full visibility
• Optimum compliance to mine plans
• Less risk for greater peace of mind
• Continuous improvement drives ROI

Reducing variability and increasing safety. That’s what automation is all about.”

– Anthony Cook,
Komatsu AHS Center of Excellence (COE)

A heritage of haulage excellence

Combining the reliability and durability of Komatsu electric drive trucks with the power of our innovative autonomous haulage technology has helped mines worldwide increase safety, productivity and reduce TCO. Our focus is always on helping mines achieve their operational and financial goals.

The right technology. The right truck. The right team. The right results.

Technology you can count on

• 19 of the world’s 21 largest mines use Komatsu’s industry-leading DISPATCH fleet management system to deliver superior production results.
• With this fleet management system powering Komatsu’s FrontRunner AHS, the advanced algorithm enables maximum productivity through real-time decision-making and mine-wide optimization.
• The FrontRunner autonomous supervisory system possesses a zero harm safety record.

Equipment that’s in it for the long haul

• 5% or greater increase in availability and asset utilization with electric drive haul trucks compared to other manufacturers.
• Industry-leading trucks engineered to set standards for reliability and long life.
• Robust structures and frames deliver worry-free production, fewer maintenance needs and lower total cost of ownership.

Our commitment to your success means your transition to automation can be made with confidence.

12+ years operating with zero safety-related incidences

Over 3.5 billion tons of material moved autonomously
FrontRunner full system solution

Central control

The FrontRunner autonomous control system integrates seamlessly with the industry-leading DISPATCH fleet management system to allow full control of your surface mining operations from one centralized location. Together, these technologies combine to deliver unrivaled system availability and asset utilization.

Traffic and safety management

Komatsu’s FrontRunner AHS supervisory system provides the critical safety functionality and traffic control to automate your fleet based on DISPATCH assignments. Incorporating five main safety systems, it protects your trucks and auxiliary equipment from damage.

1. **FrontRunner autonomous haul trucks** communicate using auto interaction for safe navigation of interactions, as well as dump and load locations.

2. Manual vehicle interaction features three modes for interaction between EMVs and FrontRunner AHTs.

3. Collision detection system (CDS) provides a digital safety envelope around all vehicles.

4. Obstacle detection system (ODS) units on the front and back automatically stop the AHT when an obstacle is detected.

5. Emergency stop button can be controlled from anywhere — FrontRunner EMVs, AHTs and Central Control.

FrontRunner-equipped auxiliary equipment seamlessly interacts with the FrontRunner AHS system over a wireless communications network, connecting your mine’s assets into a complete ecosystem.

**Electric Drive Trucks**

- Market-leading autonomous-ready EDTs include:
  - **830E-1AT (240t)**
  - **930E-4SE, 930E-5AT and 930E-5SE AT (320t)**
  - **980E-5AT (400t)**

- Retrofit kits available for:
  - **830E-1AC (240t)**
  - **930E-4, 930E-4SE and 930E-5 (320t)**
  - **980E-4 and 980E-5 (400t)**

**Leading Units**

- A highly specialized FrontRunner EM kit for single or double-sided loading including electric shovels, hydraulic shovels and excavators.

**Equipped Manual Vehicle (EMVs)**

- Includes graders, dozers, loaders, water trucks, and light vehicles equipped with a FrontRunner EM kit for seamless integration.

**Wireless Communications**

- Performance-based wireless networking specifications give mines the flexibility to use either 802.11 outdoor mesh or 4G LTE systems.
The road to automation
From concept to commissioning, we’ll work with you to determine if AHS is a good fit for your operations. After gathering site and production data from your team, we’ll prepare a feasibility study to determine the best approach for your mine.

Your ally in autonomous operations and productivity
We provide comprehensive, ongoing support tailored to meet your specific site requirements. Services include, but aren’t limited to:
- Dedicated full-time, on-site support
- Regional system support
- OEM remote system support

Ready to explore AHS?
Contact your Komatsu Mining distributor or visit komatsuamerica.com/autonomous-haulage-system for more information.

Equipped for success
Before securing a site license, AHS central controllers and EMV operators must complete comprehensive training programs to ensure safe and effective operation of the FrontRunner system. Annual certification training is also required for continued site licensing.

eLearning
Komatsu Saba learning management tool delivers customized courseware for FrontRunner training, aptitude testing and comprehension validation.

Virtual classroom
Desktop simulated scenarios train and assess teams or individuals in their application of essential procedural knowledge of safe interactions with autonomous equipment.

Equipment operator simulation
Immersive Technologies simulated AHS FrontRunner panel integrated into machine modules for “learn by doing” operator training.

Real-time central classroom
Komatsu instructors use a real-time FrontRunner application to train central controllers to operate the AHS system.

In-field training
Skilled Komatsu trainers provide EMV operators with direct, hands-on coaching and validation in the field.

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.
Komatsu: Revolutionizing the mining industry for a sustainable future

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