

Special feature 1: Project story A future pioneered by automation and remote operation (construction equipment)

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A future pioneered by automation and remote operation

Komatsu established a goal under the Strategic Growth Plan (FY2025-FY2027) to create new customer value through the evolution of product and solution value. One of the key strategic initiatives is the automation and remote operation of construction and mining equipment. While demand is rising in the construction equipment business, labor shortages in the civil engineering and construction industries are becoming worse, making productivity improvement an urgent priority. As demand for critical minerals continues to rise, automation technologies that support stable, long-hour operations at mine jobsites have become essential. Komatsu addresses these customer challenges by combining automation and remote operation technologies for construction and mining equipment with solutions that optimize the entire construction workflow and jobsite operations. In this special feature, we showcase Komatsu's progress in automation and remote operation and our efforts to help customers solve their operational challenges through candid perspectives from customers who have adopted and are using these technologies.

■ The civil engineering and construction industry environment and Komatsu initiatives

The civil engineering and construction industries are experiencing a severe labor shortage as the workforce ages. At the same time, addressing aging infrastructure and responding to the increasing frequency and severity of natural disasters has become a pressing issue. As a result, challenges at jobsites are becoming increasingly complex. These trends are common across the world. Demand for construction projects is rising due to social infrastructure upgrades, the development of energy-related facilities, and increased investment in digital infrastructure. Amid these developments, securing a sufficient workforce remains a major challenge. In addition to the need to improve productivity, demand is growing for automation and remote operation technologies that improve safety at disaster recovery sites and hazardous jobsites.

In response to these jobsite challenges faced by our customers, Komatsu began developing automation and remote operation technologies from very early on. In the 1960s, we began developing a wireless remote operation system for bulldozers to reduce the risk of people working in hazardous jobsites. We subsequently applied this technology to the development of the world's first underwater bulldozer. In 2013, Komatsu introduced ICT construction equipment to the market. In this effort, we were the first in the world to achieve semi-automated operations for attachments using machine control technology. This technology makes high-precision construction possible, even without the skills of a seasoned operator.

In 2015, we began offering Smart Construction, a solution that uses digital technology to visualize the entire construction



Radio-controlled bulldozer used for slag handling at a steelworks (D125AR)

process and support the optimization of construction jobsites. In addition to improving construction accuracy through the use of advanced equipment, we help our customers solve their challenges by leveraging construction data to enhance overall jobsite productivity.

■ Innovative solutions reshaping the industry

Smart Construction Teleoperation Mobility Office

In addition to addressing labor shortages, the civil engineering and construction sectors have shown growing interest in improving safety and productivity for environments that allow a diverse workforce to thrive. Consequently, there have been high expectations for technologies that improve working conditions on jobsites to enhance the appeal of working in the industry. In response to this feedback, in 2022, Komatsu began developing Smart Construction Teleoperation, a remote operation system for construction equipment. We launched Smart Construction Teleoperation in 2024. EARTHBRAIN Ltd. led the development, serving as a group company spun off from Komatsu to accelerate the digitization of jobsites and improve productivity.

Smart Construction Teleoperation is a system that allows users to remotely operate hydraulic excavators from regular offices or other safe and comfortable environments. The system allows for switching between multiple pieces of construction equipment from a single cockpit, contributing to labor savings and improved operational efficiency at the jobsite. The system combines proven Komatsu remote operation technology with the video and communication technologies of partner companies. In June 2026, Komatsu launched the PC200i-12 Remote System Specification. This specification provides ICT machine control functions, even during remote operation, enhancing remote construction operations further.

The system also features the ability to proceed with construction while monitoring the overall status of the site by linking with Smart Construction technology. For example, operators can integrate Smart Construction Fleet, a system that manages dump truck operations

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and dispatching, to work while checking truck locations and estimated arrival times. This configuration allows users to optimize the timing of excavation and transportation, which reduces downtime and improves overall jobsite productivity.

In 2024, the Company launched the Mobility Office. This system is designed to be installed inside a large van and features the Smart Construction Teleoperation cockpit system, allowing operators to travel to locations near jobsites and perform remote construction work. In the event of a disaster, the Mobility Office can be deployed quickly to affected areas, using survey data collected via drones and other means to assess the jobsite situation. From there, the Mobility Office assists in formulating recovery plans and supports initial response operations in hazardous areas.

By combining remote operation technology with digital solutions, Komatsu improves safety and productivity, helping solve the challenges customers face at jobsites.



PC200U-12 Remote System Specification



Smart Construction Teleoperation cockpit

Customer comments on Smart Construction Teleoperation

Hirose Co., Ltd. (Niigata Prefecture)



Tokuo Hirose, president and CEO (left)
Masato Hoshino (right), general manager, Construction Systems Management Department, Civil Engineering Division

Standing still means falling behind: Remote operation is an investment in the future

Since our founding in 1954, we have operated as a general contractor engaged in construction projects and public infrastructure development. We have always believed in the important stance that standing still means falling behind. Given this stance, we have actively pursued digital transformation (DX) initiatives and received the Infrastructure DX Award from the Ministry of Land, Infrastructure, Transport and Tourism in 2023. However, we do not rest on our laurels. As we were exploring further ways to transform our business, we came across Smart Construction Teleoperation.

The deciding factor in our decision to adopt the system was a demonstration event in Ehime Prefecture. Not only did I operate the hydraulic excavator right in front of me, but I also controlled a second machine located far away at the Komatsu IoT Center Tokyo (Mihama Ward, Chiba City, Chiba Prefecture). I knew intuitively that this technology was going to be useful.

After the installation, we set up a showroom in conjunction with the expansion of our new office building. Our installation has been featured not only by industry insiders, but also on local information websites. It's not uncommon for people to visit us from outside the prefecture. We see the system as a valuable investment in the future from the perspectives of talent acquisition and corporate visibility. Currently, we use Smart Construction Teleoperation in excavation work to prevent river flooding. Under this system, one operator is stationed at the jobsite to handle preparations and coordination, while another operator controls the system remotely from the cockpit at headquarters. Travel time, which used to be an hour each way, has been reduced significantly, leading to greater efficiency in construction.

We expect that our employees will use remote operation as an opportunity to gain a greater awareness of the need to improve productivity. I encourage employees to use the time freed up by our DX efforts for self-improvement. In this way, employees will contribute positively to our overall competitiveness.



Remote operation from the head office using Smart Construction Teleoperation

A true improvement in the work environment



Operators Hirai (left) and Kobayashi (right)

I used to work in a completely different industry. I'd always wanted to try operating large machinery, and when I came across a job posting for a remote operator on a job search site, I took the opportunity to change careers. When I visited the company for a tour, I saw female operators hard at work and thought that maybe I could do that, too. That's when I decided to join the company. The appeal of remote operation is the ease of use that encourages even people with little experience operating construction equipment to give it a try. At first, I was a little confused by the depth perception and the differences compared to the actual piece of equipment. But once I got used to it, I was able to work without any problems. If I may be so bold, I think the system would be safer and easier to use if the camera position and control levers were improved. (Ms. Hirai)

I've also noticed an improved work environment. Although the effects of weather and dust on the jobsite remain an issue, working in the cockpit is comfortable. The absence of equipment vibrations means less physical strain. Since you can step away from your desk when necessary, you also have a better mental environment. This type of work style makes it easier to continue one's career, even when dealing with life events such as childbirth and child-rearing. I look forward to seeing this environment expand and help people from diverse backgrounds thrive. (Ms. Kobayashi)

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Comments from Mobility Office customers

Koujigumi Co., Ltd. (Hiroshima Prefecture)



Naotoshi Hiyaama (left), executive vice president and head of the Corporate Planning Office
Hisao Konishi (right), general manager of the Civil Engineering Division

Mobile DX hub exceeded expectations for convenience

Since our founding in 1882, we have spent the following 140 years growing alongside our communities. With civil engineering and construction as our two main businesses, we have been involved in the construction of numerous landmarks that represent Hiroshima. During the torrential rain disasters of 2014 and 2018, we played a leading role in recovery efforts, working on the front lines to ensure the safety of the local community. Even before the Ministry of Land, Infrastructure, Transport and Tourism launched the i-Construction initiative, our company was making advancements in ICT and DX efforts, adopting cutting-edge technologies such as 3D models, autonomous drones, 3D printers, and AR/VR, continuing to enhance our appeal and value as a business. Thanks in part to these efforts, employees in their 20s now make up between 30% and 40% of our workforce, and our organization has evolved into one that attracts interest from younger workers.

I had been following Komatsu's Smart Construction Teleoperation for some time, and I came to feel that Mobility Office held great potential for us. In particular, I had high expectations that the technology would improve safety at hazardous jobsites, including mountainous areas or steep slopes, as well as reduce the physical strain of working in the extreme heat of summer and the bitter cold of winter. Once we actually put the technology into use, we found that the access to a mobile system that eliminated the need to set up equipment at each jobsite provided a convenience that exceeded our expectations.

Going forward, we plan to expand the scope of remote construction



Exterior of the Mobility Office (left) and operating space inside the vehicle (right)

operations, while keeping in mind the potential of implementation at multiple jobsites. The Mobility Office includes a mobile DX hub, which integrates with various Smart Construction solutions to handle tasks ranging from progress management to the verification of survey data. We used remote construction for slope stabilization work in the Yokote district of the Kagikake Pass Road project, which we were contracted to perform in fiscal 2024. This case was recognized as an example of Infrastructure DX by the Chugoku Regional Development Bureau of the Ministry of Land, Infrastructure, Transport and Tourism.

Komatsu is not only a reliable construction equipment manufacturer, but also a partner who shares our passion for improving jobsites. They work with us to solve the challenges we face. As a local general contractor, we hope to contribute to the development of the regional construction industry as a model of DX.

The potential to transform jobsite productivity in significant ways

Yasunori Takamori
Machine operator
Takamori Industries, Co., Ltd.



I have been working as an operator for more than 20 years. When I first tried remote operation functions, the experience definitely felt a little strange. For example, there was no physical vibration typical for construction equipment. We've spent many years working while feeling the vibrations and hearing the sounds of the equipment. Operating equipment from a screen was a bit confusing at first, until getting used to it.

The more experience I gained at the controls, the more natural everything felt. I expect that younger people will actually find it easy to adapt to the technology without feeling any discomfort. Now that I've used the system, I'm starting to appreciate the unique benefits of remote operation. What I find particularly appealing is how comfortable the work environment is. The cab is fully air-conditioned, allowing us to work comfortably even under harsh summer and winter conditions. This environment has reduced the physical strain enormously. On the other hand, depth perception on the screen is a challenge, and there are still some aspects that will take getting used to compared to operating the actual equipment. We are using the technology primarily for slope grading and other tasks. But we expect that improvements, such as enhanced camera views, will improve operational efficiency even more.

In the future, a single operator will likely manage and oversee construction at multiple jobsites. This development has the potential to transform jobsite productivity significantly—we think the possibilities are endless.

Developing next-generation technologies to address customer jobsite challenges

While Komatsu moves forward with the practical application of remote operation technology, we are also accelerating the development of autonomous driving technology for construction equipment. In 2025, three companies—TIER IV, Inc. a firm involved in developing autonomous driving software, EARTHBRAIN Ltd., and Komatsu—began a collaboration to commercialize autonomous technology for the HM400 articulated dump truck and the HD785 rigid dump truck for use at civil engineering and quarrying sites. Looking toward commercialization by the end of fiscal 2027, we are currently conducting field trials and demonstrations.

As the terrain and construction conditions at jobsites change from day to day, autonomous driving that relies solely on pre-set maps and routes is not adequate. For this reason, we are also conducting tests on tasks specific to dump trucks in addition to basic operations such as driving and stopping. These tests—including loading, hauling, and unloading tests—will help us ensure the trucks can adapt to changes in the jobsite environment.

As the development of autonomous driving technology advances worldwide, Komatsu's strengths extend beyond autonomous driving technology. Over the 10 years since launching Smart Construction, we have continued to evolve solutions to optimize the entire construction process at the jobsite. The Komatsu strengths lie in our ability to leverage the insights and data obtained from customer jobsites to adapt flexibly to construction conditions that change day-to-day, achieving autonomous operations that work at the jobsite.

Komatsu will continue to contribute to improvements in customer safety and productivity by combining remote operation technology, autonomous driving technology, and digital solutions that optimize the entire construction process.



The HM400 articulated dump truck used in autonomous driving tests

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■ The value of AHS in paving the way for mining operations

Demand for critical minerals in the mining industry, including copper and lithium, continues to rise globally in response to advancements in electrification and the expansion of renewable energy infrastructure. Stable, long-term operation under harsh conditions is essential at the mine jobsites that support this demand. And since even the slightest operating error can lead to a serious accident, ensuring safety within the mine while maximizing productivity has become one of the most critical challenges for our customers. Amid these developments, demand for automation technology is growing in the context of improved safety and productivity.

Komatsu began conducting basic research on autonomous driving in the mid-1970s. In the 1990s, the Group welcomed Modular Mining Systems (MMS; U.S.A.), a company known for its fleet management system (FMS)*1. Komatsu subsequently integrated the Komatsu vehicle control technology with MMS's fleet operations management technology. Following many years of development toward practical application, we launched the world's first commercial Autonomous Haulage System (AHS; a driverless dump truck operation system for mines) in 2008. We continued to upgrade functions and

make improvements tailored to the specific challenges of each jobsite, and, as of April 2026, the cumulative number of ultra-large driverless dump trucks deployed in mines surpassed 1,000 units.

The AHS central control system monitors and manages all elements of the mine jobsite operation while tracking the location and operating status of each vehicle in real time. Using location data from systems such as the Global Navigation Satellite System (GNSS), the dump trucks travel autonomously to transport and unload materials. The system minimizes the frequency of workers entering hazardous areas, and Komatsu has maintained an AHS safety record of zero personal injuries since the launch of the system.

In addition, the DISPATCH fleet management system determines the optimal destination for each truck based on traffic conditions at the mine. At the same time, the FrontRunner vehicle control system automatically guides the trucks according to instructions from DISPATCH to minimize human error and inconsistencies. As a result, waiting times during the loading and hauling processes and downtime during operator shift changes are much shorter, which contributes to improved and more stable productivity. Using optimal vehicle control

technology to minimize sudden acceleration and sharp turns, the system extends tire life and improves fuel efficiency, which contributes to a reduced environmental impact. Since mining equipment is used for 10 to 15 years or so, Komatsu and our distributors provide detailed support tailored to each mine to ensure stable operations, building relationships of trust with customers.

In this way, AHS creates value in social and economic terms by improving safety and productivity at mine sites and reducing environmental impact. Komatsu adopted impact accounting*2 in fiscal 2025, and we calculated that AHS generated approximately ¥360 billion in social value globally during fiscal 2024. Customers who have used AHS for many years have appreciated the value that the system provides.

*1 A solution that automatically calculates and proposes dump truck routing to optimize mining operations

*2 An accounting method that quantifies the impact (both positive and negative) that a company has on society and the environment in numerical or monetary terms, evaluated alongside financial information

Comments from Group Company and customer



John Ward III
SVP, Mining and Company Stores
Komatsu North America

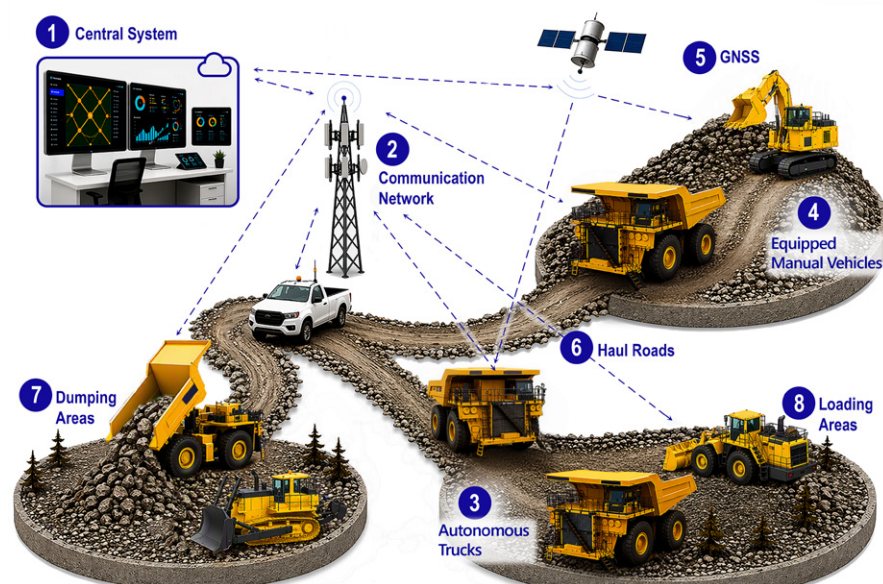
Advancing autonomy through customer collaboration

In April 2026, Komatsu marked a significant milestone with the deployment of its 1,000th autonomous ultra-class haul truck. The milestone vehicle, a Komatsu 930E-5AT, was commissioned at Barrick Mining Corporation's Nevada Gold Mines (US). This achievement reflects both the continued development of autonomous haulage technology and the enduring customer partnerships that have shaped its evolution.

The mining industry is responding to rising demand for critical minerals while managing labor constraints, increasingly complex operating conditions, and growing expectations for safety and sustainability. Meeting these challenges requires more than advanced equipment. It calls for close collaboration with customers to develop practical solutions that deliver lasting value across the mining value chain.

Komatsu believes that innovation creates the greatest value when it is developed in partnership with customers. Since the commercial introduction of the FrontRunner Autonomous Haulage System (AHS), we have continuously enhanced the solution using operational insights gained at mine sites around the world. This collaborative approach has enabled FrontRunner AHS to support safer working environments, improve operational consistency, and contribute to more efficient use of energy and other resources.

How AHS works



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Commenting on the partnership, Barrick said:

FrontRunner has elevated both the quality of work for our people and the way we meet production goals at our Nevada operations. By transitioning operators away from haulage activities and enabling more predictable operations, autonomy supports safer, more skilled roles while helping us use energy more efficiently and reduce our environmental footprint. Together with Komatsu, we see a significant opportunity to advance productivity further while benefiting our workforce and community.

This perspective illustrates that the value of autonomy extends beyond the automation of individual tasks. Autonomous haulage can help move people away from higher-risk activities and create opportunities for more skilled roles, while supporting stable, efficient, and increasingly sustainable operations. Realizing these benefits depends on continuous collaboration, shared learning, and a long-term commitment to operational improvement.

The deployment of our 1,000th autonomous haul truck represents an important point in Komatsu's autonomy journey, rather than its conclusion. We will continue to work closely with customers and distributors worldwide to develop solutions that address real operating challenges and contribute to safer, more productive, and more sustainable mining.



Komatsu AHS trucks operating at Nevada Gold Mines

Developing next-generation technologies to address challenges at mine sites

The introduction of AHS has resulted in steadily improving safety and productivity at mine sites. At the same time, a new challenge has emerged: to enhance performance and functionality while minimizing machine downtime, all while adapting flexibly to the varying topography, road conditions, and mining conditions at each mine. To address these challenges, Komatsu aims to enhance value further through software that continuously improves functionality and optimizes the entire mining operation.

As part of these efforts, Komatsu began developing the SDV^{*3} architecture together with Applied Intuition in 2025. The collaborative project will serve as the foundation for next-generation mining machinery (SDV) and an automated vehicle platform. Komatsu pursues the creation of next-generation mining equipment that continues to learn about mine site characteristics and changing conditions, optimizing controls and improving functions in response to each specific environment. Through this approach, we strive to achieve more stable operations and ongoing performance improvements, all while adapting to the unique conditions at each mine site.

The future of mine sites

SDV architecture enables flexible and timely software updates throughout the lifecycle of mining equipment. Through this approach, Komatsu delivers new value to the industry, building a foundation for continuous performance and functionality improvements together with minimized machine downtime.

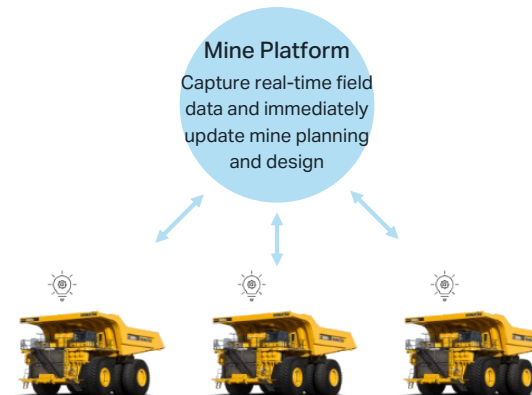
Komatsu is also advancing the development of a platform that integrates all aspects of mining operations. By integrating the mining platform with next-generation mining equipment, users can monitor mine site conditions in real time and incorporate that information into mining plans and mine design. The system will visualize discrepancies between plans and actual progress, contributing to mine operation optimization. Komatsu connects people, machinery, and data through digital technology integrated into a single system. Through this approach, we will create next-generation mining operations that are safer, more efficient, and more sustainable than ever.

Komatsu views the development of next-generation mining equipment as a key growth investment toward new customer value in the mining equipment business. As a collaborative partner committed to optimizing safe, productive, and clean workplaces, we will accelerate technological innovation.

^{*3} Software Defined Vehicle: A vehicle whose functions can be expanded through software updates

Next Generation Architecture

Optimize mine operations leveraging
Next Generation Mining Equipment and Mine Platform



Next Generation Mining Equipment

Learn autonomously, optimize control and functionality