

## CTO Message

**By envisioning the construction site of the future where people and machines cooperate, we will engage an increasing number of partners to continue moving forward.**



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### Acceleration of Technology Development

#### Our Challenge to Quickly Implement CASE\* Into the Civil Engineering, Construction, and Mining Industry

While the global pandemic is having a tremendous impact on the economies and production of many countries, our social environment continues to also undergo major changes. We now live in an era where corporate growth cannot be expected without demonstrating proper responses to social issues such as the declining birthrate and aging population, climate change, and resource depletion. At our customers' business/sites, due to a decrease in workers, shortages of operators and on-site managers are now the norm. There is a growing demand to improve efficiencies in construction and site management using ICT and other technologies.

In the automotive industry, technological innovation based on the keyword CASE is rapidly advancing, and this trend is also being seen in the civil engineering, construction, and mining industry. Our top priorities are to develop construction equipment

and solutions that incorporate new technologies, solve on-site issues and bring about new ways of working. In other words, our major objective and challenge is to make the adoption of CASE into the civil engineering, construction, and mining industry a reality as fast as possible.

Starting in fiscal 2020, under the medium-term management plan "Realizing Tomorrow's Opportunities 2022", our basic strategy is to reinforce the development of digital and advanced technologies. Our main themes include the realization of human-machine cooperative control technology and new technologies for decarbonization. In addition to our own resources for technology development, we are promoting development through open innovation.

\* CASE: Acronym for Connected, Autonomous, Shared & Service, and Electric. The four English words used to describe technological innovation.

### Open Innovation

#### Envision the Future of the Field and Take on the Challenge of Turning it Into a Reality

Collaboration with groups who have expertise in a wide range of technologies is essential for future technological development. In fiscal 2018, Hitachi Construction Machinery established the Open Innovation Promotion Office within the Research and Development Group to strengthen ties with a variety of companies, including start-ups. In fiscal 2020, we launched the Venture Business Investment Promotion Project, and are actively working to expand contacts with start-up companies in Silicon Valley and

other parts of the world. From venture companies to large corporations, we are currently partnering on a number of projects a wide range of fields.

In February 2021, as part of the Ministry of Land, Infrastructure, Transport and Tourism's i-Construction initiative, in collaboration with the Kato Group in Hiroshima Prefecture and Nishio Rent All Co., Ltd., in Osaka, we conducted a test run using the fifth-generation mobile communication system 5G to remotely

control multiple pieces of construction machinery. Overall, the experiment was a huge success. What was even more impressive than the results was the feedback we received explaining that staff shortages at small and medium-sized companies being a serious problem and they are in immediate need this kind of cutting edge technology. Although there are still many technical

issues to be overcome in controlling machinery remotely, I realized that it is important to illustrate that we are taking on the challenge of envisioning and realizing the future of civil engineering/construction, mining sites, and other customers' sites, as demonstrated by this practice run.

### Cooperative construction machinery

#### Development of ZCORE for Humans and Machines to Work Cooperatively

Despite the challenges we have undertaken, there is still a gap between our dream of achieving the construction site of the future and the current reality. Looking into the needs of our customers, we see that they want to increase work efficiency and improve productivity with fewer technicians in a safe environment. For the past 70 years, Hitachi Construction Machinery has focused on making machines that operate according to the operator's intentions. The next thing that needs to be done is to incorporate the operator's intentions into the construction machinery. In other words, the construction machinery will be able to perform a series of operations that humans used to do, such as checking the surroundings, making decisions, and operating the machinery. This is now more like developing operators rather than building construction machinery. ZCORE is the system

platform for this purpose.

Cameras and laser radar confirm the machinery's surroundings and AI and the CPU plan and command the next movement through arithmetic operations. The engine, motor, and each hydraulic part then move smoothly to execute the command. In other words, ZCORE is the operator. And just like people, it is important to exchange information outside the company in order to make more appropriate decisions. For example, work plans and weather information can be given via cloud technology to enable more accurate decisions. In this sense, construction machinery is both an operator and an information terminal. Based on this concept, we are operating an experimental machine using ZCORE.

### Role as CTO.

#### Build a New System That Can Adapt to Change

In our 70-plus years of history, Hitachi Construction Machinery has grown by providing society with construction machinery products that always meet the needs of the time. In the face of increasingly rapid social change, for us to be able to achieve future growth, we face even greater challenges than before, such as catering solutions that go beyond the provision of construction machinery products in order to solve the problems faced by society and our customers. In the face of such changes and challenges, if we rest on our past successes and fear the risks of taking on new challenges, we will not only fail to grow, we will decline.

I recognize that my role as CTO is to remove the barriers to change that remain in the organization and in individuals, and to build a mindset and a new system that will allow the entire organization to adapt to change. And the most important thing is to change together with our customers. Experiencing the trials and errors of change together with our customers is the solution we are aiming for, and it will further deepen our relationship with them.

We, the Hitachi Construction Machinery Group, would like to express a single worldview that paints the future of the civil engineering, construction, and mining industry. Some people believe that machine automation will eliminate the need for people. We envision an ideal workplace where no matter how advanced the technology, people and machines communicate and

cooperate safely. While the realization of a world in which people can feel affluence alongside sustainable development isn't easy, we believe it is possible whether in urban or remote areas. We would like to discuss our future vision with as many groups as possible and find collaborative partners willing to take on the challenge with us, moving forward step by step.

