



Activity1

Manufacturing construction machinery



Undertaking the evolution of construction machinery, and bringing new value to work sites around the world

After the development of the first hydraulic excavators with genuine Japanese technology in 1965, HCM Group has been developing industry-leading technologies and products, such as being the world's first to equip construction machinery with satellite communication terminals in 2000, and accumulating various core technologies related to construction machinery.

Our products are mainly used in civil construction and mining sites to conduct a wide variety of tasks in place of human beings. Therefore, our machines need to be tough, enable high and stable productivity over long periods of time, and have high levels of trustworthiness and durability; furthermore, our products need to come equipped for safety and excellent controllability that allow for "human beings" to work efficiently in various work sites without any accidents, as well as being products that achieve lower energy consumption and lighter environmental impacts. In recent years, there has been progress in the development of electric drive technology, leading to the development of hybrid construction machines that reduce fuel con-

sumption by 30% compared with our traditional products, and haul trucks making use of electric drive technology. In addition, we have implemented electronic control technologies essential to improvements in performance, controllability, and safety of our products. In June 2016, we introduced "ZX200X-5B", new intelligent hydraulic excavator to the market toward the coming age of informatized construction processes utilizing 3D design models.

Furthermore, we offer solutions and services utilizing information and communication technologies (ICT) that support "i-Construction", informatized construction process proposed by the Ministry of Land, Infrastructure, Transport and Tourism, with construction machinery as the core competence. In addition to offering a wide range of products adapted to customer needs, we are also working towards the resolution of issues such as increasing productivity and decreasing manpower in the civil construction industries.

"Manufacturing" the future of construction machinery by the total power of Hitachi Group and open innovation network

In expanding the domain of cutting-edge technology, HCM's major advantage is the power of Hitachi Group. Hitachi Group, with Hitachi, Ltd. as the core company, has businesses in various fields including information & telecommunication systems, power systems, social infrastructure & industrial systems, electronic systems & equipment, construction machinery, high functional materials & components, automotive systems, and smart life & ecofriendly systems. There are no other construction machinery companies with such an extensive backbone in the world.

The synergy of Hitachi Group reveals its effects through three main aspects. The first aspect of the synergy is "wide variety of the products and technologies". By making use of the various products and technologies possessed by Hitachi Group (electronic control devices and sensors, information and telecommunication systems, etc.), we are able to rapidly and surely introduce electric drive systems or intelligent technologies into construction machinery and develop solutions that increase the efficiency of product maintenance and management. The second aspect of the synergy is "technological innovation". Hitachi Group is making efforts to reinforce its global social innovation business starting with our customers by establishing research and development hubs close to them. At the same time, HCM's researchers and engineers, collaborating with the related departments of Hitachi Group, work for technological development that produces innovation for construc-

tion machinery. The third aspect is "human resources". There are frequent exchanges of human resources in the form of transfers and secondments in research and development fields. Human resources who have gained broad experience in Hitachi Group participate in business operations of HCM. This human-resource flexibility act as the well-spring of diversity, activity, and innovativeness in HCM's organization and human resources. Furthermore, we are aggressively working towards joint development and technological cooperation with domestic and overseas manufacturers, universities, research institutions, and venture companies outside of Hitachi Group as well.

In future, we will further reinforce the culture of open innovation that has taken root and lead the technological innovation of construction machinery.



"I feel the joy of being a developer through visiting to our customers' sites and gaining their trust directly"

For the development of "ZH200-A" hybrid hydraulic excavator that went on sale in 2011, developers from HCM and Hitachi, Ltd. combined to form a project team, and I participated in the development at the time through a secondment from Hitachi, Ltd. In order to have as many customers as possible make use of the "ZH200" series, we set "hybrid + (plus)" as the development concept, making it into a model that combines not just low fuel consumption but also a practicality that can adapt various types of worksites.

Due to my experience in developing electromotive devices for motor vehicles with Hitachi, Ltd. I was in charge of designing the electric / hydraulic swing system. I used to be one of the designers working on part of a product during my time at Hitachi, Ltd. But after joining into HCM, I became a responsible designer who delivers the final product to the customer, and I felt a big difference. Just after joining into HCM, I got an operator license for construction machines in order to actually operate excavators by myself.

I also went directly to customers' sites, and made a lot of efforts to design the machine which more operators would find easy to use. These efforts made me feel getting the confidence from customers directly, and I felt a great pleasure as a developer.

Currently I am participating in the development of intelligent excavators for informatized construction process as the engineer of HCM. I am proud to say that we are the team absolutely carrying out challenging development even in the limited time-frame. We will make efforts with the full power of the Group for creating innovative products that will be favored by many customers.



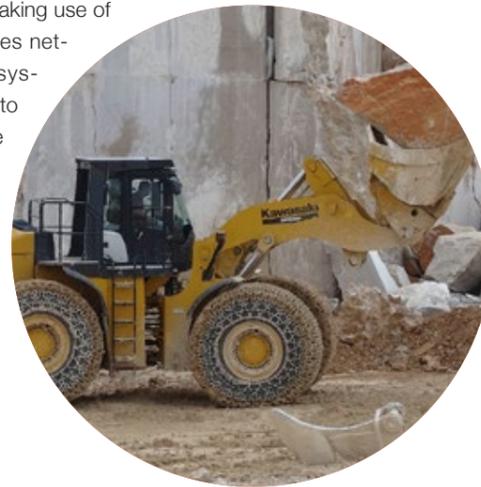
Hitachi Construction Machinery Co., Ltd.
Development and Production Group
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Promoting the wheel loader business through a full line-up and accelerated development

In 2009, HCM and Kawasaki Heavy Industries established the joint venture wheel loader company KCM in order to move forward with joint research and development and production system optimization of wheel loaders that conform the emissions regulations. On October 1, 2015, HCM made KCM into its 100% subsidiary, producing even further expansion and strengthening of the wheel loader business through integration of both companies' technologies and improved efficiency in procurement and production. As the global competition continues to heat up, we entrusted our wheel loader development and manufacturing business to KCM as of April 1, 2016 with the goal of achieving further improvements in competitiveness. This consolidation through KCM will mean further acceleration for the strengthening of development and manufacturing in the wheel loader business.

Originally Kawasaki Heavy Industries performed well with

large machines while HCM did well with small and medium machines, so integration of those technologies allowed for the expansion of the product line-up for the Group. Through making use of synergy in our sales networks to create systems that allow us to respond to the needs of different locations around the world with one-stop service, we will aim for further improvements in customer satisfaction.



Reinforcing development capacity in order to achieve total solutions based on customer needs

As part of the globalization of the market and changes to the business environment, there have been large changes in the needs for construction equipment and peripheral systems. Up until now systems development was mainly centered around the domain of construction machinery itself and its support networks, but these days systems development for total solutions centered around equipment is necessary, such as management systems for mining sites and construction sites, and information network systems that connect those systems to the equipment itself.

In response to these changes, as of FY2016 we have begun working in earnest on our "IoT^{*1} Solutions Business Project" with the goal of strengthening development capacity for

machinery peripheral systems products including network server systems. The mission for this project is product development that realizes the solutions planned and proposed by the "Client Solutions Business Development Division" based on customer needs.

We are promoting a three-pronged system where HCM Japan proposes these solutions to domestic clients in Japan. HCM's development department is working towards total solutions for mining and construction sites through open innovation making proactive use of collaborations between the Hitachi Group and global leading companies in related fields.

*1 IoT: Internet of Things

TOPICS

Holding the 12th HCM Group International Skills Competition

The HCM Group holds the annual HCM Group International Skills Competition for the purpose of encouraging technical skills improvement and technical information sharing among technicians working at our plants. This year's competition is the 12th since its founding, and was held over two days on November 3 and 4, 2015 at the Kasumigaura Institute. A total of 82 people participated, making it the largest scale competition in our history, including 34 individuals from each of our production hubs with Brazil's first-ever entry and 48 individuals from domestic Group companies such as KCM and partner companies. In addition, robot welding became an official competitive category for this first time, leading to a total of seven types of competitive categories.

In recent years our overseas engineers have been displaying excellent results and we have seen definite improvements in technical ability. We will continue to work diligently toward achieving the globally unified level of quality exemplified by "Made by Hitachi" throughout all our plants around the world.



The robot welding competition

Higher productivity with less environmental impact - Reducing the environmental impact of business activities

In order to achieve the Hitachi Group's shared environmental vision and "Environmental Vision 2025" long-term plan, the HCM Group is working towards reducing the environmental impact during product manufacturing phase. We have established group-wide consolidated benchmarks (quantitative and non-quantitative targets) and specific action items for the entire HCM Group based on the environmental action plan covering FY2016 that need to be followed by manufacturing and sales group companies, both domestic and overseas, and each hub is working towards achieving these targets through the PDCA (plan-do-check-act) cycle.

Each company within the domestic manufacturing group is promoting energy conservation activities through reductions in peak electrical power consumption. In 2015 we conducted peak electrical power reduction activities at the Tsuchiura Works convention hall. During the hall's peak power consumption periods we supply energy through solar power and electric automobile storage batteries, making up for the deficits through supply from the electric companies. The electric vehicles are charged in advance using night-time power supply. As a result of this initiative, we achieved a maximum peak cut of 15% and reduced total electrical power consumption by 13%. In future we will be expanding these activities to other facilities as well as making use of these strategies to address business continuity plans (BCPs) for blackouts and energy supply.



"Power monitoring (visualization) has brought the new 'monozukuri' into view"

We are working towards the target of a "30% improvement by FY2016 in energy consumption basic unit compared with FY2010" in five domestic plants. This is a high target that means reducing energy consumption for a fixed volume of production activities by 30%. As part of that we have placed emphasis on making electrical power consumption more visible, since it forms 80% of the energy used in plants since FY2013, and promoting independent energy reduction activities.

We collected daily data on electrical power consumption and standby power on manufacturing lines, whether for each individual device or for each phase, and displayed those trends monthly. For example, in the case of machining equipment, it became apparent that the time they were actually tooling service parts was only a small percentage of the whole while the majority of the energy consumed was for standby power. By showing this data to operations managers and staff we can instantly get them to understand where waste is occurring and begin methodical actions to cut the power. Furthermore, by displaying data comparing which phases were and weren't achieving significant energy conservation effects through these activities and bringing attention to these issues we were able to produce further improvements.

By implementing this power monitoring, we were able to catch sight of the next issue to tackle. By using the IoT to connect the production management information and energy consumption data for each phase in real time and analyzing it by phase, it is now possible to tie the productivity of service parts to electricity. For example, comparing the electricity cost of a particular service part with that of a service part from a different model and correlating the loss rate with the electricity we become able to abstract the structural waste of the production phase. We believe that this power monitoring will help HCM's plant reforms in future through its goal of achieving lower environmental impact and costs with higher energy productivity.

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