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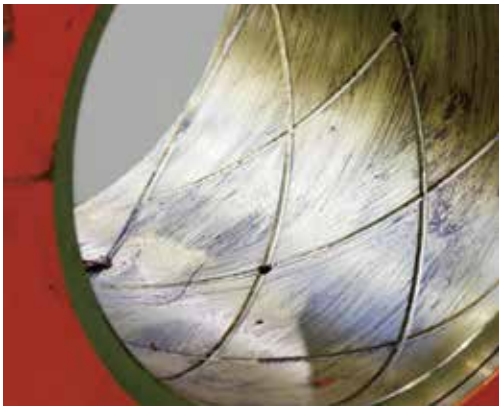
[Special Issue]

Parts that Connect:

Our Customers and a Sustainable Society.

Hitachi Construction Machinery Group





Parts that Connect:

Our Customers and a Circular economy.

Engines and buckets, tires, cylinders and filters... These are not mere parts, but components that connect to one another and become the driving force behind large construction machinery. And that's not all. Our parts are also a point of contact that connects our company—Hitachi Construction Machinery—and our customers, and they have the potential to become a bridge bringing new value to society. In this issue, we will look at these parts which become all the more fascinating, the more you know about them closely.

Text: Toshiaki Saito
Photographs: Kazashito Nakamura (cover, p. 2, portrait on p. 3, p. 7-8); Norio Sekine (portraits on p. 4 and 7)
Illustrations: Hirotaka Uchiyama (p. 3)






All about Construction Machinery Components

The number of components that make up construction machinery is enormous. The machinery is created by connecting these individual components.
What purpose does each component serve?
Let us look at some surprising facts about construction machinery components, as well as some trivia about them.

We learned this from
Takanori Doi
Service material Dept. Customer Support Div.

What components make up a hydraulic excavator?

Main Components

Hydraulic excavators are a representative type of construction machinery used for a variety of purposes. They use large buckets to dig into the surface, and scoop up and move soil and the like. Such hydraulic excavators consist of over 13,000 different components. Let's first have a look at the main components that are essential when operating a hydraulic excavator.

Engine

The engine provides the motive power that becomes the energy for operating a hydraulic excavator. One could truly call this component the hydraulic excavator's heart.

Hydraulic pump

A hydraulic excavator moves with hydraulic pressure. A hydraulic pump uses the engine's turning force to push out oil in order to convey motive force to all parts of the machine.

Control valve

Oil from the hydraulic pump flows through hoses to every corner of the machine. This control valve controls which part of the body the oil flows through.

Cylinder

Cylinders are attached to the machine's front. Taking in the dispensed hydraulic oil, the cylinders lengthen/shorten and correspondingly move the boom, arm, or bucket.

Travel and Swing Device

When a hydraulic excavator is excavating soil on site, it can't just stay in one place. It obviously must travel to its work site and perform movements such as changing directions. In this section we will have a look at the components that control a hydraulic excavator's movements.

Travel device

A hydraulic excavator has crawlers for traveling. The travel device is the motor that uses hydraulic power to generate rotation for turning these crawlers.

Swing device

In order for the machine cab to swivel, force is needed to generate rotary movement. The swing motor uses hydraulic power like the travel unit, to convey the power for the hydraulic excavator to turn left or right.

Consumable Parts

The hydraulic oil, which moves the main components, the motor and the like, plays an important role in transmitting the engine's power and allowing the excavator to utilize its full potential. When the hydraulic oil deteriorates, the metal used in these components is more likely to suffer from wear, so filters, which remove waste from the hydraulic oil and prevent its deterioration, are another type of essential component. Also, bucket tooth and undercarriage parts are counted as consumables.

Oils

Filters

Bucket tooth

Undercarriage parts

An extremely important factor for construction machinery is to not stop working on site. If machineries do stop working on site, operations obviously stop as well, severely impacting our customers' business. In order to prevent such situations, Hitachi Construction Machinery is strengthening its after-service system for maintenance. It is particularly important to diagnose the state of machinery and replace individual parts before they fail.

At the same time, there are two things our customers can do to use their machinery in good condition for a long time: 1) always perform periodic inspections based on the methods and periods for maintenance described in the operating manual; 2) use components recommended by Hitachi Construction Machinery. Especially after a warranty term has expired, mishaps frequently occur due to the use of general-purpose parts/components that can be inexpensively procured on the market. This may not only impact the entire machinery and cause defects, but also result in expensive repair costs.

At Hitachi Construction Machinery we offer parts/components for various after-services, so that our customers can minimize machinery downtime due to part/component replacement and use their machineries in good condition and for a long time. The performance and cost our customers expect from our parts may depend on a machinery's period of use. Hitachi Construction Machinery therefore provides different options for parts/components based on the performance and price desired, in order to provide thorough support for machinery from right after purchase to disposal.

Special focus on giant mining machinery parts!

Component trivia

The tires on Hitachi Construction Machinery's largest rigid dump truck are six times the size of regular passenger car tires!

The tire measurements of the rigid dump truck EH5000AC-3, which operates with an AC (alternating current) power source, are: 3.8 m in diameter, 1.2 m in width and 4.7 tons in weight. Compared to the tires of a standard passenger car (60 cm in diameter, 20 cm in width), the dump truck's tires have a diameter and width that are six times as big. Just for comparison, the body of a rigid dump truck has a length of 13.8 m and a width of 8.5 m, making it nearly 120 square meters or the size of a small house.

The EX8000, one of the world's largest class hydraulic excavators, is equipped with two engines and 16 hydraulic pumps.

Even without the arm and bucket, the EX8000's giant body has a height of 9.9 m, or almost 10 m, and a width of over 10 m. In order to move such a large frame, it is equipped with two engines with a rated output of 1,450 kW each, and 16 hydraulic pumps. The capacity of the bucket attached to the end of its arm is likewise enormous: 40 m^3. It's so big that even just the height of its undercarriage easily surpasses 3 m, which a person couldn't reach even if they stretched their arms as high as possible.

Using Keywords to Decipher the Future of Hitachi Construction Machinery and Components

In order for our customers to be able to make long-term use of their machinery, we offer machinery operations management services in addition to selling replacement parts/components and focusing our efforts on parts remanufacturing business, and we cherish staying connected to our customers through our parts/components.
Furthermore, our parts business helps contribute to the Sustainable Development Goals (SDGs) and local communities.
We will explain such efforts by focusing on some keywords.

The reuse of parts will likely become standard.

We learned this from

Jun Shibuya
Remanufacturing Promotion Dept. Spare parts Div.

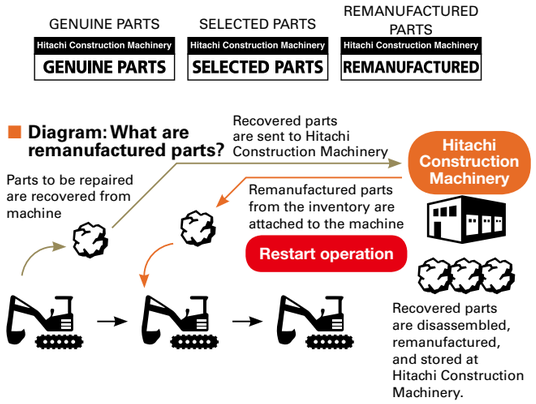
Yosuke Matsumoto
Sales Promotion Dept. Customer Support Div.

Parts and Our Original Brand

A Parts Line-up Based on Customer Needs

Our replacement parts line-up consists of the three categories "GENUINE PARTS," "SELECTED PARTS," and "REMANUFACTURED PARTS." Genuine parts are the same used in new machines, and it goes without saying that a product quality equal to that of a new machine is guaranteed. Selected parts are procured from authorized our suppliers. They are characterized by a performance close to that of genuine parts, but at a lower price, while their warranty period is the same. Most such parts offered are consumable parts. Finally, remanufactured parts are used genuine parts that have been recovered, disassembled at the our Group's parts remanufacturing plant, and remanufactured in a way that gives them similar performance to new parts (see Diagram). Remanufactured parts also have the same warranty period as new parts, but can be purchased at 50-70% of the cost of genuine parts.

01



Used genuine parts such as hydraulic pumps and cylinders are disassembled, repaired, maintained, and stored. If these remanufactured parts are used for parts replacement before any trouble occurs with our customers' machinery, machinery downtime can be minimized and machinery can be put back to work at low cost.

ConSite Parts Web shop screen image. When specific parts are selected on-screen, other parts recommended for simultaneous replacement are shown at a glance, based on judgment as if by professional mechanics.

The ConSite periodic report service aggregates operation data in more than 30 languages and distributes a report via email or an app.

Parts and Health Checks

Offering Parts Replacement with IoT Solutions

02

If the state of a machine's health is precisely understood, parts replacement can be determined more easily before problems occur and it becomes possible to minimize downtime due to sudden machine defects. The ConSite service offered by Hitachi Construction Machinery in 130 countries around the world uses IoT to remotely monitor the state of machinery and provide data reports on information such as operating time and fuel consumption as well as any abnormalities. The reports can be used for operation management and also for improving the efficiency of inspections and deciding on parts replacement. We will continue to strengthen our predictive diagnostic features in order to be able to provide our customers with even more precise information on parts replacement timing. Moreover, by introducing "ConSite Health Check" which diagnoses and evaluates machinery health based on operating noise and measurement data, machinery diagnostics such as of hydraulic pumps and engine fuel injectors, for which we used to rely on the experience of service staff, can be performed semi-automatically in a short period of time.

In response to ConSite diagnostics, distributors can furthermore purchase necessary genuine parts online in the ConSite Parts Web Shop. The quick provision of cost estimates reduces the number of days required for parts replacement.

Parts and SDGs

Parts Remanufacturing Contributes to Solving Global Environmental Issues

03

The remanufacturing of parts consists of not only contributing to our customers' business continuity, value improvement and cost reductions by minimizing machine downtime, but also accomplishing circular economy. Remanufacturing parts means that they won't be discarded, helping reduce industrial waste. Furthermore, not producing new parts decreases energy consumption and also has an effect on cutting CO_2 emissions. At the same time, such efforts contribute to achieving SDGs. Moreover, environmental consciousness is further growing, especially in Europe, and there is a chance of significant tightening of legal regulations for promoting the the cyclical use of resource. In terms of expanding sustainable business for the future as well, the remanufacturing of parts is an area of business that should be continuously developed.

Remanufacturing process of used cylinders at the Hitachinaka Works factory.

Because mining development occurs on remote lands, not only the people working there, but their families as well live together in communities near the mine. Machinery stoppage can easily affect the economy of such communities as well.

Parts and Mining

When the Machineries Stop, the Entire Mine Stops

04

At a large-scale mine, an enormous number of machines and vehicles—several thousand—are operating day and night for various tasks including resource excavation, road surface maintenance and transport. There are not only those who operate the machineries , but also those who are responsible for maintenance and repairs. If mining machinery at such a mine stops, operations across the entire mine stop, with immeasurable consequences. That is exactly why parts replacement at the appropriate time is essential for ensuring continuous mining operations. Parts replacement consists of cases called overhauls in which machinery is disassembled and repaired on site, cases in which remanufactured parts are used for replacement, and cases in which parts are shipped from Japan, each requiring a planning period of half a year to a year in advance. Regularly checking the state of machinery and replacing parts systematically are necessary in order to minimize the machine downtime due to maintenance as well.

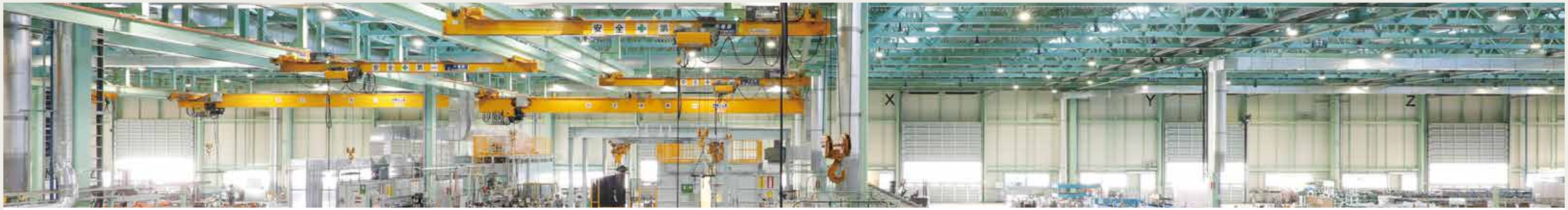
Parts and Africa

Expanding Business in Africa

05

Hitachi Construction Machinery established a mining machinery parts repair plant in Zambia in southern Africa in 2011, which serves as its parts remanufacturing business hub in Africa. Southern Africa has many giant mines and our machinery is active in multiple countries. Zambia in particular is famous for its largest copper mine in Africa, and Hitachi Construction Machinery is collaborating with the U.S.-based H-E Parts which became part of the HCM Group in 2016 to expand the Group's parts remanufacturing business based on this synergy effect. In addition to accelerating the hiring of local staff in Zambia, Hitachi Construction Machinery is engaged in CSR efforts supporting the education, training and employment of younger generations, for example by starting an internship program for students of a technical college in northern Zambia in 2018.

Interns from this Zambian technical college are assigned to the hydraulics, electricity and machinery sections. During their three-month internship program, they will be taught practical work at production sites.



We want to connect with our customers through our parts business, and contribute to a circular economy

Sales promotion of parts-related services and technical support in Japan and overseas parts remanufacturing plants. We interviewed two staff members, who are both engaged in the parts business but in different positions, about the meaning and strengths of Hitachi Construction Machinery's parts business, support infrastructure, and more.

Xu Liang
Oceania Business Div.

"We have established a firm after-sales service with our field service professionals and advanced IoT and ICT technologies!"

Providing our customers with information for reducing lifecycle costs

At Hitachi Construction Machinery we are strengthening our "value chain business," which allows us to stay in touch with our customers over a long period of time, from when they purchase new machinery to when it's disposed of. As part of this, we are committed to services that comprehensively minimize our customers' costs in all aspects of the lifecycle of construction machinery, such as parts replacement, maintenance and fuel.

I believe that one element of these services, our parts business which also includes remanufactured parts, is indispensable. Our customers' awareness has been changing as well, and in the Oceania region for which I am responsible, we have received favorable feedback not only in terms of costs but also regarding environmental friendliness since we began promotional efforts for remanufactured parts in New Zealand market in October 2019. Our Business Division plans on continuing to expand the parts remanufacturing business in other regions as well.

Putting customers first, reinforcing our support

Apart from the thoroughness in quality and warranty, the strength of our parts and services lies in always putting customers first. In order to ensure that our customers continue to do business with us, we are promoting our support in two focus areas. One is the training of so-called Service Parts Engineers(SPC), specialists with a high degree of skill and expertise, and the reinforcement of on-site support and customer proposal capabilities. The other is that we are always staying in touch with our customers and watching over their machinery with our IoT/ICT solution ConSite.

At Hitachi Construction Machinery we also offer services that allow estimates for lifetime parts and maintenance costs depending on the operating status of machinery. Thus we are able to create plans for reducing the costs associated with machinery owned by our customers. Moreover, we provide customers with periodic reports including concrete usage examples such as machinery run time, parts wear and frequency of hydraulic excavator rotations, to convey the importance of periodic maintenance and parts replacement. By utilizing such information based on quantitative data, we put a high value on direct contact with our customers on site, and we intend to use this to provide reliable and even better service in response to their needs.

Aiming circular economy by expanding our remanufactured parts business

Hitachi Construction Machinery has expanded its parts remanufacturing business to seven countries including Japan. In Japan, the Hitachinaka Works serves as the central hub of our remanufacturing plants. Overseas, Zambia, Australia, and Indonesia are our main hubs, and at these three sites we primarily offer repairs and remanufacturing of large parts dedicated for mining machinery. I provide technical support for those hubs and plants.

In order for a mining machinery to keep operating, regular parts replacement is a necessity. By keeping remanufactured parts ready, replacement can be undertaken on site, costs can be kept lower than by substituting new parts, and the machine downtime can be reduced. In terms of these advantages there are increasing needs for remanufactured parts. On the other hand, the operating rate of a mine is susceptible to changes in the demand for resources, which also impacts the frequency of machinery parts replacement. Amid such circumstances we suggest appropriate replacement periods based on information on past replacements and feedback from our customers on site. We are also striving to optimize our proposals for customers by utilizing ConSite which monitors machinery's operating status.

Used parts are a "treasure trove"

Used parts removed from machine by substituting remanufactured parts actually have significant value. The reason for this is that from them we can glean data regarding their operation, such as which locations were worn down by what minerals handled or based on the machinery's usage. By linking this data with development and design departments, in the future we may be able to develop parts that are more resistant to breaking and wearing down, and it may become possible to design structures that allow parts to be reused without being repaired. If the performance of a product itself improves, maintenance-related costs can likely be kept down too. Currently we are in the middle of analyzing such data and establishing a system to apply it to the optimization of product design.

When waste of materials occurs in the process between production and consumption, it is all the more important to fulfill our role as a manufacturer to get our products closer to a circular economy system via various ideas such as remanufacturing, recycling and product lifetime prolongation.

In addition, when our customers use our remanufactured parts, it means they are endorsing a circular economy society and SDGs. I want to strive to contribute to society together with our customers, socially and environmentally.

Toshiyuki Asaka
Remanufacturing Promotion Dept. Spare Parts Div.

"I want to create an environment in which remanufactured parts are available to all customers".