

HITACHI

Reliable solutions

Remanufactured components

Contributing to the circular economy



Abstract

Due to the tough environments that mining, construction and quarrying machines work in, parts will always need replacing. To mitigate the high costs of new parts and help reduce industrial waste, manufacturers are offering remanufactured components as an affordable and sustainable alternative that will benefit business operations – without compromising on quality.

This white paper will demonstrate the positive contribution that the construction and related industries can make to the global circular economy by increasing the production and encouraging the use of remanufactured parts. This is as an alternative to customers and suppliers simply replacing used, or worn-out items, with new ones.

Contributing to this circular economy by encouraging a resource-efficient society is increasingly important, and not just in terms of corporate social responsibility. The benefits of embracing and adopting parts remanufacturing are numerous and include: the reduction of non-reusable waste products; helping address resource scarcity issues; and contributing to a reduction in the environmental impacts of industrial activities all around the world.



Leading the way to a global circular economy

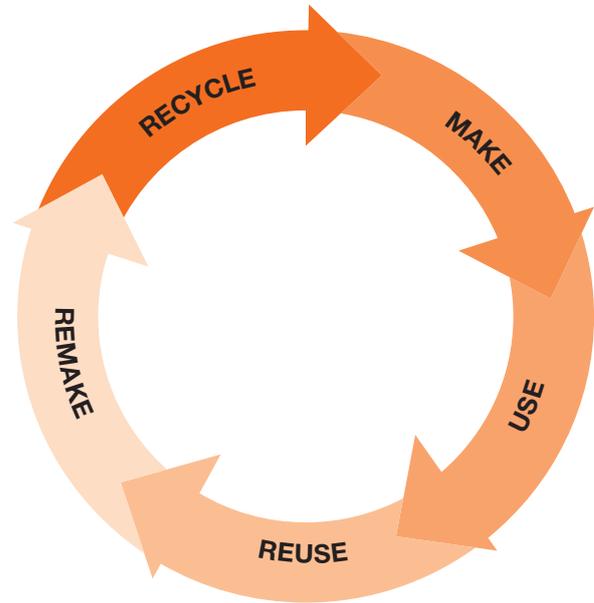
As the global population continues to grow and many emerging nations look for increased prosperity, this is putting enormous stress on our environment and natural resources. Economic growth is usually linked to consumption, yet our current levels cannot continue indefinitely at the expense of the earth's resources.

Something has to change with our 'take, make and waste' linear economic model that relies on large quantities of cheap, easily accessible materials and energy. These resources are not infinite; therefore, we have to think of alternatives to producing items with no reuse, recovery or regeneration built into the life-cycle process.

A circular economy is an alternative to a traditional linear economy, in which large and small businesses, organisations and individuals are encouraged to look at all their processes and habits to minimise consumption and waste. The challenge for the construction industry – or indeed any manufacturing industry – is how to extract the maximum value from machinery and parts while they are in use, while being able to recover and regenerate most of these products and materials at the end of their initial service life.

Imagine a circular economy in which few materials are wasted, and products (and parts) are not only designed and built for longevity, but also for multiple reuse and eventual recycling. As a backbone of the global circular economy, the importance, the relevance of, and the demand for remanufacturing has been growing over recent years.

Adopting practices and manufacturing techniques that reduce waste to a minimum can deliver far-reaching benefits. This is not just for industry with all of the extra jobs created – and the resulting increased levels of innovation and competitiveness – but also for society in general. There is reduced pressure on the environment, and the benefit of more durable and innovative products finding their way to customers, also saving them money in the short- and long-term.



Cylinder assembly and disassembly area at the Hitachi Remanufacturing Centre in Lusaka, Zambia

Remanufacturing – the ultimate form of recycling?

According to the Centre for Remanufacturing and Reuse, the definition of remanufacturing is ‘the process of returning a used product to at least its original performance with a warranty that is equivalent to or better than that of the newly manufactured product’. [1]

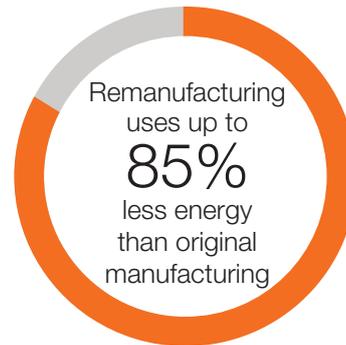
Remanufacturing should not be confused with reconditioning, which usually involves a partial disassembly or strip-down of a component, with any damaged parts replaced prior to being rebuilt. In contrast, a remanufactured part is one that has been returned to the manufacturer’s original factory specification.

The Society of Motor Manufacturers and Traders cites many benefits of remanufacturing in the forward to its 2019 Automotive Sustainability Report [2], stressing that ‘most good quality parts can be remanufactured multiple times. Remanufacturing also tends to be labour-intensive, which can benefit the local economy by creating jobs’.

Furthermore, considerably less energy – up to 85 per cent less than original manufacturing – is required to remanufacture goods, with the added benefit of diverting end-of-life products from landfill.

There can’t be many industries in which machines and their individual parts will have a harder life than in the construction, quarrying and mining sectors. Given the tough environments they work in, component wear is unavoidable and certain parts will inevitably need replacing.

For any dealer, plant hire centre or operator, keeping machines in optimum condition is paramount in today’s competitive marketplace. Remanufactured components offer an affordable and sustainable alternative to new ones to keep a machine running with minimal unscheduled downtime.



How does remanufacturing work?

Construction machinery manufacturers, such as Hitachi Construction Machinery Co., Ltd. (HCM), offer an affordable, premium replacement solution – known as Hitachi Remanufactured components – to keep a fleet up and running. Just like new parts, Remanufactured components will keep a Hitachi excavator, wheel loader or dump truck operating with minimal downtime, as they are tested and made to the same exacting specifications. They also come with the same Hitachi warranty as new parts, but are more affordable than new parts.

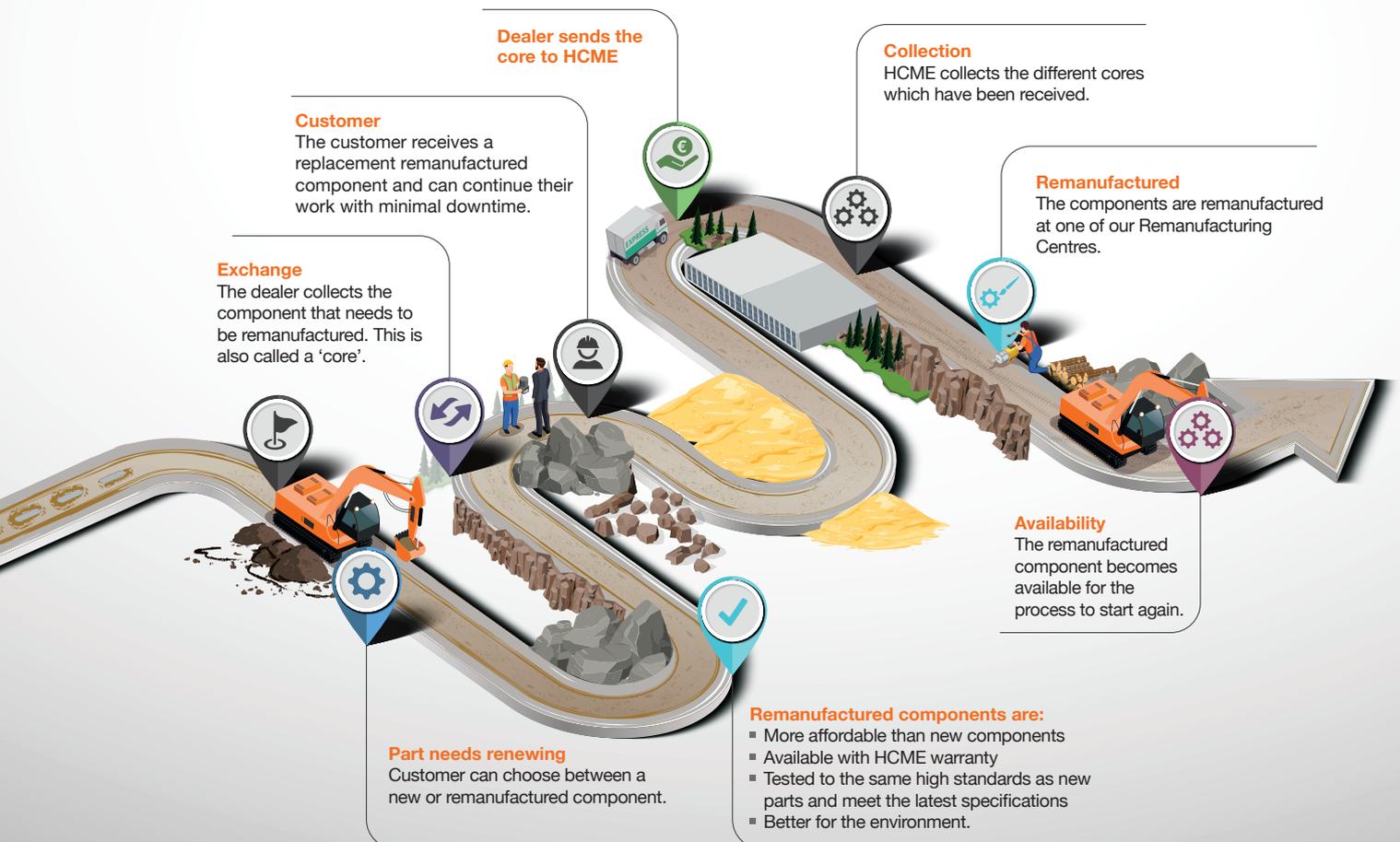
Designed to lower operating costs and minimise unscheduled downtime, Hitachi Remanufactured components are an excellent choice for preventative maintenance, or to get back up and running as soon as possible. As Jun Shibuya of HCM's Central Remanufacturing Centre in Japan says: "Malfunctions or failures in construction machinery take considerable time to restore since the problem parts need to be removed at the site, transported to the service shop, and then disassembled and repaired."

"Replacing problem parts with new parts results in high repair costs, and the old parts (generally) end up as industrial waste. Remanufactured parts provide a way to solve these issues. This approach enables machinery to be rapidly restored, lowers repair costs, and reduces industrial waste." [6]

The purchasing process is simple too. A used part can be easily and quickly exchanged for the corresponding Remanufactured component at a local Hitachi dealership. It will then be returned to one of the manufacturer's dedicated centres to be remanufactured to the same high standards as new components. Once this work is finished, the part is then ready to go to another Hitachi customer, complete with a comprehensive warranty.

This programme is sustainable too. Just like new parts, Hitachi Remanufactured components will keep a machine operating in top condition. Furthermore, the remanufacturing process allows Hitachi to lower waste and save resources by reducing the need for raw materials. It has the added benefit of being better for the environment as the 'core' product is rebuilt and then supplied back into the market.

The remanufacturing roadmap



The remanufacturing process

To ensure Hitachi Remanufactured components live up to customer expectations, nothing is left to chance. Every component is completely disassembled to allow a thorough inspection of the individual parts.

Each must meet OEM specifications – or it is not reused. Wear parts like bearings, bushings, seals and gaskets are never reused. Parts scrapped during the remanufacturing process are replaced with the same OEM parts that were originally used in the component.

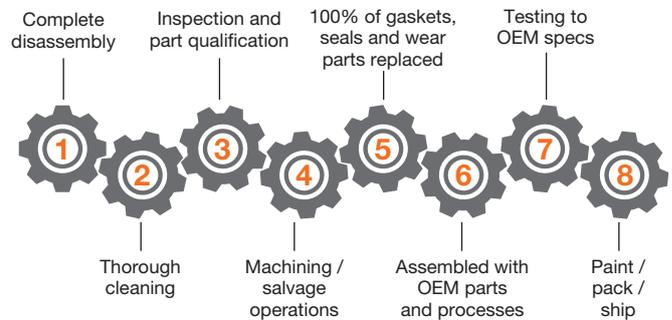
All technical updates are also incorporated into the Remanufactured component to maximise performance and durability. After assembly, each component is thoroughly tested to OEM specifications. Once the component has been tested, it is painted, packaged and sent to the nearest Hitachi parts distribution centre, ready for despatch when a customer needs it.

Ultra-large mining excavators and rigid dump trucks are made up of thousands of parts, some of which are extremely large and heavy – but most of these can be remanufactured. For example, the final drive on a Hitachi EH4500 rigid dump truck is the heaviest item handled as Hitachi Remanufactured parts, weighing 14,200 kg. This is equivalent to the weight of around 12 small cars, such as a Nissan Micra.

Remanufacturing such large components provides major benefits for saving resources and reducing waste. The HCM Group also has a large portfolio of other technologies for reusing parts – without discarding them – greatly reducing the volume of scrap. Overall, the Group’s remanufacturing business reduces waste by about 2,900 tonnes per year [3].

There is brisk demand for remanufactured parts for ultra-large excavators and rigid dump trucks used for example in Australia, Indonesia and Zambia, where HCM’s remanufacturing plants are located. In FY2018, these three countries generated Remanufactured components sales of approximately JPY17 billion from a worldwide figure of JPY20.8 billion (81.7%) [4]. Since remanufacturing eliminates unneeded industrial waste, it also offers the advantage of greatly reducing waste treatment expenses.

Our remanufacturing process



Into Africa – a continental perspective

HCM began remanufacturing activities in Zambia in June 2012 to support its operations in the Lumwana and Kansanshi mines, among others. After a successful introduction, Hitachi Construction Machinery Zambia's (HCMZ) Remanufacturing Centre in Lusaka was designed, built and open for business within two years.

The impressive facility was expanded in July 2016 to meet the increasing demand in volume of component repairs. The warehouse and workshop both doubled in size to provide an increased level of production capacity.

HCMZ supplies Remanufactured components to its mining customer base in southern Africa, with a total population of over 85 EX ultra-large excavators and 180 EH rigid dump trucks across the region. The number of Remanufactured parts supplied to this market has already increased more than sevenfold in only five years, from 115 in 2014 to 1,050 in FY2019 – with a target of 1,200 for 2020.

HCMZ's Remanufacturing Centre in Lusaka is the first centre outside Japan to be certified by Hitachi, Ltd. and is now also the official Hitachi Remanufactured supplier of mining components for Hitachi Construction Machinery (Europe), Hitachi Construction Machinery Middle East Corporation and Hitachi Construction Machinery Eurasia, as well as the entire sub-Saharan African region. All told, that's a population of around 550 EX ultra-large excavators and 750 EH rigid dump trucks.

"The key point of having the Remanufacturing Centre is to increase the usability of the components, which enables us to help reduce the life-cycle costs for Hitachi mining equipment," says Scott Johnston, HCMZ's General Manager, Commercial. "Rather than acquiring new parts, our customers can save up to 60% by opting for Remanufactured components."

"This facility has given Hitachi a point of difference in the mining sector, not only in Zambia – where customers are happy to buy locally sourced products – but across southern Africa. In addition, this is the only centre for repairing the pantographs for the EH dump trucks. Some mines have even asked us to remanufacture other manufacturers' components!"

Around 25% of the Remanufacturing Centre's income is now derived from international and cross-border trade, which has brought a significant benefit to the local economy.

"We've significantly increased our machine shop's capacity for repairs, which are now all conducted in-house, including chroming, machining and welding," adds Scott. "We've also added an environmentally friendly HVOF (high velocity oxygen fuel) re-chroming system. Traditional chroming uses high quantities of water and electricity, but this system produces zero emissions and has significant advantages relating to quality."

"We're also doing more heavy structural item repairs, such as main bodies, track frames, booms, arms etc. Everyone now wants to run machines up to 100,000 hours, so they need significant preventative maintenance intervention. Furthermore, Remanufactured buckets are around 50% of the price of new ones."



"Our customers can save up to 60% by opting for remanufactured components"

Scott Johnston, General Manager, HCMZ



How the Hitachi Remanufacturing process works at Lusaka

HCMZ holds a stock of Remanufactured parts on site – with almost 100% availability – and recovers the core (part) from the machine when it is being replaced. This is shipped from the mine direct to the Remanufacturing Centre, where it is documented by the creation of a specific serial number for each item.

After it has been washed, the component is disassembled, and a decision is taken on its suitability for future use. The customer is refunded after a successful inspection has been carried out, while unusable parts are scrapped. The Remanufactured products include: cylinders; hydraulic pumps and motors; travel and swing devices; centre joints; transmissions; final drives; AC motors; alternators; and pantographs.

If the component passes the test, HCMZ has a team of 57 personnel on the shop floor with an extensive range of equipment at its disposal to complete the remanufacturing process. These are divided into hydraulic, electrical and mechanical sections, and include: the welding and machining centre; the electric component test room; the digital test bench (with separate rigs for pumps and motors); cylinder assembly and disassembly area; painting and shot blast rooms; and a despatch area for final checks.

Around 80% of parts are despatched out of Africa via sea freight and 20% via air freight. Shipping times can be as little as 72 hours for air freight from Zambia to Europe.

As well as lowering the total cost of ownership (TCO) of customers' equipment, HCMZ has achieved significant environmental improvements thanks to adopting remanufacturing processes in the region.

Since these operations began in 2012, HCMZ has been able to save 3.6 million kg of materials by being able to reuse components as opposed to purchasing new from HCM. More than 18,000 tonnes of packaging materials have been saved by using steel rather than wooden crating, and the amount of electricity saved by not having to process refined steel is the equivalent of powering over 94,000 homes.



3.6 million kg of materials saved since 2012 (HCMZ)



Reducing downtime and saving money – a European perspective

Offering Hitachi Remanufactured components is certainly a business opportunity for an authorised HCME dealer. There is less risk (the warranty is with the manufacturer, not the dealer) and a better profit-to-sales ratio by converting in-house repairs to Remanufactured sales – all of which can result in improved customer retention.

For the manufacturer, the ethos of Remanufactured components fits perfectly with its corporate social responsibility (CSR) goals, as Rob Feskens, HCME's Part Sales Representative, explains: "Environmental responsibility takes a leading role in Hitachi's CSR vision, which makes the Remanufactured programme a perfect fit. It allows us to work towards a circular economy and reduce our carbon footprint, while further enhancing our after-sales services."

This is a view shared by fellow HCME Part Sales Representative Sjors van Vugt, who explains: "Affordability, availability and sustainability – these are the main benefits for the customer, and that's what they need. Remanufactured components can be mounted to newer and older machines, for which new parts might not be economically viable.

"Availability is key, as the part will mostly be used on a machine that is not running well. The construction business is conservative, with older owners having survived the last financial crisis. However, younger contractors see sustainability as a key item."

Finland's authorised HCME dealer Rotator Oy was founded in 1954 and has been a Hitachi dealer since 1983. It employs 150 people across eight branches and has become a strong advocate of Hitachi Remanufactured components since HCME rolled out its dealer-based sales operations.

"We're mainly selling remanufactured parts for ultra-large mining equipment, and medium and large Zaxis excavators, from the ZX240 upwards," says Rotator's After-sales Director Jukka Oksanen. "The most crucial thing for the customer is that they get the parts as soon as possible. Availability and delivery time are the most important factors, followed by price."



"Environmental responsibility takes a leading role in Hitachi's CSR vision"

Rob Feskens, Part Sales Representative HCME



Kone-Kostamo Oy – a leading rock-crushing contractor in Finland – took advantage of the Hitachi Remanufactured parts programme for the replacement of a key component on its ZX470LCH-5 excavator

“Our customers have been satisfied with the delivery and quality of Hitachi Remanufactured components, such as pumps. Sustainability is another benefit, along with the 12-month warranty. We always keep a stock available – and at a competitive price too. If the customer is happy, then we are happy!

“The lifespan of the machines is getting longer and instead of, say, 40,000 hours, they will be doing maybe 80,000 hours in the future. Then we will naturally have to maintain and service them more. At that point the Hitachi Remanufactured parts will also become more important.”

Kone-Kostamo Oy – a leading rock-crushing contractor in Finland – took advantage of the Hitachi Remanufactured parts programme for the replacement of a key component on its ZX470LCH-5 large excavator. The Salo-based company maintains its own fleet of seven Hitachi excavators that service the needs of its customers’ quarries.

When a main pump was needed, Kone-Kostamo’s Workshop Manager asked Rotator for a quotation. This included the favoured option of a Hitachi Remanufactured component, which was in stock and only took two days to supply and fit to the machine.

“We didn’t have any spare pumps for this model, so buying the Remanufactured component from the Hitachi dealer was faster than refurbishing the part ourselves,” says Kone-Kostamo’s Foreman, Karri Mäenpää. “This meant that we saved ourselves up to three weeks of downtime, which is vital when you need the machine every day to load the crusher.

“We work well with Rotator and this is a good example of how happy we are with their solutions. It was an easy process: they collected the original ‘core’ component, which needs to be sent off and renewed by Hitachi, at the same time as delivering the Remanufactured pump.

“We would choose to buy a Hitachi Remanufactured part again, especially as it is environmentally friendly, in that we’re helping to extend the life of the part. The peace of mind that comes with having a one-year warranty for the pump is also a bonus. In addition, it was supplied at a good price and the machine was working again with minimal delay!”



“We would choose to buy a Hitachi Remanufactured part again, especially as it is environmentally friendly, in that we’re helping to extend the life of the part”

Karri Mäenpää,
Foreman, Kone-Kostamo

Conclusion

The years ahead should see increasing efforts to create a circular economy on a global scale, as demonstrated by moves such as relevant policies starting to be incorporated into the legal system in Europe [5].

The process of remanufacturing can help industry to play a significant role in the future health of our planet. This is due to the realisation of the importance of no longer discarding used parts, and the increasing demand that the service life of these items is extended by collecting them, reworking them and turning them back into usable components. This requires cooperation, uptake and an organised remanufactured parts supply chain, of which HCM is in a commanding position to exploit, thanks to its Group synergies.

With regard to the construction, quarrying and mining industries, it is hard to argue against the use of remanufactured components. The maturing of this commodity will help the sector to contribute to a more resource-efficient society, while reducing the environmental impact of its industrial activities around the world. This reduced use of resources and waste will assist manufacturers in meeting their CSR goals.

For authorised Hitachi dealers, offering Remanufactured components provides additional business opportunities, including increased sales, reduced labour costs, improved customer retention and less risk. In short, a machine's life can be extended without compromising on quality and without it literally 'costing the earth'.

For Hitachi owners and operators, using Remanufactured components is an affordable and sustainable way of keeping their machines working. Owners will not only benefit from less machine downtime, but also a reduction in the total cost of ownership by using higher quality components (versus locally repaired or refurbished parts) and the peace of mind provided by a comprehensive warranty.

As the journey towards a circular economy gathers speed, Remanufactured components is an area that Hitachi plans to refine in the years ahead as a way of further reducing environmental impact, boosting profitability, and pursuing a more globally oriented approach to business.

References

1. <http://www.remanufacturing.org.uk/what-is-remanufacturing.php>
2. <https://www.smmr.co.uk/industry-topics/sustainability/remanufacturing-2/>
3. Hitachi Construction Machinery Topics, Global Development of Parts Remanufacturing Business Wins Award of the Director-General of the Industrial Science and Technology Policy and Environment Bureau at the "Awards for Resources Recirculation Technologies and Systems," (Oct. 2018), <https://www.hitachicm.com/global/jp/news-jpn/news-topics/topics/18-10-17j/> in Japanese.
4. https://www.hitachi.com/rev/archive/2019/r2019_05/05b02/index.html
5. <https://ec.europa.eu/environment/circular-economy/>
6. https://www.hitachi.com/rev/archive/2019/r2019_05/pdf/P108-112_R5b02.pdf

