



## Product Lifetime Extension Case Study: Caterpillar

**Company name:** Caterpillar Inc. ([website](#))

**Sector of activity:** Solar Turbines and Progress Rail Services remanufacturing

**Implementation area:** Global operations in 110 facilities

(51 plants in the USA and 59 plants in other 22 countries, headquartered in Illinois, USA)

**Business strategy for product lifetime extension:** Remanufacturing

### Remanufacturing

According to the *European Remanufacturing Network*, to remanufacture is to return a used product to at least its original specifications and performance with a warranty that it's equivalent to or better than that of the newly manufactured product. It involves disassembly, cleaning, restoring and replacing components and testing the individual parts and whole product to ensure that it meets origin design specifications. From a consumer and regulatory viewpoint, the remanufactured product is considered the same as a new product.

## Context

Caterpillar is one of the world's remanufacturing leaders, a strategy that focuses on extending a product's lifetime to its maximum capacity and, consequently, use its resources in a more effective way.

Caterpillar's remanufacturing is an exchange model, which means that when a component needs to be replaced, consumers work with their authorized 'Cat Dealer' to exchange their nonfunctional item and replace it by a remanufactured one. The 'old' product is then sent back to Caterpillar for remanufacturing. The remanufactured product typically costs less than half of a new one but has the same performance.

This represents an economic benefit to the consumer, since a remanufactured item is priced lower than a new one, and decreases the use of raw materials, through additive manufacturing techniques and reuse.

A remanufactured product is not the same as a recycled or repaired product, since the complete component undergoes a process that replaces worn or unsalvageable parts with new parts and remanufactures others so that the component meets original manufacturers' specifications. When a product is remanufactured, the parts that need replacement are submitted to an industrial process that returns the components to same-as-new conditions, or they are replaced with new parts.

Design is an important aspect of the remanufacturing business model, since products need to be durable, so that they can withstand as many lifecycles as possible – according to Caterpillar, some products can be repaired and remanufactured for multiple lifecycles.

## History

Over 45 years ago, Caterpillar was approached by a large customer of engines for on highway trucks that needed a repair option that was more time and cost effective than replacing their diesel engines with new ones.

In the search for a solution to solve a customer request, Caterpillar saw an opportunity for business in remanufacturing, which was not widely known around the world and could be profitable for the company because it was innovative and attractive to consumers in financial and practical ways (**Figure 1**).

The company then started looking for alternative engine overhauls that could turn the usual long repair method – taking days to be completed – to a process that shortened the time and complexity for servicing these engines.

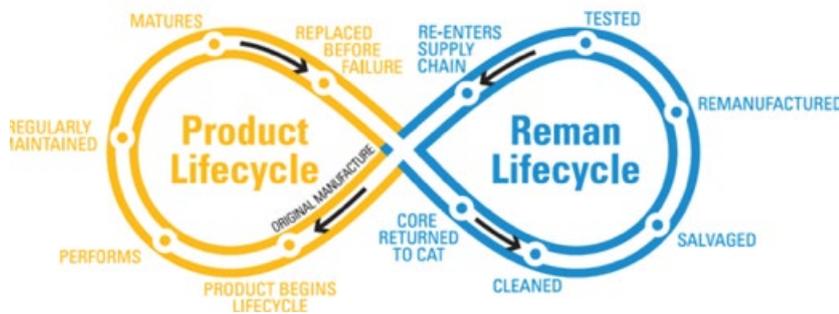


Figure 1. The Benefits of Remanufacturing | Source: *Monark-CAT.com*

## Barriers

Once the new business model was implemented in Caterpillar's first plant, they expanded this kind of work around the globe as companies started requesting it. Developed countries were the first ones to demand it and had a positive acceptance of remanufactured goods.

Some developing countries have been more resistant. According to Caterpillar, there are concerns to

not be a "dumping ground for the developed world's used goods", which is also connected to a misconception of perceiving remanufactured products as old used products.

This reasoning is not unjustified. In some countries that used to receive parts from other countries' end-of-life products, for example, both society and government are now opposing this.

Caterpillar is trying to reverse this image, and encourages the notion that the remanufacturing process is very different to discarding used, old or broken products in other countries.

Despite these challenges in developing countries, Caterpillar invested in a new unit in Brazil, choosing the city of Piracicaba, in the State of São Paulo, to build its first remanufacturing plant in South America. With this investment, Caterpillar is looking to show Latin American consumers and policy makers that remanufactured products are similar to new ones, but with less associated environmental and monetary costs. Just to illustrate this, Caterpillar highlights that the remanufacturing resulted in 134 million lbs of material remanufactured or recycled per year, the preservation of 85% of original energy "value add" and approaching the "zero landfill" status<sup>1</sup>.

Having a regulation assisting the implementation of a new business model is a decisive factor for its approval in a country. Each country has its own legislation, and in the United States, for example, there are almost no barriers for the exchange market in NAFTA (North American Free Trade Agreement) regulations, which can help explain why remanufacturing is more popular in the country, both for government and consumers.

This happens in many developed countries, where legislation on the matter is usually new or has been recently updated to recognize remanufactured products. On the other side, many developing countries still have legislation, mostly from the 1960s, in force which only recognizes new and used products.

Caterpillar is also focusing on legislation that clarifies the value of remanufacturing and the remanufacturing market. The company is working with policy makers to develop and implement regulations that make the commercialization of remanufactured goods possible and accepted in those places.

## Partnerships

Caterpillar sells its products through 180 independent dealers around the world. The company also works with the Remanufacturing Industries Council<sup>2</sup>, an organization that communicates the benefits of remanufactured products in order to educate different stakeholders such as schools, academia, policy makers and consumers on this subject.

Other essential partnerships have been formed with organizations such as the *Ministry of Industry and Information Technology (MIIT) of China* and the *Rochester Institute of Technology* in New York that analyses Caterpillar's reports in order to communicate the good results of the company's work so that consumers can better understand the matter of this business.

Source of information: 1 *Cat Reman Products* 2 *Remanufacturing Industries Council*



## Communication and results

Caterpillar’s business model of remanufacturing highlights the benefits to consumers and businesses, demonstrating how both can get positive results through remanufacturing and also how the remanufacturing process can provide solutions that contribute to more sustainable production and consumption models.

On their website, Caterpillar explains – through videos, infographics and statements – how the remanufacturing exchange model works and its relation with the circular economy, emphasizing the environmental benefits of this business model and the positive results achieved through product lifetime extension.

Some of the benefits include a financial gain for consumers, such as clients and suppliers, due to lower operation costs for providing same-as-new performance, and more repair options. It also helps businesses reduce owning and operating costs.

## How to get involved?

Everyone can contribute to a more sustainable industry sector. Consumers have a double role, both when deciding what to consume, looking for more durable products depending on their design and raw materials, but also when choosing products from companies that address key issues of the value chain, passing through raw material extraction and labor relationship, and that allow an adequate end-of-life management of the product, ideally extending its life or reinserting it into the chain.

## The Long View Report

This case study is related to *The Long View Report* in two main aspects:

- Removal of legal barriers for refurbishment and remanufacturing, because the biggest challenge reported about the implementation of this business model was the lack of government regulations that support remanufactured goods.
- Alternative business model, since the second barrier pointed by Caterpillar was the lack of acceptance of remanufactured products mainly in developing countries, making this business model difficult to be implemented – but research points to this also being a problem in developed countries.



**Closed Loop perspective: enable manufacturers to retain full responsibility over their products in order to extend product lifetime**

**Removal of legal barriers for refurbishment and remanufacturing**

The development of international standards for remanufacturing and the introduction of warranties and a tax reduction on remanufactured products can provide incentives. There is also a need to address trade barriers that prohibit the import of product parts that are to be remanufactured.

**Alternative business models**

Stimulating the acceptance of alternative business models (the shift from ‘owning’ to ‘using’ products) in the Business-to-Consumer market, includes addressing privacy and other liability issues pro-actively