

# Diffusing the commodity time bomb through sustainable business practices

University of Strathclyde & a diesel engine manufacturer  
*A Remanufacturing Case Study*

## Ticking Time bomb

Manufacturers are facing a potential commodity time bomb.

Globally, between now and 2025 we expect to see:

- 1.1bn more people
- 1.8bn more middle class consumers
- A dramatic shift to packaged products
- Much greater waste at end of life

*Source: Towards the Circular Economy – Ellen McArthur Foundation*

In the eight years between 2002 – 2010 commodity prices rose by 150% and with the estimated consumption rate set to rapidly rise, there will be increased volatility in the price of raw materials, posing serious risks to businesses.

## Diffusing the bomb

Business strategies often focus solely on internal efficiencies in the Infrastructure and Operations that save money - reducing energy usage, using renewable energy sources, reducing waste and water efficiency.

However, the real opportunity to add value to the business comes from looking at products and services.

## Reuse within Remanufacturing

Working with a diesel engine manufacturer, the Centre for Ultrasonic Engineering (CUE) at the University of Strathclyde set out to investigate the possibility of reusing roller bearings within their current remanufacturing process, currently 100% of used roller bearings are discarded.

A cost effective and efficient solution could realise economic benefits – as each roller bearing costs between £30 and £60 to replace and significant environmental benefits due to the reduction of materials entering the waste stream.

By partnering with the University, the company were able to take advantage of expertise and specialist acoustic emission equipment to test and verify a process for analysing the quality of roller bearings.

## Project Summary

Extensive research was undertaken to determine the best method using acoustic emission (AE) technology to assess the condition of roller bearing elements and from this designed and constructed a lab test facility.

Two types of roller bearings with both new and used examples were examined in the test facility to detect and measure the AE.

Rigorous testing with the various samples demonstrated that no AE was detected above the background noise from new unused bearings and AE could be detected and measured from the used bearings. This means that there is potential to use the AE technology to determine the quality of a used roller bearing and assess its suitability for reuse.

The potential savings for the company are significant. It is estimated that a minimum of 1000 roller bearings per year could be reused amounting to approximately 660kg of hardened steel and 10kg of rubber saved from entering the waste stream and cost savings of around £50,000 with the potential to increase this as the testing is fine tuned.



*Left: Bearing Test Rig*

*Right: Open bearing in test mount*

## Next Steps

A follow on project is now planned to refine the parameters of the acoustic output which indicate that the roller bearing is suitable for reuse. Development of the testing has the potential to increase the amount of reuse within the company and positively impact sales turnover beyond the current estimate of £50,000 per annum leading to new product innovation and job creation.

## Remanufacturing

Remanufacturing is the process of bringing back used components to their original OEM standards for a new cycle of use through a process involving:

- Disassembly
- Cleaning
- Inspection
- Restoration
- Testing

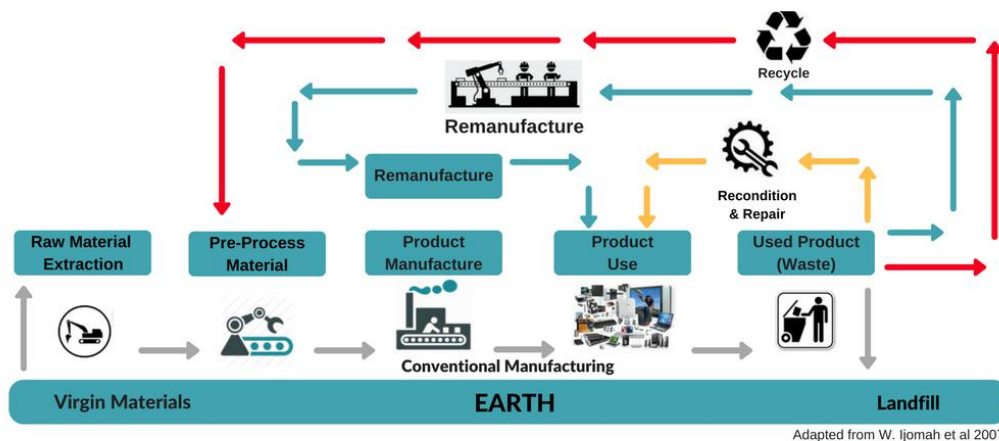
## Benefits of Remanufacturing

Remanufacturing allows the company to gain a competitive advantage throughout the product lifecycle and protect intellectual property by severely restricting unofficial repair and remanufacture.

Existing engines can be upgraded to facilitate the advance of technology further extending their useful life without the expense of procuring a brand new engine.

For the customer, the remanufacturing process means faster turnaround times, less down time for machinery and a lower cost product therefore minimising any financial implications associated with non-operational machinery.

When compared to manufacturing a new product, remanufacturing represents a reduction in energy usage of 85% and 200 million pounds of greenhouse gases are avoided providing measurable environmental benefits.



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