

remanufacturing **REMANPATH** pathways

One product, multiple lives: it's easier than it seems!

Find out how remanufacturing could help *your* business.

Remanufacturing involves taking back and dismantling a product, restoring and replacing components and testing the reassembled product to deliver an 'as new' product. The remanufactured product is supported by a warranty and can be considered to be the same as a new product.

Why should *your* business get involved in remanufacturing?

- **Improves sustained relationships** through trade-in schemes.
- Offers products that are typically **60%-80% the price of new**, while delivering **higher margins** for the remanufacturer.
- **Develops problem-solving skills for the workforce** through learning how to disassemble and reassemble products.
- **Improves staff retention** through more interesting work.
- **Maintains larger amounts of materials**, energy and labour invested in keeping products at '**as new**' quality.
- **Reduces energy consumption**, cuts carbon emissions and **keeps materials out of landfill**.

 Customer	 Environment	 Remanufacturer
Lower prices Availability Purchasing flexibility Supports ethical consumption	Reduced raw material consumption Reduced energy consumption Reduction in CO ₂ emissions Reduction of material sent to landfill	Local jobs Higher profit margin Skilled jobs New manufacturing techniques Better customer relationships

The RemanPath educational materials share best practice to develop remanufacturing competencies in SMEs. The materials help small manufacturers grow their businesses, showing how they can take back the products they make to remanufacture and give them a new life.

EIT Raw Materials, the project funder, aims to develop raw materials into a major strength for Europe. VTT in Finland leads RemanPath (<https://www.vtt.fi/sites/remanshipfinder/>) with partners from TU Delft, Wuppertal Institute, Grenoble INP, Coventry University and Oakdene Hollins.

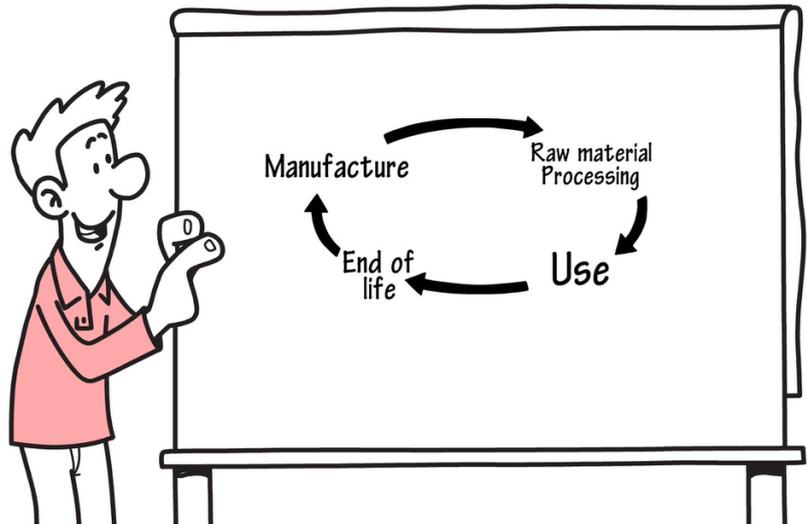
How Remanufacturing Works

What is remanufacturing?

Remanufacturing involves dismantling and cleaning a product, restoring or replacing any damaged components, then testing the reassembled product.

For a customer, the remanufactured product can be considered to be the same as a new product, usually with a warranty that's equivalent to that of a new product.

A remanufactured product should be at least as good as the original and should meet the original product's performance specifications.



How does this work?

- There are several actors involved in a typical remanufacturing supply chain. Some Original Equipment Manufacturers (OEMs) will do their own remanufacturing, while some contract it out to third parties.
- Whichever way they operate, a critical part of remanufacturers' business is taking back 'core' - end-of-life - products to remanufacture, either directly from the user or through brokers.
- Remanufacturers also need access to components to replace worn or broken parts. The remanufactured product can then be returned to use, either through a supplier or directly to the user.

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Governments are advocating the transition to a more sustainable use of natural resources. Natural resources such as materials and energy are required to produce products. Practical strategies are needed to handle products and the resources they comprise at the end of a product's life. The **6Rs** of sustainability are to **reduce, reuse, recycle, recover, redesign** and **remanufacture**. Remanufacturing is the focus of RemanPath's guidance and educational materials.

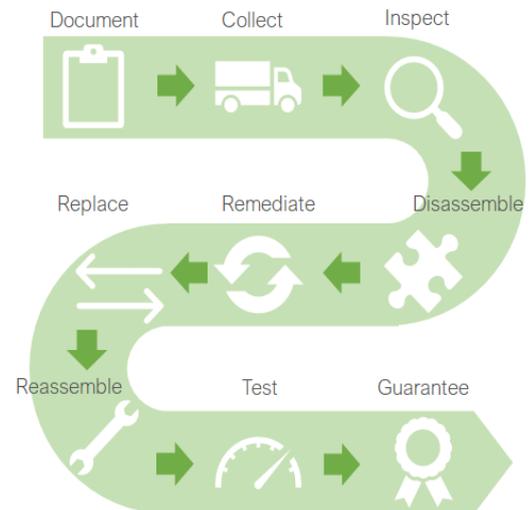
**Find out what remanufacturing could do for your business.
Follow this link to free materials to help get you started:**

<https://www.remanufacturing.eu/remanpath>

The RemanPath Project

RemanPath was funded by the EU as part of the EIT Raw Materials KIC, which aims to share knowledge, enhance innovation and support business.

Building on the results of a previous Horizon 2020 research project called the *European Remanufacturing Network*, RemanPath has developed learning materials to inform Small and Medium Sized Enterprises about their path to remanufacturing. The aim of RemanPath has been to help those working in SMEs to use these learning materials to identify development pathways towards remanufacturing and devise innovative business models that fit with their competences. The ultimate aim is to help firms retain the inherent value in end-of-life products through remanufacture.



David Fitzsimons, Director of the European Remanufacturing Council, shares his thoughts

Why should businesses get involved in remanufacturing?

It is the attitude of OEMs towards product value retention that largely determines whether specialist remanufacturers will have a stable business that can grow with external finance. As more OEMs are changing their position this may open up new opportunities for those that can service OEMs.

What is the biggest challenge for firms?

The legal framework has been designed for a linear economy. It continues to be especially difficult for non-approved independents to thrive. They often discover the latest opportunities, but then struggle to find external sources of finance.

Is remanufacturing worthwhile?

In many product categories, the resource saving from remanufacture translates into a financial saving. If policy makers could add in additional value from the CO₂ savings, for example, then more product categories could be brought inside the boundaries within which remanufacturing is economically viable. If this is the way the economy is heading, then specialists in this area should be well positioned to benefit.

An example of best practice?

Good practice examples are almost all in the B2B space. Volvo is an example of an OEM that sees product value retention as a central element of its corporate strategy. Volvo expects us to buy fewer personally owned vehicles but instead to use vehicles through intermediaries. Keeping the cost of maintenance as low as possible will be a competitive advantage; this will include having remanufactured components available.

What single piece of advice would you give?

In all cases make sure your investors understand the IP issues.

European Remanufacturing Network: <https://www.remanufacturing.eu/>

Remanufacturing in Practice

Finnish tractor manufacturer **Valtra** began offering remanufactured transmissions in 2012, and since then the turnover for remanufactured gearboxes has increased 25-30% annually. Currently, Valtra offers around 120 types of transmission components. Each year it remanufactures over 800 transmissions, powershift gearboxes and forward-reverse shuttles. Remanufactured components are an attractive alternative for a growing number of customers. They come complete with a warranty and all available updates. They are priced at 60-70% of new components and can be sent to customers straight off the shelf. The resultant material and energy savings are remarkable. The service requires a high level of expertise, with products improved as a result of Valtra's cross-functional collaboration.



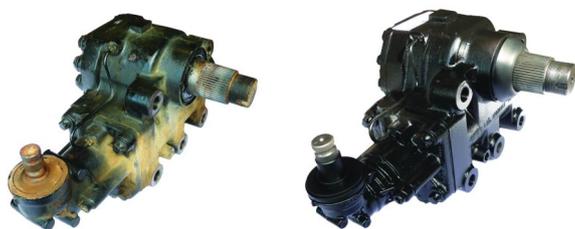
Since 2009, the German company **robotif GmbH** has offered standard remanufacturing of industrial robots, including disassembling, cleaning, analysis, remanufacturing, reassembly and final testing. Furthermore, robotif offers the use of improved spare parts that have been designed in-house.

Armor is an Intermediate Sized Enterprise based in Nantes, France. One of its main activities is the remanufacturing of laser cartridges. Armor's approach involves the collection of used laser printer cartridges through an online management service provided on its website. Typically these cartridges are not designed for remanufacturing. Most cartridges are protected with patents, contain chip sets, are weak or are made of many different materials, which makes them more difficult to remanufacture. Armor has developed specific remanufacturing processes to address these challenges.



Remanufacturing in Practice

Aqua Assainissement, working in partnership with the G-SCOP laboratory, has developed an initiative to remanufacture end-of-life compressors and engines for micro-sanitation stations. This remanufacturing initiative, which is part of a global circular economy project, involves recovering components from several out-of-use products, the online sale of remanufactured products with a six months' warranty, and the recovery and recycling of materials from parts that cannot be remanufactured. Aqua Assainissement was the winner of the 2018 "Innovative Eco Service" of the Bourgogne Franche Comté Eco-innovation trophy (France).



Norfolk-based **PSS** has been remanufacturing steering, hydraulic and mechanical products for the UK on- and off-highway and military markets since 1971. This has enabled vehicles and applications of all types to be kept in service for many years, and has saved customers from having to make costly replacements with new parts. PSS's main products include power steering boxes, power steering pumps, power steering racks, hydraulic cylinders, hydraulic motors and brake calipers. In 2020, PSS expects to be remanufacturing over 10,000 units from its market leading facility for its UK customer base.

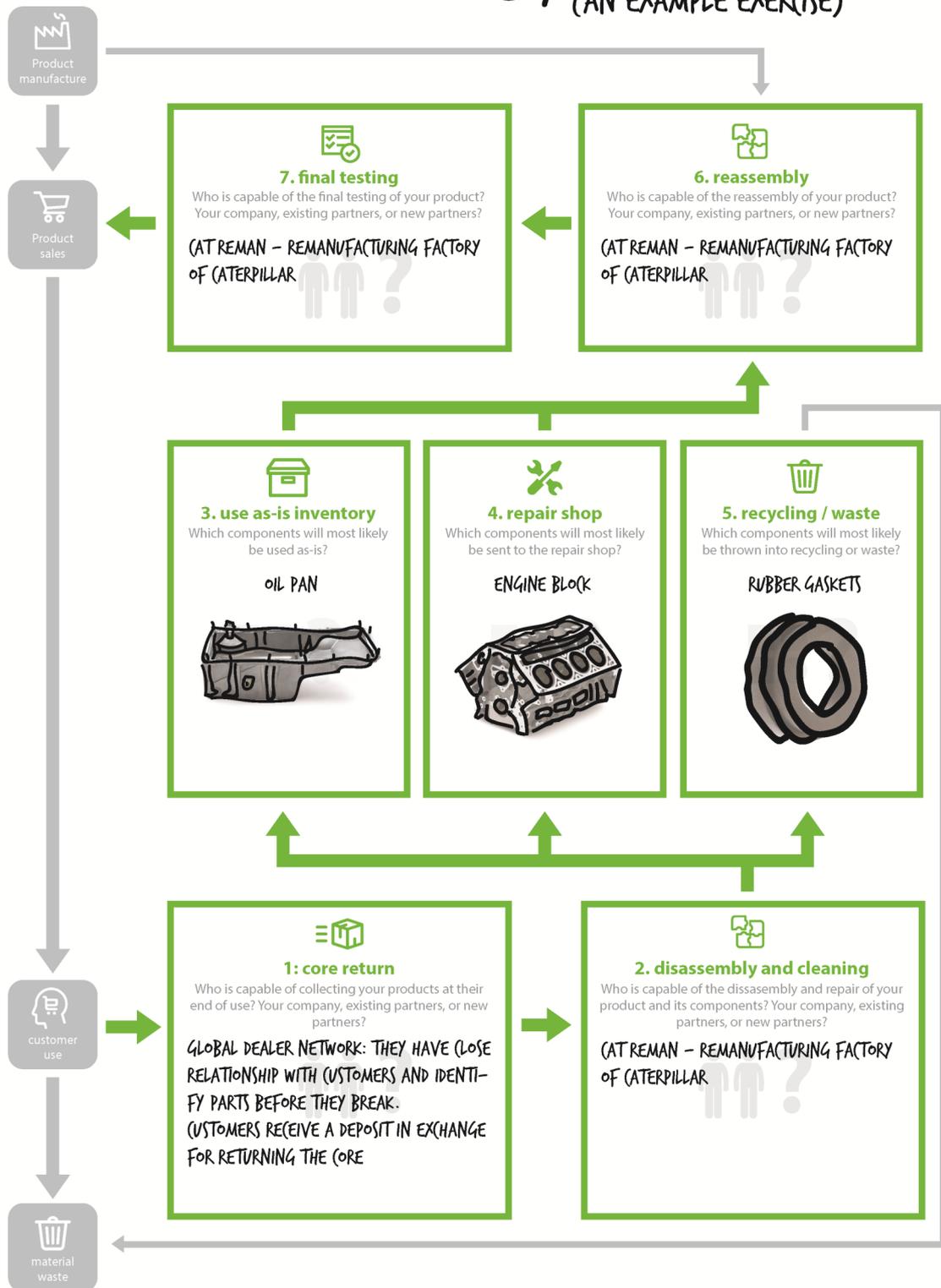
German **AfB GmbH** is a non-profit IT company that is active in the remanufacturing of used, high-quality and refurbished IT hardware, warranted for up to three years. AfB undertakes the refurbishment, including the pick-up of the hardware, certified data deletion, professional cleaning, disassembly, separation and remanufacturing.



The RemanPath Educational Materials

Process Map

remanufacturing **REMANPATH** pathways **PROCESS MAP** FOR THE CATERPILLAR ENGINE (AN EXAMPLE EXERCISE)



The RemanPath Educational Materials

Checklist



THE REMAN CHECKLIST

Is your product or company suitable for remanufacturing? When it comes to remanufacturing, what are your existing opportunities? What are the barriers that need to be overcome? Answer the following questions to find out.

MARKET POTENTIAL		
CUSTOMERS & MARKETS	Y	N
could remanufacturing improve the brand, recognition, and reputation of your company?	X	X
are customers accepting of remanufactured products?		
is there a separate target market for remanufactured products?		
OTHER ISSUES	Y	N
does legislation allow for remanufactured goods?		
is sustainability seen as the company's way of doing business?		

PRODUCT AND PRODUCTION		
PRODUCT STRUCTURE & DESIGN	Y	N
is the product modular, or designed to be (easily) dismantled?		
has the product been designed from the perspective of life cycle costs?		
are the safety requirements relating to the product low?		
SUPPLY & DELIVERY CHAIN	Y	N
is there a relationship between sales and after-sales?		
is the testing of remanufactured products straightforward?		
PRODUCT CHARACTERISTICS	Y	N
does the product have a high retained value?		
is the rate of change for the product slow?		

REVERSE LOGISTICS		
BUSINESS MODEL & MARKETS	Y	N
is the recovery of products included in the business model?		
are there good logistical connections in the market?		
is the recovery of products unrestricted by customs, tariff, or other border formalities?		
LOGISTICS	Y	N
is the length of the product's life possible to predict?		
is the storing of products (cores) possible / affordable?		
can the existing sales and distribution channels be utilised for remanufactured products?		
is there an efficient system of reverse logistics with which products can be collected?		
is there an incentive system that encourages customers to return their products?		



RemanPath Project Partners



About VTT: VTT is a leading research, development and innovation organisation in Europe. It is an impartial expert organisation that develops new technologies and produces research, development, testing and information services for domestic and international clients. By combining expertise and innovation, VTT aims to increase technological and economic competitiveness and social welfare. With expertise in knowledge intensive products and services, smart industry and energy systems, and solutions for natural resources and environment, VTT is part of Finland's innovation system operating under the mandate of the Ministry of Employment and the Economy.



About Coventry University: Coventry University is an ambitious and innovative university with a reputation for excellent research, business engagement, innovation and entrepreneurship. The Centre for Business in Society (CBiS), where RemanPath takes place, is home to 35 specialist researchers and one hundred Doctoral students; a core team focuses on the circular economy. CBiS's research seeks to promote responsibility and change behaviours, to achieve better economic and societal outcomes. Sustainability is a core theme for CBiS, which works closely with public and private sector partners.



About Grenoble INP: Grenoble INP and Université Grenoble Alpes are two leading universities in France in the Alps region. Research at both universities in partnership with local research organisations and higher education institutions covers all disciplines, from basic science and engineering to humanities and social sciences. It is this diversity that stimulates innovation where the disciplines meet, all in the name of serving society. Research addresses key technological, environmental and societal challenges.



About TU Delft: Delft University of Technology (TU Delft) is the Netherlands' oldest and largest university of technology. Its ground-breaking research, education and new venture creation profile focus on engineering and applied sciences. TU Delft provides technological solutions that facilitate the transition to a sustainable, flourishing economy. It is viewed by the business community as a source of outstanding professional scientists and engineers, a producer of excellent practical knowledge and an innovative partner.



About Wuppertal Institute: The Institute undertakes research and develops models, strategies, and instruments for transitions to local, national and international sustainable development. Its sustainability research focuses on resources, climate, and energy-related challenges and how they relate to economy and society. Special emphasis is placed on analyzing and stimulating innovations that decouple economic growth and wealth from natural resource use. The thematic focus for the Division of Circular Economy is on a transition towards a circular economy, in which waste is avoided and products are used as long as is possible.



About Oakdene Hollins: Oakdene Hollins is a technical, science-led, circular economy consultancy delivering creative, strategic and practical solutions to support clients to be environmental and sustainability leaders in their field. Our vision is for the circular economy to be a fundamental feature of strategic decision making because it is known to deliver economic, social, and environmental value. Oakdene Hollins has been involved in research into remanufacturing for over 15 years and established and manages the European Remanufacturing Council (www.remanCouncil.eu). Oakdene Hollins has offices in Aylesbury in the UK and in Brussels.

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