

Uses of Remanufacturing Considering Economic and Product Design

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Abstract

This paper answers the question of what happens to such product in light of current offers made by organisations and manufacturing firms "to bring old goods and get discount to new product." Additionally, it explains how the organization's goodwill is demonstrated. But management practises in conventional manufacturing might vary substantially from those in production planning and control. Through a study of production planning and control activities at remanufacturing companies across the nation, we provide information on management remanufacturing methods. Due to uncertainties resulting from stochastic product returns, imbalances in return and demand rates, and the unknown state of returned items, production planning and control tasks are more difficult for remanufacturing enterprises.

Keywords: *Product Design, Remanufacturing, Recycling Product, Economic Manufacturing*

INTRODUCTION

Remanufacturing is the process of taking things that are known to be used up, broken, or thrown away and disassembling them in a manufacturing setting. Every component has been cleaned and examined. Reusable items are upgraded to

meet specifications. Replaced are those that can't be utilised again. The item is prepared for a second life and will function flawlessly after it has been put back together and tested.

Many times, a product may be improved to make it more dependable, easier to maintain, or with more advanced controls. Remanufacturing also involves reconfiguring and reprogramming to accommodate new consumer uses in various circumstances, particularly in electronics.

WHY IS REMANUFACTURING IMPORTANT?

The significance of remanufacturing is that:

- It can assist manufacturers in addressing the environmental, statutory, and competitive challenges of contemporary manufacture.
- It is a crucial approach in waste management, material recovery, and sustainable manufacturing.

Because of the considerable negative environmental effects of conventional manufacturing, it is not sustainable. More than 60% of non-hazardous waste produced annually comes from manufacturing, which also contributes to pollution, resource constraints, and high costs for landfill space and virgin materials.

International regulation currently aims to compel producers to lessen the

environmental effects of their goods and production methods and to fine them in accordance with the quantity of trash they generate. Additionally, firms must lower product prices while retaining quality due to international competition.

Remanufacturing can support businesses as they deal with these governmental, environmental, and competitive concerns. For instance, by lowering manufacturing costs through reductions in processing and raw material utilisation, it simultaneously enhances competitiveness and decreases environmental harm caused by production. Waste may be recycled back into the manufacturing cycle, reducing landfill space and disposal costs. [1]

Range of products being remanufactured

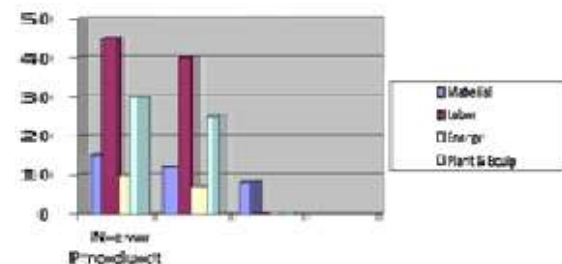
- Machine tools
- Electrical motors and compressors
- Starter motors
- Automatic transmissions
- Car and truck engines
- Office photocopiers (laser toner cartridges)
- Excavation equipment
- Office furniture
- Power bearings

- Defense equipment
- Computer and telecoms equipment.
- Air-conditioning units
- Pumps
- Industrial food processing equipment
- Aerospace
- Carpet tiles
- Rolling stock (railway vehicles
- Transit and Railroad: Small Machinery
- Drilling: Agriculture

Material flow

The movement of materials during the production, repair, reuse, remanufacture, and recycling of durable goods is depicted in this diagram. [2]

Remanufacturing/Recycling Economics



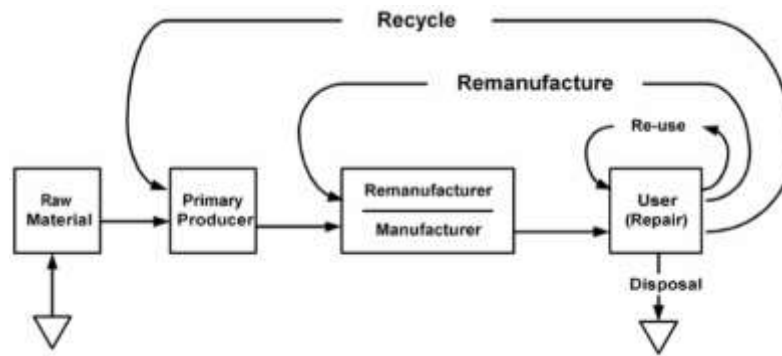
This chart illustrates conservation of value in a product that is remanufactured versus one that is recycled. The relative costs of material, labour, energy and the contribution of plant and equipment to a product in its manufacture are shown on the left. Remanufacturing preserves much of this value while adding a second life to the product.

REENGINEERING IN INDUSTRY

Remanufacturing services are offered by businesses for the hydraulic and mechanical parts generated by important product lines. Rebuilding, refurbishing, and restoring hydraulic components to original equipment manufacturer (OEM) specifications, or "like new" condition, are all examples of remanufacturing services.

Remanufacturing services are geared to a variety of industries, including but not limited to:

- Mining: Heavy Equipment
- Steel: Forestry Equipment
- Mobile Equipment: Petro-Chemical



This graph compares the conservation of value between recycled and remanufactured products. On the left, you can see the relative expenses of labour, materials, and energy as well as how much plant and equipment contributed to the creation of a particular product. Remanufacturing gives the product a second life while preserving a large portion of this value. In contrast, recycling attempts to recover solely the material value by shredding the goods. The other residual values in the product are either hardly kept or not at all. In just a few months, efforts at continuous improvement have resulted in operational savings of more than \$1 million. Cross-training efforts have been effective in reducing premium labour hours by more than two thirds and boosting labour flexibility by 30%. A new quality programme reduced material damage in half and almost eliminated product line deviations.

Concepts from lean manufacturing have streamlined warranty operations to reduce processing times by 67% while more than tripling throughput.

REMANUFACTURING AND PRODUCT DESIGN

The relevance of Design for Remanufacture in supporting remanufacture over recycling is that it is rarely possible to do more than recover the materials with old assemblies or equipment not built for remanufacture, and even this process of recycling may be challenging and expensive. Remanufacturing and repair are contrasted in the graph above. The graphic has been slightly revised to reflect the new knowledge gained as a consequence of this study. [6] Remanufacturing differs from other components of the word "re" in terms of its method and location within the material flow loop.

REMANUFACTURE	REPAIR
Used products	Defective products
Applicability	
Defective products	
Process	
Complete disassembly	Failure detection
Cleaning of all parts	Disassembly of some parts
Remediation of parts to as new state / Replenishment of new parts / Upgrading of parts	Restoration or replacement of defective part
Product reassembly	Reassembly of parts
Characteristics	
Industrialised process	Mechanic's work
Overall restoration to like new condition	Individual repair of defect
Customer receives anonymous product	Customer keeps his/her own product
Like-new or lifetime warranty	Warranty covering repair work only

THE FUTURE OF REMANUFACTURE

Remanufacturing and other reuse tactics have been more widely known in recent years, and government-sponsored initiatives would indicate that they are now being taken more seriously for both their environmental and economic advantages. Although it can be observed that remanufacturing is still insignificant in comparison to the manufacturing sector, it is impossible to say whether the industry is growing or declining.

CONCLUSION

Remanufacturing serves the people by reducing post-consumer waste, consuming less energy and raw materials, and

lowering the cost of replacement items. It also benefits the industry by creating profitable sales. The expenses of remanufacturing-oriented technologies are borne completely by the original producers, but the benefits of remanufacturing are shared by society. Therefore, government regulation is required.

The expense of complying with the legislation is thus transferred to those who create and consume final goods. As a result, original manufacturers might expect to make more money. This finding supports the Porter Hypothesis.

Since private collaboration increases manufacturability and, indirectly, the supply of high quality remanufactured goods, it may be used as a social planner's tool to encourage remanufacturing activities instead of environmental legislation. However, the implementation of an environmental rule that lessens the danger of the outsider and addresses the communal problem can lead to the social optimum.

Resolve the issue. If the social planner chooses this course of action, it should suppress personal alliances. Original manufacturers will always provide more support, or less resistance, when the technological choice is originally open to free riding, when the variance in earnings after the public involvement is viewed as the industrial degree of compliance with the legislation.

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