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Applications of Remanufacturing With Economic & Product Design Consideration

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Abstract

This paper is inspired from the recent offers which provided by the organizations and manufacturing companies "to bring old product and get discount to new product" what happens to that product is that answer of this paper. It's also tells us that how it is the goodwill for the organization. However, the management of production planning and control activities can differ greatly from management activities in traditional manufacturing. We report on managerial remanufacturing practices via a survey of production planning and control activities at remanufacturing firms in the country Production planning and control activities are more complex for remanufacturing firms due to uncertainties from stochastic product returns, imbalances in return and demand rates, and the unknown condition of returned products

Keywords: Remanufacturing; Economic Manufacturing; Recycling Product; Product Design

1. Introduction

In remanufacturing, products that are known to be worn, defective, or discarded are brought to a manufacturing environment, where they are disassembled. All components are cleaned and checked. Those that can be reused are brought up to specification. Those that cannot be reused are replaced. When the product is reassembled and tested, it is ready for a second life, performing as new.

In many cases, improvements in a product may be made to increase its reliability, improve ease of maintenance, or add more sophisticated controls. In other cases, especially in electronics, remanufacture includes reconfiguration and reprogramming to match new customer applications.

2. WHY IS REMANUFACTURING IMPORTANT?

The significance of remanufacturing is that:

- It is a critical strategy in waste management, material recovery and sustainable manufacturing.
- It can help producers address the environmental, legislative and competitive pressures of modern manufacture.

Conventional manufacturing is unsustainable because of its significant adverse environmental impacts. Manufacturing generates more than 60% of annual non-hazardous waste and causes problems including pollution and shortages and therefore high cost of landfill space and virgin materials.

International legislation now aim to force manufactures to reduce the environmental impacts of their products and manufacturing process and to penalize them depending on the amount of waste they produce. Also, global competition requires organizations to reduce product price whilst maintaining quality.

Remanufacturing can help companies address these competitive, legislative and environmental pressures. For example it simultaneously improves competitiveness and limits environmental damage due to production by reducing production costs via reductions in processing and raw material usage. By integrating waste back into the production cycle it limits landfill and cost of waste disposal. [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

3. REENGINEERING IN INDUSTRY

Industries provide remanufacturing services for the hydraulic and mechanical components produced by major product lines. Remanufacturing services include: rebuilding, reconditioning, and restoring hydraulic components to original equipment manufacturer (OEM) specifications, or “like new” condition. Which provide an economical alternative to purchasing new components?

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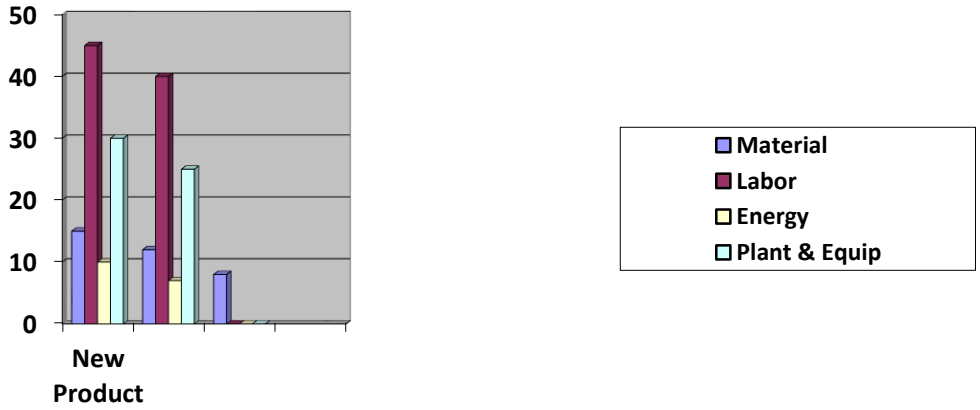
Remanufacturing services are geared to a variety of industries, including but not limited to:

- **Mining:** Heavy Equipment
- **Steel:** Forestry Equipment
- **Mobile Equipment**: Petro-Chemical
- **Transit and Railroad:** Small Machinery
- **Drilling:** Agriculture

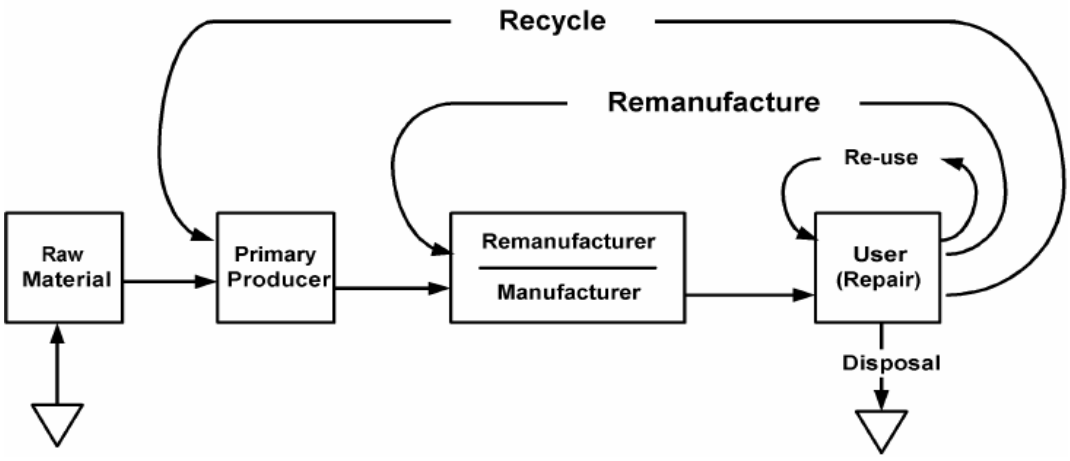
Material flow

This diagram describes the flow of materials through the cycle of manufacture, repair, reuse, remanufacture, and recycling of durable products. [2]

4. 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. In contrast, recycling shreds the product in an attempt to



recover only the material value. Little or none of the other residual values in the product are retained. [3]

Continuous improvement efforts have netted more than $1 million in operational savings in a matter of months. Cross-training initiatives have been successful, increasing labour flexibility by 30% and cutting premium labour hours by more than two thirds. A new quality program virtually eliminated product line variances and cut material damage in half. Lean manufacturing concepts have helped streamline warranty functions to cut processing intervals by 67% while simultaneously more than doubling throughput. [4]

5. REMANUFACTURING AND PRODUCT DESIGN

The importance of Design for Remanufacture in promoting remanufacture over recycling is that with old assemblies or equipment not designed for Remanufacture, it is seldom possible to do more than recover the materials, and even this process of recycling may be difficult and costly.

The chart above, compares remanufacturing with repair. The chart has been slightly updated to take into account new understanding as a result of this research.[6] The difference between remanufacture and other elements of 're' are therefore distinct in terms of its process and positioning within the material flows 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

6. THE FUTURE OF REMANUFACTURE

The information available on remanufacture and other reuse strategies has increased in the last few years and government sponsored activities would suggest that it is now being more seriously considered for its environmental and commercial benefits. It is however difficult to state whether the remanufacturing industry is in growth or decline, but it is can be seen that remanufacture is still marginal compared to the manufacturing sector.

7. CONCLUSION

Remanufacturing benefits the population through less post-consumption waste, lower energy and raw material consumptions, and lower prices for replacement products, it also benefits the industry through the generation of positive profits. While the gains of remanufacturing are shared among the society, the costs of remanufacturing-oriented technology are born solely by the original manufacturers. Consequently, public regulation is necessary.

As a consequence, the cost of complying with the regulation is redirected towards final good producers and consumers. Hence, original manufacturers can see their profits increase. This observation corroborates the Porter Hypothesis.

A social planner who wants to stimulate remanufacturing activities can consider allowing private collusion as an alternative to environmental regulation since it leads to a higher level of remanufacturability and, indirectly, to a larger supply of high quality remanufactured products. However, the social optimum can be achieved through the application of an environmental regulation that reduces the threat of the outsider and solves for the collective

Act on problem. If the social planner opts for this option, it should repress private collusions. When the variation in profits following the public intervention is interpreted as the industrial degree of cooperation with the regulation, original manufacturers will always offer stronger support, or lower opposition, when the technology choice is initially subject to free-riding.

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