REMANUFACTURING – A CHALLENGER OF ENGINEERING

Dinu DARABA, Marius ALEXANDRESCU, Marius COSMA

1Associate Lecturer Eng. and Economist, 2,3Lecturer PhD. Eng., North University of Baia Mare, 62A Dr. V. Babeş street, Romania

1ddinu_dmd@yahoo.com, 2mariusa_ubm@yahoo.com, 3marius.cosma@ubm.ro

Abstract: Remanufacturing is the activity which combines the profitability and the benefits of the sustainable development, through reducing the landfills and virgin raw material consumption, energy and specialized labour used in production. Remanufacturing should be approached under two aspects: the remanufacturing of the technological equipment that is during exploitation or in preservation, and which were not designed for remanufacturing and approaching the remanufacturing in the conception stage of the technological equipment.

Key words: remanufacturing, durable development, structure element, life cycle, etc.

1. INTRODUCTION

Remanufacturing is defined as an industrial process in which used products or products at their end-of-life are restored to a like-new condition. Through a series of industrial processes in a factory environment, a discarded product is completely disassembled. Usable parts are cleaned, refurbished, and put into inventory. Then the new product is reassembled from the old one, and where necessary with new parts, to produce a fully equivalent – and sometimes superior – in performance and expected lifetime to the original new product. Like-new quality is sometimes not enough to make remanufactured products attractive alternatives to new products. Therefore, the process of remanufacturing can be associated with upgrading, allowing the remanufactured product

Remanufacture returns a used product to like-new condition; it is a process of recapturing the value added to the material when a product was first manufactured. Remanufacture results in reduced energy and material use, and production cost reductions.

2. APPROACHING WAYS FOR REMANUFACTURING

The remanufacturing should be approached under two aspects, in the present world economic circumstances[3]:

1. remanufacturing of the technological equipment that were not conceived for remanufacturing, which are during exploitation or in preservation;
2. approaching the remanufacturing in the conception stage of the technological equipment.

In order to enhance the remanufacturing activity, a series of requirements are imposed for the technological equipment that are to be remanufactured, thus requirements have to be respected since the product conception and design.

These are the main characteristics necessary for a product to be remanufactured:

► those technological equipment parts which have not the properties of dissipation or breaking up, can be the object of the remanufacturing process.
► the required technology exists for bringing about the product to the original shape, condition and operability.
the original technological equipment was performed according to execution documentation, norm or standard, and it has interchangeable parts. Making competitive remanufactured equipment is the principal exam of the remanufacturing quality. The performance of the remanufactured products should be as good as the originals. The following is a common scenario within all the remanufacturing industry: equipment disassembling, parts cleaning, parts measuring and testing, remediation work, replacing unusable parts and subassemblies, waste recycling, reassembling. The remanufactured products are tested according to the original technical specifications. Researches show that up to 85% of the weight of the remanufactured products could be obtained from used components, and the quality of this kind of products is equivalent with the similar new products, but they require 50% up to 80% less energy to be carried out[5].

The remanufacturer should dispose of the necessary gear to execute the following operations:
1. collecting the core components;
2. inspection and verification of subassemblies;
3. sorting;
4. desassembling;
5. testing the parts;
6. remediation, repair and replacement of the parts;
7. reassembling;
8. testing and adjustment of operating parameters;
9. delivery;
10. guarantee enforcement.

The figure no.1 comprises the remanufacturing stages of technological equipment. Remanufacturing offers the manufacturers a method of avoiding the waste limiting penalties, concomitantly with the profit raising, because they profitably integrate waste back into the manufacturing cycle. For efficient capitalization of the technological equipment, after one exploitation cycle, it is necessary to approach the following aspects, in the research-design stage[1]:

► carrying out clear and precise assemble drawings;
► using standardized and normalized parts and subassemblies in the equipment design;
► proliferation of raw materials with broad usage characteristics;
► using components that are not affected by morale wear;
► standardization and typifying of the new parts and subassemblies;
► setting up remanufacturing norms since the early design stage;
► simulating different remanufacturing options of the technological equipment, even since the design stage;
► capitalization norms of the technological equipment, after life cycle end.

The technologic equipment manufacturers that have also the activity of used equipment remanufacturing, should set up an inventory of all the executed and delivered equipment, in order to have a database from which to be able to extract the information regarding a specific equipment, before it is sent to the metallic materials recycling centers.

3. THE REMANUFACTURE ADVANTAGES

Remanufacturing is associated with a number of benefits that can be classified into three categories:

Social benefits. Remanufacturing is a labour intensive operation compared to manufacturing. Remanufacturing changes the demand for raw materials to the demand for labour.
Remanufacture demands skilled labour, however 3rd party remanufacturers, face economic challenges. Reduced costs through an optimisation of the remanufacture process via activities which may include Design for Remanufacture may help the preservation and creation of jobs in remanufacture. Many small businesses face challenges such as costs[2].
**Environmental benefits.** Remanufacture has inherent positive environmental consequences. Generally, environmental benefits of product remanufacturing comprise extension of product life, saving of materials, energy, water and reducing waste in comparison with manufacturing of an equivalent product. Remanufacture views ‘waste’ as a resource. Promotion of remanufacture can therefore benefit both economy and environment[4]. Through reuse of resources, remanufacture leads to a reduction in landfill, pollution and natural resource use, which can preserve the quality of the natural and built environment. Air pollution is reduced by the remanufacture of products that would have had to be re-smelted or otherwise reprocessed in manufacture.

This technique asks whether environmental impact can be reduced by minimal use of materials, use of low impact materials, use of low impact materials, use of renewable materials, and/or use of recovered materials.

**Benefits for companies.** Remanufacturing is profitable for companies. Remanufacture is reputed to lead to increased profit and creates a demand for skilled employment. Historically, remanufacturing is a sort of environmentally friendly approach that works best on expensive products with long lifespan (locomotives, machine tools, aircraft engines, military equipment, automobile engines), which help to justify the costs of collecting, reconditioning and testing products[6]. But nowadays, remanufacturing is extended to a large number of consumer goods with short life cycles and relatively low values (home appliance, mobile phones, computer components, spare parts). Remanufacture can offer prosperous businesses opportunities to entrepreneurs and OEMs alike in conjunction with reductions in energy use and CO₂ emissions.

4. CONCLUSIONS

International differences in the practice of remanufacturing are driven by numerous factors including geography and culture. The historically independent countries and languages which make up Europe mean that OEM products are not spread evenly.

As in other industries, the more established the market, the higher the price for remanufactured products. Although remanufactured spare parts could be (and sometimes are) sold at 30-70% of the cost of new, remanufacture is shown to work best in markets when there is no discount for remanufactured items compared to new. In these cases the market has accepted the remanufacturer’s offer that its goods are as good as new.

Generally, in case of the technological equipment, the structural elements (body, frame, upright beam, diaphragm, etc.) that are the object of remanufacturing, are precisely processed during the manufacturing stage for a reliable functioning and with shape and dimensional modifications in prescribed parameters.

5. REFERENCE


