

## **Analysis of production planning activities in remanufacturing system**

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### **ABSTRACT**

This article examines the problem of uncertain quantities and quality conditions of used-products obtained from the customer-stream, third-party-stream & mixed-stream on remanufacturing cycle-time under three different remanufacturing resources policies. Simulation technique is used to model a remanufacturing system with uncertain quantities and quality conditions of used-products obtained from the customer-stream, third-party-stream and mixed-stream under three different remanufacturing resource policies. Findings show that the quantities of used-products either from the customer-stream or third-party-stream affect the remanufacturing cycle-time. For used-products form the mixed-stream, the percentage of used-products from the customer-stream greatly affects the remanufacturing cycle-time. The different remanufacturing resource policies also affect the remanufacturing cycle-time. It can be established and concluded that the performance of a remanufacturing system is affected by the uncertain quantities and quality conditions of used-products.

**Keywords:** used-products; remanufacturing; production planning; simulation.

### **INTRODUCTION**

Nowadays, used-products remanufacturing has become an important part of normal production activity in many companies. Some examples of remanufactured products are automotive parts [1, 2], agricultural machinery [3], PC tablets [4], photocopiers [5] and smartphones [6]. Remanufacturing aims to transform used-products or some of the components into a like-new condition. The process typically includes inspection & grading, disassembly, component reprocessing/replacement and reassembly & testing [7]. The performance of remanufacturing system is very crucial for surviving the competitive remanufacturing industry [2]; this requires optimize cooperation of the remanufacturing process steps [8].

In remanufacturing environment, there are several unique characteristics that further complicate the production planning and control activities [9-11]. These characteristics are (i) uncertain quality conditions of incoming used-products which are due to their different degree of usage, (ii) uncertain quantities of used products available for remanufacture, (iii) uncertain inspection yield of the used-products, (iv) uncertain disassembly yield of the disassembled components, (v) uncertain reprocessing effort of the disassembled constituent components, (vi) multiple types of constituents components, (vii) match and reassemble the same set of constituent components into a final product, (viii) balancing customer demand and supply of used-products.