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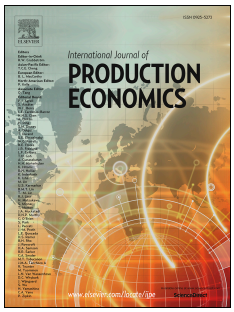

Subcontracting strategies with production and maintenance policies for a manufacturing system subject to progressive deterioration

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Subcontracting strategies with production and maintenance policies for a manufacturing system subject to progressive deterioration

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Abstract

This paper investigates the case of a manufacturing system subject to several progressive deterioration processes through an integrated model that seeks to determine the subcontracting, production and maintenance strategies employed simultaneously. The model is based on the premise that such deterioration affects several performance indices of the machine, centered mainly on the quality of the parts produced and on its reliability. When a machine fails, a minimal repair is conducted and preventive maintenance is available to restore the machine to initial conditions. The control policies indicate the production and preventive maintenance rates, as well as the amount of subcontracting required as a support measure to satisfy product demand. The main objective of the model is to minimize the discounted overall cost, which comprises production, subcontracting, inventory, backlog, preventive maintenance, defectives and repair costs. Hence, we develop a stochastic optimal control model, and numerical methods are used to solve optimality conditions in order to define the structure of the control policies. A

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