

## **Algorithms for Managing a Portfolio of Long Term Service Agreements (LTSA)**

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### **Abstract**

A Long Term Service Agreement (LTSA) is an agreement between a producer of a product and a customer. The agreement makes the producer responsible for maintaining and repairing the product in exchange for a fee, and stipulates customer's usage constraints. A producer typically sells several LTSAs and needs to manage them together. He needs to develop a coherent maintenance strategy for the products (units) based on reliability of its components (parts). The producer prevents costly breakdowns by periodically replacing the critical existing parts in the units with *new* ones. The removed parts are refurbished and made available for re-use. We find the optimum schedule for changing these critical parts from the units after identifying a period of time in the parts' usage-life during which they should be replaced to prevent breakdowns. The schedule is determined to minimize the total cost of inspection, repair, part-holding, and part purchasing costs. A flow-type integer-program formulation is developed and solved using CPLEX. Using the solution properties from CPLEX, heuristic solution for realistically sized problem is developed. Effect of stochastic breakdowns on a deterministic part replacement schedule is analyzed.