Materials Management for Repairable Parts

Repairables

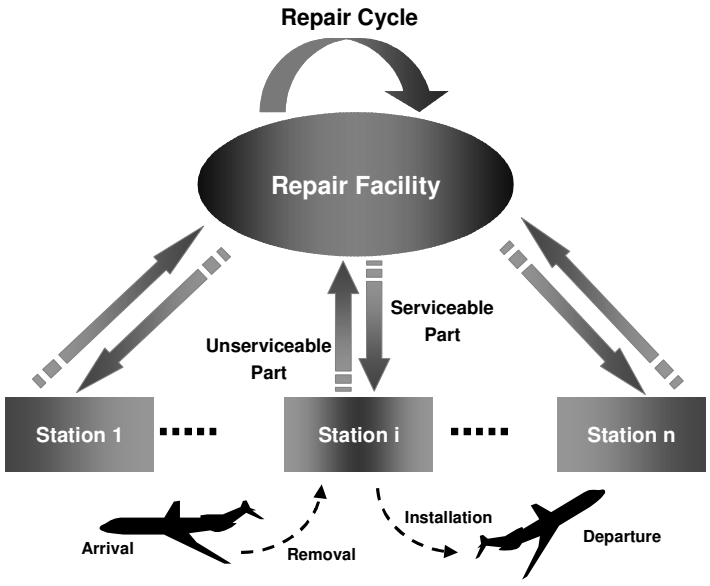
Air transport operators carry spare parts in inventory to support air operations. Some parts are economically justified to repair. Repairable parts – often called rotables if tracked during the unserviceable cycle – are among the most expensive aircraft pieces. Unserviceable parts are removed from operation, and are sent to a repair facility. Serviceable repairables are then taken from inventory and placed in operation. Decisions for managing repairables are considerably challenging and significantly impact the operation and financial positions.

Managing Inventory

Carrying excessive inventory is costly, while part shortages disrupt air operations. It takes detailed analysis to identify the appropriate inventory stock levels for repairables. Advanced inventory decision-support systems present a tremendous opportunity for air carriers to lower inventory costs and to optimize resources by right-sizing their inventory stock levels.

The state-of-the-art inventory planning for repairables employs multi-echelon inventory modeling. Inventory planning approaches not incorporating the multi-echelon structure result in inaccurate figures for inventory requirements and service levels. Multi-echelon inventory modeling provides scientific and reliable answers to the following questions:

- What is the optimal number of repairables?
- How should they be allocated throughout the operation network?
- Given a specific allocation scenario, what are the performance indicators (protection levels and fill rates) at the maintenance stations and the base?



Repair Distribution Network

Benefits

Recent research has led to substantial advancements and breakthroughs, both theoretical and applied, in inventory modeling for repairables.

(1) *Sloan Management Review article by Hau L. Lee, Stanford University, and Morris A. Cohen, The Wharton School, University of Pennsylvania:*

> "The benefits of this improved system [at a mainframe computer company] included the following:
>
> - a 25 percent reduction in the spare parts inventory investments, i.e., a savings of over ¼ billion dollars at selling price;
> - a 10 percent improvement in customer service; and
> - a $20 million reduction in annual operating costs resulting from personnel, expediting, and holding costs"

(2) *Management Science article by Stephen C. Graves, Sloan School of Management, Massachusetts Institute of Technology:*

> "The problem that we address is to determine the inventory stockage levels in a multi-echelon inventory system for repairable parts… We contrast this model with existing models for these systems… We show that this approximation is very accurate on a set of test problems… The METRIC approximation [existing models] results in a wrong decision 11.5% of the cases… The negative binomial [new approach] is even better. It errs in 0.9% of the cases."

Implementation

Putting into operation an advanced multi-echelon inventory system for repairables, based on the latest modeling technique, alleviates the regulatory concerns for lack of air operation support while reducing and controlling costs. The system development phase can take place quickly since our experts have successfully completed similar tasks. We have a structured way of developing, testing, and validating results that ensures the quality and applicability of our deliverable system. We will also train your staff, and will work with them to institute effective business processes for managing related activities, and doing so efficiently.

Even for large operators, PC is a suitable platform for developing a multi-echelon inventory management system for repairables. As certified carriers, air operators have to track certain information for parts. The decision-support system for materials management of repairables uses the existing information systems as the primary data source. The chief consideration is to utilize the available data to make better decisions concerning the investments in repairable parts and their usage, leading to lowering costs significantly while drastically improving performance.

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CA Advisors has a core expertise in aerospace and aviation, with a focus in the MRO-related areas. Our consulting services consist of a unique blend of academic expertise and practical hands-on experience in air transportation.