[Top 10 Examples of Product Support Success for Available Aircraft Demand Utilising Dispatch Service Spare Parts Pooling At Installations]

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Competing mission requirements between airwings, means aircraft availability must be secured by providing aircraft fleet with efficient component support.

Availability services in general & aircraft component support in particular, have been examined under such topics as split up demand, cost structure of availability services & benefits of spare part cache pooling implementation.

We reviewed major selection of past attempts at global spares pooling in order to gain insights and lessons that might be applicable to future aircraft programmes. Initially, the focus was on programmes with spares pooling involving fighter/attack aircraft.

Because there were so few examples of pooling for fighter/attack aircraft and so little information available on the ones that exist, we expanded our search to include other types of military aircraft.

Here we examine Cost/benefits of spares pooling mainly in the context of programme barriers for mission success. This report identifies three major mechanisms for cost savings from spares pooling:

First, consider scenario when there is an expensive part that rarely fails. With a number of units each possessing a relatively small fleet of aircraft, without pooling, each unit must retain some high-cost parts, no matter how small the fleet. With pooling, smaller number of these parts would need to be stocked because they could be shared among all units due to high reliability of the part.

Second, reduced variability from pooling particularly favours smaller air units because larger pool reduces relative lead time variability in relation to total demand.

Third, offsetting demand refers to each partner needing a specific part at different times, leading to some but not complete overlap of demand for the same part. This permits a pool to stock a smaller total number of parts than would be the case if all units stocked separately just for themselves.

However, this report suggests spares pooling also poses some risks. Different quantitative, economic, operational, and other methods were used to arrive at the conclusion business rules proposed for spares pooling initiatives in future variants posed three main risks for DoD:

First, prioritising the allocation of scarce pooled resources and ensuring security of supply

Second, distinguishing between technology innovative leaders/followers while maintaining configuration control and maximum standardisation

Third, identify "Free Riders" on the programme and address violations decisively

One of most important factors in airwing operation is availability of aircraft for scheduled missions, i.e. technical dispatch reliability. Dispatch reliability is kept at adequate levels by upgrade/repair functions.

Success is achieved by replacing failed units, i.e. aircraft components, quickly with functional units & repairing the failed units afterwards. Technique allows aircraft to continue operation immediately without waiting for repair work to be completed.

Demand for aircraft component availability services is usually split up. Airwings operate with disparate fleets from many installation hubs. DoD has strong interests in keeping spare units required by supporting fleets as close as possible.

In contrast, availability services stand to benefit from demand consolidation since demand is caused by random component failures. DoD cost pressures require efficiency improvements in availability services & must be performed without compromising dispatch reliability.

Airwing fleet structure has big impact on costs & demand split up of component availability services. Models can measure uniformity of airwing fleets & potential for achieving scale economies.

Considering one installation providing spare components for its operations in-house, the scale of its fleet determines cost levels of availability service. When several airwings operate in same region, scale of total fleet determines potential for achieving economies by cooperative arrangements between installations.

Models show deficits in commonality of fleets along increased fleet scale have been steadily increasing. Decreasing commonality causes extensive complexity in DoD processes, but increasing scale allows new levels of efficiency to be achieved.

Predominant availability service costs include ownership cost of spare units, originating directly from valuation/depreciation principles applied. Challenges in valuation of repairing components is that, unlike other capacity assets & disposable spare parts, components keep changing between capacity function & spare part function.

Components require different valuation/ depreciation rules: 1) Revenue generating function as common capacity assets 2) preservation of mission requirement function as spare components & 3) Situations when changing from one function to the other.

Availability models provide simple & feasible pooling arrangement with increased return of availability service costs if installation participants are willing to endure some delivery delays from a remote pool stock.

Installation pool participants experience higher service levels with lower cost but must wait for spare units longer compared to airwings providing its spare components in-house. Cost savings achieved by entire pool is determined by total fleet scale of cooperation implementation.

Pooling benefits under optimal conditions are generally higher when more demand for one component type is served by one pool. Conflicting interests between participating installations have the potential to result in less efficient pooling arrangements.

Primary causes of conflict involve issue of allocating availability service costs between pool participants, frequently complicated by split up spare component demand.

Deeper dives examining route creation implementing pooling are required to measure potential of each option to capture pooling benefits in availability service of airwing components against much variation in external conditions.

Our review of attempts to implement comprehensive spares pooling initiatives and programmes reveals results of efforts have been modest at best.

Most initiatives have stalled. The largest spares pooling efforts resulted in major challenges, including spares shortages and poor readiness rates, which ultimately led to the restructuring and renegotiation of the entire programme.

Some cases of spares pooling initiatives are generally considered to have achieved success. Successes are characterised by instances where remote installations do not have major design stakes in aircraft build events and fleets are relatively small.

So it is possible to maintain common configurations by requiring all installations to participate in upgrades and modifications since support cost/benefits far outweigh the extra cost of modifying aircraft to meet standard configuration.

While several attempts at asset-pooling programmes have been made, spares pooling programmes with larger installation scopes are rare and difficult to implement, especially for fighters and other combat aircraft. We were unable to identify any major successful historical fighter/attack aircraft programmes from recent decades that led to formal global spares pooling.

Most past historical attempts have been challenged by factors related to security of supply ie, demand prioritisation, configuration control and encouraging innovation leaders instead of followers, and also promoting advantages to innovation leaders, fleet build job site concerns, as well as other issues.

In order to achieve success, future spares pooling programmes must carefully review all critical issues and create strategies to mitigate risk. In summary, our assessment of historical cases of spares pooling with wide global scope resulted in the following high-level findings:

1. Negotiation of multi-partner spares pooling programmes for common major weapon systems has been attempted many times but have proven difficult to implement

2. Barriers include security of supply, prioritisation of scarce assets, configuration control and identification of innovators

3. Major challenges include conflicting, tech/economic interests & objectives

4. Most successful spares pooling programmes had single dominant partner to establish resource allocation priorities & control configuration

5. Successful programmes made major efforts to ensure transparency for all partners based on contribution & requirements

6. Specific policy measures for success include establishing special priorities for dominant partner to include control of all spares required for location-specific aircraft

7. Critical keys to success of configuration control & promotion of innovation include assumption of nonrecurring upgrade costs

8. Contract incentives to meet performance metrics/priorities require splitting out separate metrics for smaller fleets for priority service

9. Some factors cited for programme success may only work well when dominant fleet is principle customer

10. Some scenarios may not hold equally well for future programmes, particularly for aircraft subtype variants where dominance is not clear-cut.