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Perspective

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Tenets of MRO strategy for Airlines

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Abstract:

Global airline MRO (Maintenance, Repair and Overhaul) is a $ 38 billion industry, growing modestly @ 3-5%. The four broad parts of MRO are, Line maintenance, Engine overhaul, Airframe, and Component repairs. Currently the MRO market is dominated by OEMs (Original Equipment Manufacturers like, EADS, Boeing, Honeywell and engines manufacturers like GE, Pratt and Whitney, Rolls Royse), major airlines, and independent third party operators. As the engine overhaul as well as airframe work is labor intensive work, such jobs are being outsourced from USA, EU to East Asia, Eastern Europe, and Latin America. Driving maintenance costs down, faster turnarounds, increasing aircraft utilization, at same time increasing reliability and operational integrity, constitute core of MRO business from airline point of view. MRO expenses @ 10% of total costs are the second highest cost item for airlines after fuel. In spite of this, so far airlines have conservative approach in driving MRO costs down.

According to Infosys, M&E in 21st century calls for a new breed of white collar third party IT providers who can assist airlines to source PMA parts cheaply, build B2B platforms between airlines with identical aircraft type or distribute the MRO work on behalf of the airline, to most efficient providers. The new generation M&E systems, backed by IT, can allow service providers to depackage and repackage the contents of the maintenance check and distribute it across network, to offer 30%-40% savings in costs.

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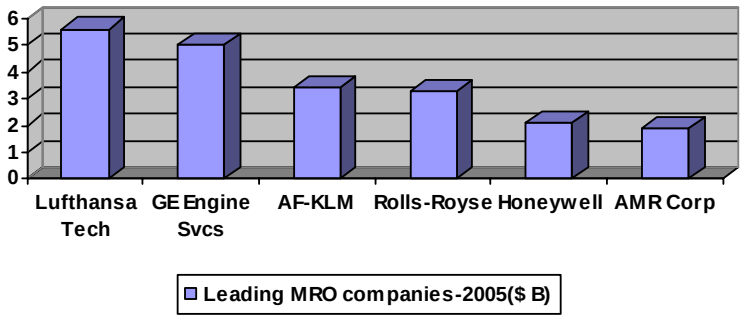
Introduction

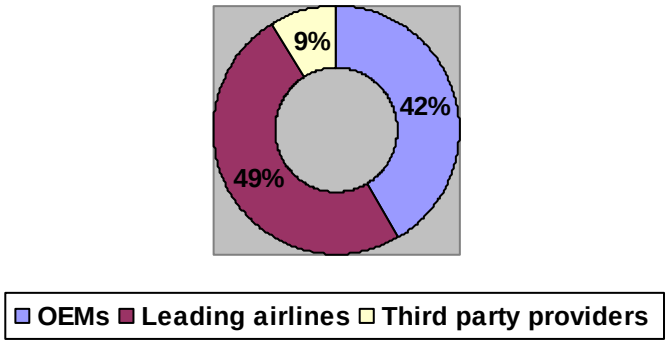
Airlines are required to spend ten man hours for ground maintenance of an aircraft for each flying hour. The time frame for maintenance procedures is based on a combination of the number of hours the aircraft flies, the number of take-offs and landings (referred to as "cycles"), plus the age of the aircraft. With such labor intensive nature of MRO, it is not surprising that most of the leading MRO companies, aircraft engine OEMs as well as almost half of US based airlines have outsourced heavy maintenance work. Yet, many airlines continue to subsidize their in house MRO operations, in name of safety. What are other tenets that will continue to be relevant for airline MRO in near future?



Boeing's revenues from technical services, modifications, maintenance services, flight checks and spares are estimated to be $ 4.5 billion. However Boeing does not provide separate breakup of such revenues.

The OEMs and leading airlines who have substantial in house maintenance work, constitute majority of MRO market. Third party contractors, many of which are owned by airline consortiums have niche share, which is expected to grow at faster pace. Analysis of top 30 MRO companies reveals that over 90% of market share is with the OEMs and major airlines.

OEMs have almost 40% of MRO share



Brief explanation of airlines' maintenance check procedures, are as follows.

"PS" Daily Checks

Every aircraft is checked every day in its "PS" (Periodic Service) check. The aircraft is visually inspected and its maintenance log book is checked for entries and maintenance needs. PS check averages approximately two man-hours.

"A" Check

The "A" check is more detailed than the "PS" check. "A" checks are performed roughly once a week (approximately 60 flight hours). The "A" check is performed at one of many stations around system, when aircraft is on ground for long time. “A check” averages 10 - 20 man-hours.

"B" Checks

The "B" check is an even more thorough maintenance check. The "B" check is done approximately once a month (roughly 300 - 500 flight hours). Besides specific service performed on the aircraft, a detailed series of systems and operational checks are performed. Unlike A check, airline always performs "B" checks inside one of its hangars. "B" check requires approximately 100 man-hours on narrow body aircraft (those with only one aisle) and approximately 200 - 300 man-hours on widebody aircraft (those with two aisles).

The "C" check

The C check is the most thorough type of maintenance work performed by an airline. C check comes every 12-18 months, after aircraft flies for an average 3500 to 4000 flying hours per year. During C check, the airframe - virtually the entire aircraft - goes through an exhaustive series of checks, inspections and overhaul work. C check is performed at Airline’s heavy maintenance and engineering centers. There are different levels of "C" checks depending on the type of aircraft. Airlines do two types of "C" checks on narrow body planes. The first is a "Light C" check, which occurs approximately once a year. It requires approximately 2,100 man-hours and three days to accomplish. Subsequently, every fourth "Light C" check becomes a "Heavy C" check. Due to complexity of widebody aircraft, all "C" checks are classified as "Heavy C" checks. Such complete airframe inspection and service is done every 15 - 18 months. A widebody "C" check takes approximately 20000 man-hours or four to six weeks duration.

Functional classification of MRO, Engine overhaul, Airframe, and Components repair

Engine Repair, and overhaul

- Airlines now typically enter into agreements on Engine overhaul, and repair, with engine manufacturers like GE, Rolls-Royse, Pratt & Whitney, while purchasing aircraft, or buy a service in "spot market".
- GE has reduced engine overhaul shops in N. America from 5 mill sq ft in 2001 to 2.8 mill in 2005, closing two plants in California, and Dallas/Ft Worth.

- With more reliable CFM 56-5, and -7 engines, which power A-320 and next gen 737, engines can run much longer without any servicing. Engine OEMs often enter into engine overhaul contracts with diagnostic element, taking stake at the airlines' engine overhaul shop.
- Engine overhaul requires heavy financial investments but does not require high labor content, as airframe work. Hence most airlines keep their core competency in engine overhaul in house.
- Engine OEMs increasingly offer “power by the hour” deals, which are an effective way for airlines to outsource engine maintenance to OEMs.
- Airlines often complain that the engine OEMs, raise spare parts prices, each year, while the engine OEMs argue that now engines are sold at such tight margin, that they have to make profits over the life time, through sales of spares.

Airframe

- Usually associated with heavy maintenance checks like C, D checks(a check for freighters) , with significant labor component; such a check is due after a specified number of landings, called as cycles or over 3500 flying hour time , which ever is earlier.
- Airlines plan to do such jobs in house or tie up with MRO companies in advance, for long term contracts.
- As per Infosys view, there is no economic sense to invest in heavy maintenance workshop unless the airline has more than 25-30 aircrafts. Airlines like Southwest, FedEx, in spite of having over 400 aircrafts, are long term customers of a third party MRO provider, Goodrich ATS.
- It is predicted that more and more Airframe jobs will shift to Latin America, Eastern Europe, and East Asia, (China, Taiwan, Singapore) due to labor cost arbitrage.

Components Repair

- Usually associated with avionics, and line maintenance.

Tenets of an ideal M&E (Maintenance and Engineering) Strategy for an airline:

As per Infosys view, the broad tenets to save on MRO costs and achieve high level of integrity are,

i. ***Reducing spare parts inventories:*** Airlines must reduce inventory costs of aircraft spares. Airline industry is estimated to be have inventories of $ 50 billion in aircraft spares, most of spare parts have poor turnover ratio. Airlines categorize the store items into four types;

   a. TL0 are the items that are replaced without any repairs work order, no time or location is recorded.

   b. TL1 are repaired, but no Time, location is maintained.

c. TL2 are repaired, location is maintained but time cycle is not maintained.

d. TL3 are repaired, location is maintained, also time cycle is maintained. TL3 are the high cost as well as important items, which are stacked for 3 days before they are sent for repairs in workshop.

Thus an airline has to achieve a trade off between value/cost of a part versus cost of tracking it. Supplier managed inventories that greatly integrate into airline supply chains can reduce lead times to supply spare parts.

ii. ***Accessing common spare parts inventories between airlines:*** Airlines can have a virtual pool spare part inventory with alliance members or partner airlines, with identical aircraft type. Occasionally, airlines do help each other out, in times of crisis. AeroXchange, an IT system which facilitates such virtual spare parts inventory was founded in 2004 by 13 airlines, has now 33 members. Another software, AeroAOG allows airlines to search for a crucial part in a AOG (aircraft on ground) situation, keeps track of parts borrowed from or loaned to other airlines, with transfer costs. AeroSourcing, is an online tendering process for purchase of commodity parts like gaskets, clamps, brackets, etc. Infosys offers to integrate such B2B IT platforms within airline groups to bring down inventory carrying costs for airlines.

iii. ***Explore option of PMA parts:*** The PMA program (Parts Manufacturer Approval) has approval of FAA, and allows private companies to apply for authority to produce spare parts as replacement for generally more expensive parts from OEMs. PMA approval consists of design, and production approval enabling their use on FAA approved as well as worldwide aircrafts. Today, more than 2000 PMA holders, are manufacturing spare parts, comprising annual sales of $250 million, which constitute less than 2% of total MRO replacement market of $ 13 billion. Airlines can save 25-30% on PMA parts as compared with OEM parts. The PMA parts range from simple nuts and bolts to air foils, and fuel pump gears, and more complex parts like landing gear, engine parts like compressor blades, turbine veins, hydraulic, pneumatic, and electromechanical, avionics, interior parts.

iv. ***Reducing % NFF on components:*** NFF (No Fault Found) are the items removed by Line Maintenance which are in fact good. As per ICAO study, 40% of components that are removed by Line Maintenance show no failure when they are brought in the workshop. The objective is to avoid inducting components into the repair facility unless it can be confirmed that the replacement of the component did in fact rectify the discrepancy. Airlines estimate that the cost of NFF is US $ 100,000 per aircraft per year. What are the additional costs associated with NFF?

a. Aircraft engineers' time, Workshop engineer's time

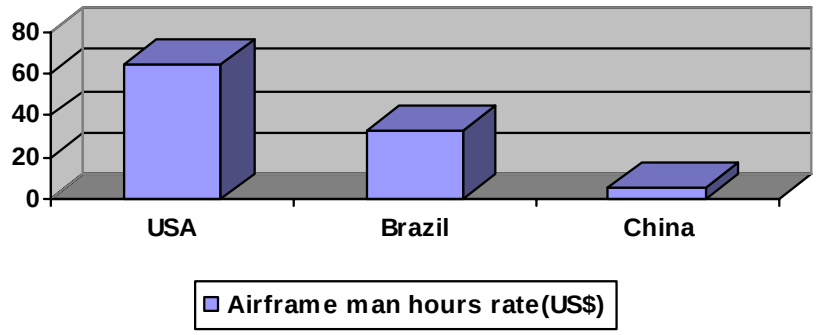
b. More inventory costs as more number of spares will be necessary for storage

c. More Trace and Analysis of removed parts

d. Potential aircraft delays, as real snag is never diagnosed

The reasons for NFF may be quite complex such as, Software issues, Bad design of a component, which leads to its modification, Bad design in aircraft installation which necessitates aircraft modification or Nuisance messages due to transient conditions.

v. ***Outsourcing MRO to cheaper destinations:*** Despite the resistance from labor unions in USA to protect maintenance jobs, as per data from DOT, airlines in USA have reached over 50% mark in MRO outsourcing. Based on current labor costs, airlines in USA can potentially save $ 1 million per aircraft per year on MRO costs, by outsourcing.



Towards an integrated M&E strategy:

Maintenance Planning System enables Engineering and Maintenance to plan, schedule, execute and monitor aircraft and component maintenance tasks. There are 6 distinct sections in Maintenance Planning System namely, Aircraft Management, Component Management, Modification Management , Inspection Management, Maintenance Management and Auxiliary functions Management. MPS assists Airline to satisfy airworthiness requirements as specified by the Civil Aviation Safety Authority.

Maintenance planning is traditionally, considered as a pure M&E (Maintenance and Engineering) activity and aircraft scheduling is considered purely as a Commercial activity. These two domains are often at cross roads of each other. Such conflicts are common between “Air time” , time that aircraft is flying in air, and “Ground time”, time that is consumed for “on ground” checks. The Commercial requirements dictate that flights have desirable morning arrival and late evening departure slot timings, requiring considerable aircraft idle times, apart from night stops, while M& E requires aircraft returns to base, within minimum turnaround time. Within such constraints, if average aircraft utilization can exceed 12 hours per day, airline can bring down costs per ASKM (Available Seat Kilo Meters), leading to a competitive advantage. According to Infosys view, an airline with agile maintenance strategy needs to carry out MRO work on equalized basis, i.e. on a day to day basis, during aircraft idle times, night stops, rather than accumulating all work to be carried out at its engineering base, when major checks are overdue. Such practice of “doing right checks at right time”, ensures that MRO work does not accumulate, and time taken for major check is reduced. For example, the “periodic service” and “A checks” may be done at places where aircraft rests for commercial reasons, including night stops. This will call for a total transformation of M&E policy, and possibly lead to outsourcing of such checks to partner airlines or independent MRO providers, away from airlines’ engineering base. As per Infosys view,

airlines can achieve improvement in aircraft utilization per year by creative M&E policies, reduce MRO expenses by integrating IT platforms between partner airlines, and finally outsourcing heavy engineering work to take advantage of labor arbitrage.

About the Author

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