THE AIRLINE GUIDE TO PMA

A Presentation To:

PMA Parts & DER Repairs as Market Forces
in Commercial Aviation O&R - 2009

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by

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Introduction

The OEM World – A World Without PMA

The Rise of PMA

PMA Approval Process

Some PMA Issues

PMA Implementation - Best Practices

Conclusion

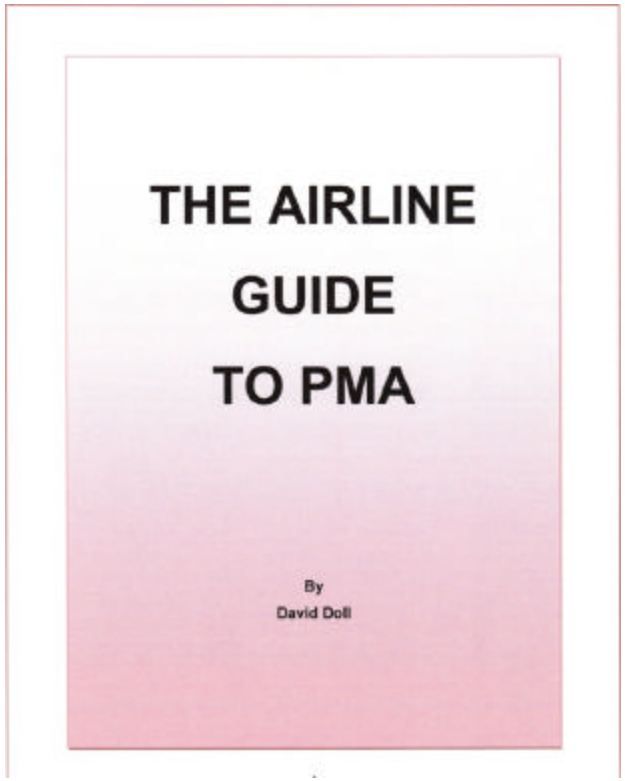
Lack Of Knowledge Still Hinders PMA Market Growth

- **PMA usage tends to increase with knowledge about PMA.**
- **PMA knowledge varies widely within the airline community.**
  - **North American airlines are the most knowledgeable.**
    - **All major airlines have a PMA program.**
    - **Lack of knowledge about FAA certification strength slows down acceptance process because many airlines believe they have to recertify every part.**
  - **PMA acceptance is variable in Europe.**
    - **There have been some large successes.**
    - **Many carriers still do not perceive that PMA parts have comparable quality to OEM parts.**
  - **In Asia interest is high, but knowledge is low.**
    - **The language barrier makes it difficult to gain knowledge quickly.**
    - **Knowledge of the PMA certification process is lacking.**
    - **Airlines do not understand how to incorporate or manage PMA.**

Acquiring knowledge about the PMA process is difficult for airline personnel.

The Airline Guide To PMA Seeks To Improve The Airlines' Level Of Knowledge About PMA

- I have been working on a resource to increase confidence in PMA.
- The Guide is a source book on PMA for airlines.
- Every attempt was made to provide a comprehensive, accurate and easy to read document.
- The Guide is available as both a text booklet and in presentation form.
- Download the guide free from my website (www.ddollconsulting.com).
- Improve the guide by sending me new information or ideas for improvement or translations. (ddollpe@foothill.net).



Increasing airline knowledge about PMA will increase airline demand for PMA

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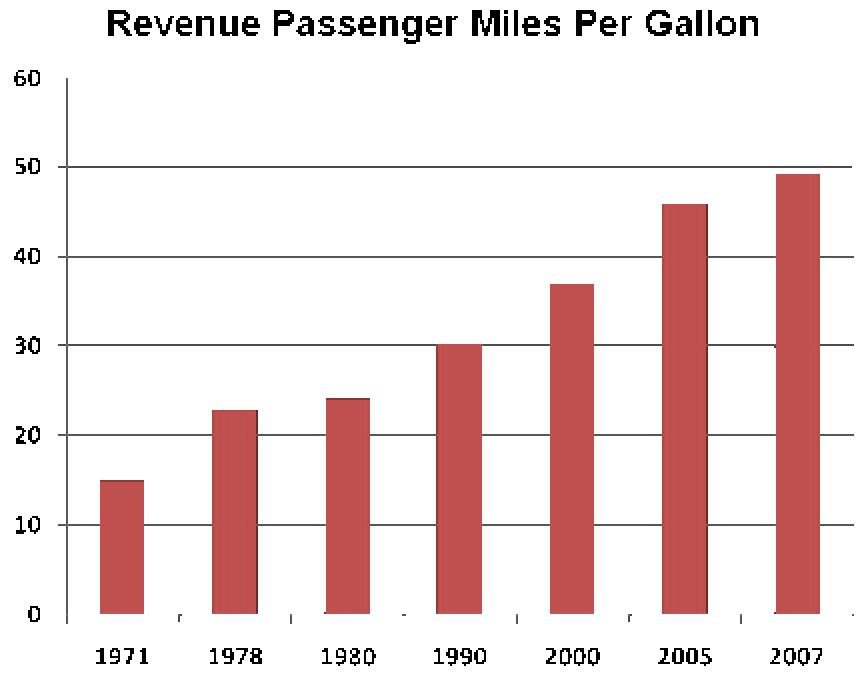
OEMs Have Provided a Continuous Stream of New And Valuable Technology to the Airlines

- **Each new generation of aircraft improves fuel efficiency by about 20%.**
- **The benefits of new technology are substantial as fuel is currently between 35% and 50% of airline operating expense.**

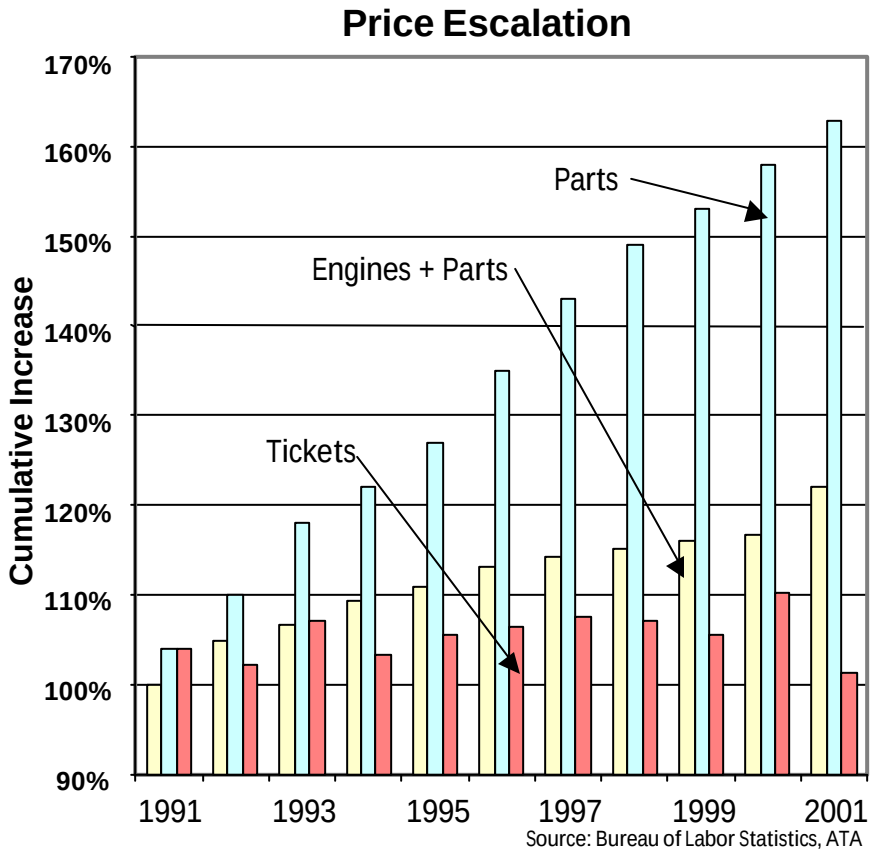


Source: ATA

If this industry is to continue to receive a stream of new and better products, OEMs must receive an adequate return on their investment.

However, the OEM Business Model Requires Continuously Raising Spare Part Prices

- **The sale of spare parts pays for OEM engine programs and provides the profits.**
- **Airlines don't remember that they bought the engines at cost.**
- **Airlines compare the OEM ability to raise part prices with their own inability to raise ticket prices.**



It's Dangerous To Appear On the Financial Radar Screen of Airline Senior Management . – OEMs have become very visible.

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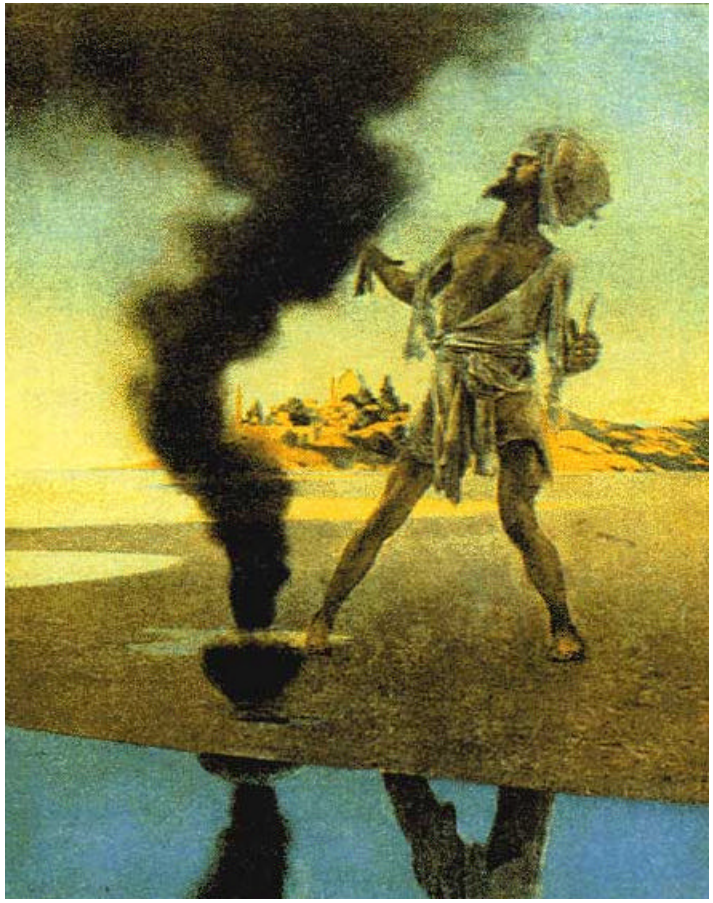
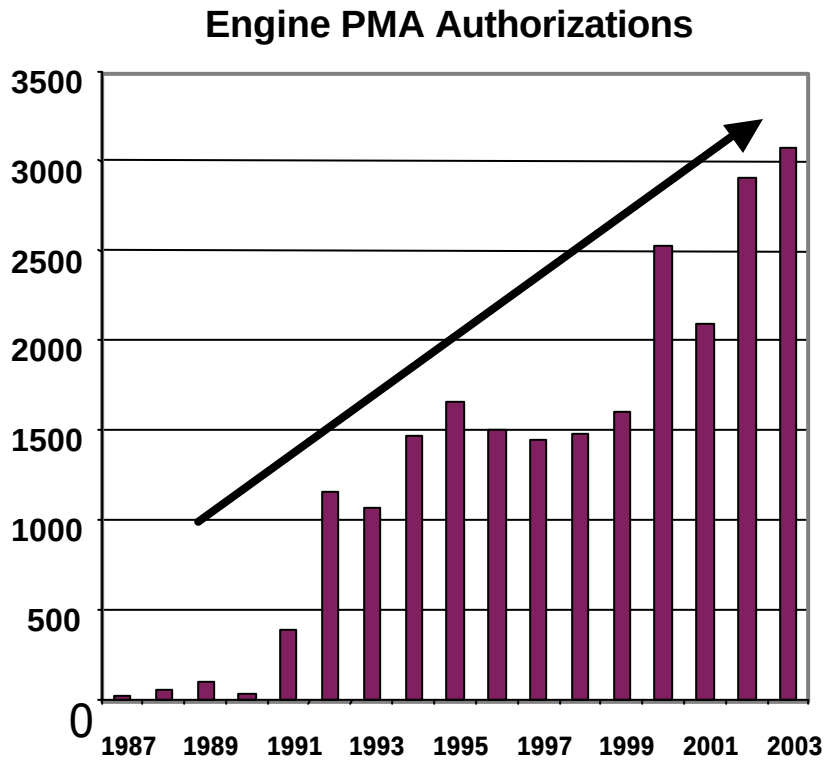
Several Factors Have Reduced The Barriers To Spare Part Competition

- **Historically, lack of airline acceptance combined with the strict regulatory environment and strong OEM opposition have limited PMA usage to the low risk margins of the spare parts market.**
- **FAA actions to eliminate unauthorized parts in the 1990s actually improved PMA credibility.**
- **OEM streamlining efforts released talent and capacity into the parts manufacturing market.**
- **The OEM price escalation built a large gap between part prices and manufacturing costs that attracted entrepreneurial talent and capital.**



PMA Is Now Solidly In the Aviation Mainstream

- **The success of PMA suppliers in providing all components of the value trio (GOOD, FAST, CHEAP) to airlines has moved PMA from the margins to the mainstream.**
- **Industry consolidation has resulted in large PMA organizations with the technical competence required to develop and support a wide range of products.**
- **MARPA provides an industry support structure to further PMA growth.**



PMA has the potential to achieve a market penetration of about 15%.

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PMA Is The FAA Standard For Approved Replacement Parts

- FAA regulations require that any person producing replacement or modification parts for sale for installation on a type-certificated product must get a PMA.
- The regulations list a number of exceptions to the PMA.
  - One time only STC
  - Existing Production Approval holders (OEMs)
  - Aircraft owners or operators
  - Air carriers (OPPORTUNITY TO SAVE MONEY)
  - Certified repair stations
  - Standard parts (ANOTHER OPPORTUNITY TO SAVE MONEY)
  - TSO

PMA is the standard for replacement parts. The OEM is just one of several exceptions.

PMA Certification Standards Are the SAME As Those Used For the Original Product

- **At the start of the process the PMA applicant must identify the applicable airworthiness standards for the part.**
  - **The airworthiness standards are exactly the same standards as for the OEM part.**
  - **If you want to produce a PMA part for a manned free balloon, you must meet all of the applicable requirements of 14 CFR, Part 31, AIRWORTHINESS STANDARDS: MANNED FREE BALLOONS!**
- **The PMA applicant must use one of three methods to prove that the PMA design meets the certification standards.**
  - **Identicality with a license agreement**
  - **Identicality without a license agreement**
  - **Test and computation**

The standards met by PMA are not just comparable to the OEM standards, they are exactly the same standards!

The FAA Uses a Risk-Based Approach To Assess PMA

- **The approval process requires a detailed assessment of the potential risk of the proposed PMA application.**
  - **The applicant must provide a failure modes and effects analysis of the PMA part.**
    - **Every way the part can fail in service is detailed.**
    - **The consequences of each failure mode is assessed.**
  - **The process is also repeated for the next higher assembly.**
  - **Based on the analysis the part is classified as critical, important, or neither critical nor important.**
- **The FAA also wants to know the service history of the proposed part and will not approve a PMA for an OEM part with unresolved problems.**
  - **Airworthiness Directives**
  - **Service Difficulties**

The airworthiness standards along with the potential criticality of the part guide the level of scrutiny for the FAA evaluation of the PMA design.

A Certification Plan Is Strongly Recommended By the FAA For Important, Critical, or Complex Parts

- **A Project Specific Certification Plan defines what is required in an acceptable plan to develop test data to support the PMA design.**
  - **Test purpose**
  - **Physical and functional description of test article and setup**
  - **Number of test units**
  - **Test conditions and duration**
  - **Test success and failure criteria**
  - **Test instrumentation and data collection**
  - **Control of test procedures**
  - **and more…**
- **In contrast OEMs are required to test the high level product, not individual parts. 5 to 7 years in service required for design to "mature".**

The work that goes into the PMA design certification process follows industry best practices for product testing.

The Fabrication Inspection System Closes The Loop

- **The PMA part must have more than a good design. The suppliers must also demonstrate their ability to meet the high standards required for aerospace manufacturing. These standards are identical to those required for the OEMs.**
- **The FAA defines the standards for the supplier Fabrication Inspection System then audits to ensure that they are met.**
  - **Materials must conform to part design specifications.**
  - **Processes affecting the quality and safety of the finished product must be accomplished in accordance with acceptable specifications.**
  - **Parts must be inspected for conformity to design.**
  - **Major changes must be controlled and approved.**
  - **Inspection records must be maintained and identified with the completed part.**
  - **and more…**

PMA isn't going to be produced in anyone's garage.

Aftermarket Support Requirements For PMA Parts Are Also Identical To Those Of The OEM

- **PMA suppliers must provide inspection and repair instructions for their parts.**
  - **Many simply rely on OEM instructions because the PMA part is identical to the OEM part.**
  - **If the PMA part is different from the OEM part, or the OEM does not provide instructions (increasingly common), the PMA supplier must provide and maintain these instructions.**
- **MARPA has worked closely with the FAA to develop the Continued Operational Safety plan now required for PMA parts.**
  - **Detailed records associating each part to its manufacturing process**
  - **Methods to identify causes of failures and corrective actions**
  - **Means to carry out these actions quickly**

Historically OEMs have had the edge here, but PMAers are catching up.

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PMA Is Currently A Problem For Lessors

- **PMA can block some aircraft transfers because not all regulatory agencies and not all airlines will accept PMA.**
  - **The FAA now has bilateral aviation safety agreements with 39 other countries providing virtually seamless approval of PMA.**
  - **Airline acceptance of PMA is growing as confidence in PMA increases.**
  - **The problem of transferability is rapidly decreasing.**
- **PMA may reduce aircraft value because PMA parts cost less than OEM.**
  - **Purchaser buys a capability at market value. A few safe and legal PMA parts on an aircraft or engine do not affect this capability.**
  - **When an aircraft or engine is parted out, used OEM parts will have little more value than used PMA parts. These parts will become commodities.**
  - **This problem as well should decrease over time.**

Airlines that want PMA should estimate the potential savings from PMA and press a potential lessor for that level of savings on the reserve.

OEMs Claim That Lookalikes Never Perform Quite Like The Original Or That PMAers Miss System Effects

- **PMA parts have an excellent track record for performance and reliability.**
- **I conducted an Airworthiness Directive comparison between PMA and OEM.**
  - **Reviewed ADs from 1992 to present – the period of rapid PMA growth.**
  - **Focused on the ADs for engines because they contain the greatest percentage of important and critical parts.**
  - **Since 1992 there were 286 ADs generated by the FAA to address engine problems caused by OEMs.**
  - **Only 3 ADs even listed PMA parts – 2 were OEM clones included on an AD written for the OEM. (*Problem was that the lookalikes did perform quite like the original.)***
- **2008 FAA Repair, Alteration, and Fabrication study**
  - **Prompted by persistent OEM lobbying.**
  - **FAA "…*did not find substantive evidence of failures or unsafe conditions…*"**

CONCLUSION: PMA PARTS ARE AS SAFE AND LEGAL AS OEM PARTS. AN AIRLINE ASSUMES NO ADDITIONAL RISK WHEN USING PMA

OEMs Threaten Not To Honor Warranty If PMA Is Used

- There are basically two types of warranty
  - New product warranty
    - Covers all material for specified period of time.
    - This warranty is not an issue because nobody would buy PMA when free material is available from the OEM.
    - The warranties, however, should include a warning:

Be prepared for a shocking increase in maintenance cost when these warranties run out!

  - Extended warranty
    - Defined by contract which is enforceable under law.
    - Typically part cost prorated against some time limit.
    - May or may not have much value relative to PMA savings.
    - PMA part warranty may be better than OEM warranty.

Read your warranty to know your rights and the OEM's obligations. These cannot be arbitrarily changed during the term of the contract.

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PMA Implementation Best Practices

- **Your PMA program must have senior management involvement if you want significant savings.**
  - **Senior management provides resources and sets expectations.**
  - **Senior management protects PMA against OEM price reductions.**
  - **Senior management involvement sends a signal to OEMs, "Your market share will decrease as fast as your prices increase."**
- **Interdisciplinary approach is required – no one organization sufficient.**
  - **Supply**
  - **Purchasing**
  - **Engineering**
  - **Quality Assurance**

Most of the process will revolve around the purchasing and engineering organizations.

Supply & Purchasing

- **PMA is a strategic effort that works to moderate the growth of material costs in the future.**
  - **Go for the gold! Understand where your money is being spent now, and establish a hit list of PMA targets.**
  - **Set up attack plans to provide some quick wins with easy applications and follow on with big wins on high impact parts that combine high cost and high volume.**
- **Leverage efforts by starting with quality PMA suppliers and suppliers that offer many items on your hit list.**
  - **Why use resources to review part designs if the seller doesn't meet your financial criteria?**
  - **Fewer suppliers reduce the vendor management overhead.**
  - **Niche suppliers with high impact offerings are exceptions.**

Good suppliers are the key to a successful PMA program.

Alliances Can Move The Program Forward

- **Alliances with a PMA supplier can be beneficial.**
  - **Supplier commits to develop parts from your high priority list.**
  - **Airline commits to purchase parts for specified period of time.**
  - **Airline gets low cost parts sooner.**
  - **PMA supplier gets guaranteed market.**
- **Competing suppliers against one another wastes resources and minimizes savings.**
  - **Large savings come from difference between PMA price and OEM price for a part.**
  - **Savings produced by switching PMA suppliers is minimal.**

Use Engineering Resources Efficiently To Avoid Bottlenecking The Approval Process

- **The FAA approves PMA, and no further approval is legally required.**
  - **Airline must ensure that it only installs FAA approved parts.**
  - **All PMA parts are FAA approved.**
- **If airline policy requires a technical approval, you need to maximize scarce engineering resources.**
  - **Use risk-based approach similar to the FAA.**
  - **Develop part approval templates that cover families of parts.**
  - **Review PMA supplier substantiation methods, and reduce airline review effort on suppliers that have already demonstrated competence in part families.**
- **Piggyback on what other airlines have already done.**
  - **Ask supplier for part experience on other airlines.**
  - **Check with other airlines to see what PMA they are flying.**

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Use The Guide To Combat The FUD That Slows Down PMA Approval

- **The Guide has been designed to combat the fear, uncertainty, and doubt that prevents many airlines from adopting PMA.**
- **The information provided in the guide is designed to remove all doubt about the quality and safety of PMA parts.**
  - **Thorough, but easy to read description of the substantiation and approval process.**
  - **Actual industry performance results.**
- **Best practices for PMA implementation enable an airline to avoid wasting time in achieving savings.**
- **Lists PMA suppliers and resources available to help the airline.**
- **The Airline Guide To PMA is available free of charge from my website www.ddollconsulting.com.**
  - **Copy and distribute it at will.**
  - **Feed back to me any changes you would like to see.**
  - **Don't delete my contact information.**