

There is widespread resistance to the use of PMAs by lessors and financiers in their aircraft & engine assets. There is an almost complete ban on the use of PMAs in engines, while the use of parts in interiors is more relaxed. The rationale behind attitudes to PMAs is examined.

Lessors' & financiers' attitudes to PMAs

There remains widespread resistance to the use of Parts Manufacturer Approval (PMA). PMA parts are manufactured by third-party providers as alternatives to parts provided by the original equipment manufacturers (OEMs). There is nothing new about the use of PMAs for airframes and engines. Indeed, the US Federal Aviation Administration (FAA) has been granting such PMA approval to manufacturers for several decades.

PMA advocates claim they offer average cost savings of at least 30%, and in excess of 60% for some parts. Given the cost pressures faced by most airlines, it would be reasonable to assume that any way to reduce cost would gain traction with them as long as safety and reliability are not compromised. This article assesses the reasons why the use of PMA parts is not growing in popularity as fast as might be expected, and focuses particularly on the concerns of the leasing community, which now accounts for over one-third of new narrowbody aircraft deliveries.

According to a survey of airlines by aviation consultancy ICFI SH&E at the end of 2011, major impediments to the growth of PMA parts were leasing companies, followed by the OEMs themselves. Other reasons mentioned in the survey were corporate culture as well as regulatory concerns.

Safety issues featured fairly low on the list of concerns and were grouped

under 'other concerns'. While safety is largely outside the scope of this article, there is now little disagreement on this, since regulatory authorities, and the FAA in particular, have done significant work to allay any fears. Indeed, the FAA has issued a special airworthiness information bulletin saying that it is not for OEMs to say that installation of PMA parts is wrong. OEMs therefore rarely use safety as an argument against PMA parts. Furthermore, given that many major airlines, including Germany's Lufthansa, have embraced PMA parts, there are no longer any credible reasons to be concerned about safety.

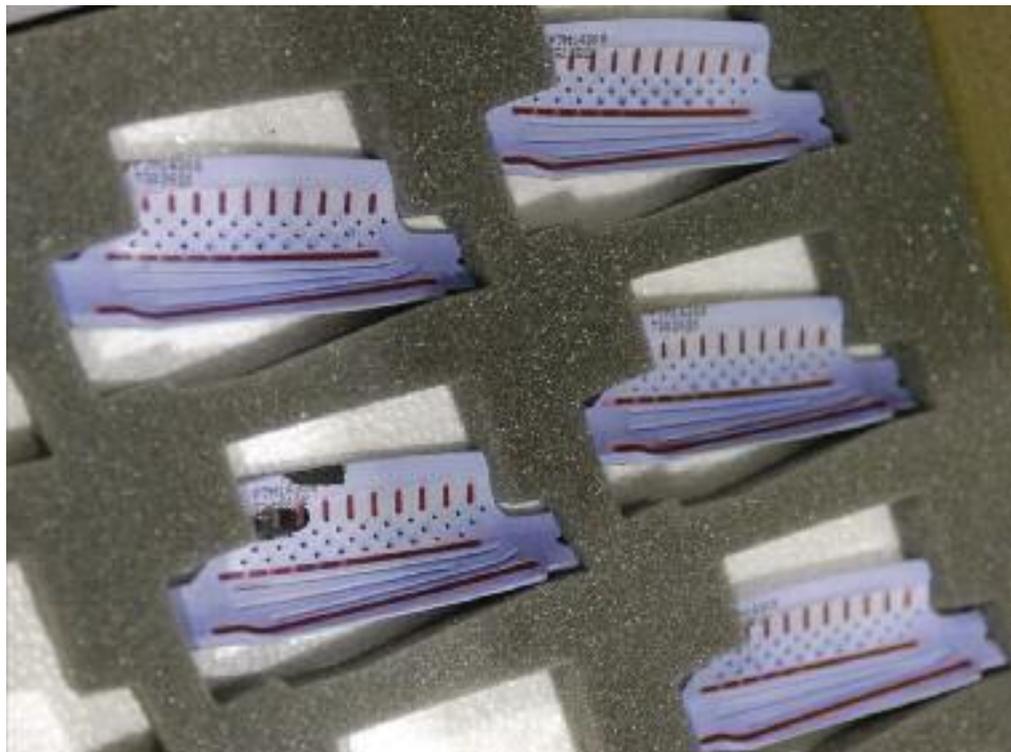
Acceptance of PMAs

While airline customer attitudes towards PMAs have gradually improved

over recent years, not least due to cost-reduction pressures, not all airlines have embraced their use. Major operators that keep and maintain their aircraft for long periods have generally been more likely to favour PMAs, while those that only keep aircraft for the first maintenance cycle have shown less interest. Low-cost carriers (LCCs), which lease a larger proportion of their fleets than legacy carriers, have been more hesitant, not least because they often need to dispose of aircraft after seven years, and in some cases are concerned that PMA parts might impact their ability to remarket the aircraft.

Acceptance of PMA parts also varies by geographical region. According to ICFI SH&E, the greatest level of penetration is in the USA, where PMA accounts for just 3% of the total parts

While some PMA manufacturers claim savings of up to 60% over the equivalent OEM parts, there has been only a gradual acceptance of PMAs. Airlines in particular that keep a large portion of their aircraft on a short-term basis, and acquire many of them under operating leases, are particularly resistant to using PMAs.



market. This is followed by Europe and the Middle East where penetration has reached about 2% and Asia where levels of 1.5% have been achieved.

Lessor hostility to PMAs

The attitude of lessors and financiers to PMAs has been contentious for some time, but nevertheless they consider the risks and concerns to be readily realisable. In order to fully appreciate these concerns, Thomas Schmid, chief counsel at CIT Aerospace, suggests that many of the reasons become clear when looking at the business model of any leasing company. Since the aim of any lessor is to maximise return on investment over the life of an asset, anything that could impair that goal becomes an issue.

At the beginning of the lease cycle, whether aircraft are new or used, lessors will purchase aircraft and finance the cost of the assets with a combination of either their own or third-party equity. This equity is very often leveraged with third-party debt. Since aviation sector lending has been in decline for most of the past five years, although it is now starting to recover, the appetite to support transactions with any increase in risk or something unusual is diminished.

Whether real or perceived, using PMA parts constitutes such an increased level of risk that many financiers and lessors have imposed a blanket ban on

their use.

This forces such a condition to be reflected in lease agreements with lessees. This means that PMA parts are even a problem for lessors when financing new aircraft that by definition have no such parts installed when delivered.

If the financing term for a lessor does not match the term of a primary lease, which would typically be 5-7 years while the loan term may be 10 years or more, the same restrictions would then apply to the secondary operator. The PMA ban would therefore have to be mirrored in the next lease.

Additional risks occur for lessors at the secondary lease stage. If not all airlines accept aircraft containing PMA parts, then a significant portion of the leasing market is closed to aircraft with such parts. If a lessor's market is in any way restricted, then its ability to maximise return on the applicable aircraft becomes impaired, since the lessor may be unable to achieve the highest possible rental in the marketplace. Put simply, Schmid says that the fewer options there are to rent the aircraft, the lower the rent potential.

Another way of describing this restriction would be in terms of remarkatability. This risk will naturally arise at the end of the primary lease terms and any subsequent lease, but could also arise if there is a default. Under such circumstances, the lessor will want to limit the aircraft's downtime and

maximise its ability to place the aircraft back into revenue service with an alternative operator. Since some airlines are reluctant to accept aircraft with PMA parts installed, this either reduces the options to place the aircraft, or the PMA parts will have to be removed and replaced with OEM parts.

Bill Cumberlidge, executive director of investor and aviation lease manager KV Aviation, describes this concern in terms of 'transportability'. He explains that anything that inhibits the ability of lessors to readily transfer an aircraft from one operator to another is a cause for concern. Because PMA parts are not universally accepted by airlines and national regulators, lessors feel far more secure without PMA parts.

According to Schmid, many of the same remarketing concerns arise at the end of lease cycles when lessors want to sell their positions in older aircraft. If aircraft contain PMA parts, how is residual value impacted? The leasing community believes that at best PMA parts, although they may perform as well as or even better than OEM parts, have a neutral impact on residual value. Some believe, however, that residual value is reduced.

The approach of appraisers is to assess the cost of the PMA parts against equivalent OEM parts. Given that PMA parts are cheaper, the value of the aircraft would be discounted by the differential. For example, if PMA components to the



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value of \$1 million were used in an engine restoration, and the equivalent OEM parts would have cost \$1.3 million, then the engine would be worth \$0.3 million less.

Some appraisers believe that the market value discount for engines with PMA parts can be 20-30%. This would severely impact a lessor's return, and most lessors state that this differential cannot be recovered through increased rent.

The result of the concerns raised by lessor business models is that the use of PMA parts offers only downside risks. While PMA utilisation benefits operators through reduced maintenance costs, there is no benefit for lessors and financiers. In fact, from a financier's perspective this concern can be taken a step further.

The savings on parts procurement costs for airlines transfers the commercial risk of their use into an asset risk for lessors.

The attitude of OEMs

A further concern for the financing community is the attitude of OEMs to PMA parts. Needless to say, despite the entry of Pratt and Whitney into the PMA market, OEMs see PMA parts as a threat and generally do whatever they can to discourage their use. In turn, this has a direct impact on the attitude of financiers, and OEMs are quite happy to see lessors imposing restrictions on the use of PMA parts.

Lessors consider OEMs' ability to support the aircraft and engines they

manufacture to be important in retaining value and remarketability.

Shannon Ackert, author of *Aircraft Monitor* and vice president at San Francisco-based lessor Jackson Square Aviation, notes that for a number of years OEMs have increasingly restricted technical support and warranty cover where PMA parts are installed.

For example, if an engine is sent to an OEM for a shop visit, it is now common practice for the OEM to refuse to reassemble PMA parts back into the engine. This means that at the shop visit the OEM would require the PMA parts to be replaced with OEM components, thereby increasing cost of the overhaul. This policy could negate the cost benefit of installing any PMA parts.

OEMs often justify this stance by arguing that there can be performance degradation issues associated with mating PMA parts with OEM parts. If PMA compressor blades are installed, for example, tolerances may not be identical to those of an OEM component. This, OEMs argue, could cause unscheduled removal at a later stage.

Cumberlidge maintains that a further risk for lessors, and indeed airlines that might accept aircraft with PMA parts, is that OEM warranties may be invalidated if an incident occurs. This then creates an additional layer of asset value risk for lessors.

According to Cumberlidge, there are two additional ways that OEMs have restricted the use of PMAs.

First, the OEMs now have a much more global reach in support capability

The use of PMA parts in the gas flow path of engines, such as baldes and stators, has been known to limit the re-marketability of engines.

than they used to. He explains that historically, certain airlines, such as South African Airways, Qantas and Air New Zealand, that are geographically remote from the OEMs, were not always effectively supported with parts, and had to use PMA parts.

Now that all OEMs have a more developed global logistics chain and consignment stocks are positioned locally, access and lead times for OEM parts are much improved. From a lessor's perspective this wider support capability only serves to increase the risk associated with non-OEM parts.

Second, and of greater significance, is the increased use of OEM power-by-the-hour (PBH) programmes, for engines in particular. While the merits or pitfalls of such programmes are outside the scope of this article, such programmes effectively lock an OEM into the maintenance process.

Since programmes like Rolls-Royce's TotalCare programme and GE OnPoint now cover a substantial portion of the active in-service fleet of new engines, PMA providers are effectively excluded from servicing those engines.

Furthermore, OEMs will not enrol a used engine that contains PMA parts in a PBH programme, without including a buy-in fee that covers the cost of removing and replacing the PMA parts with OEM components. Given that the OEMs now have a large market share in engine maintenance, the leasing community has little option but to ban the use of PMA parts in lease contracts.

The final OEM-related concern is that OEMs themselves are major buyers of used components in the market, particularly engines, often to exercise control over the value of used engines.

OEMs will not, however, purchase engines containing PMA parts. To the extent that lessors rely on parting-out aircraft at the end of the leasing cycle, this backstop solution becomes invalidated or expensive to rectify if non-OEM parts are installed, and so provides a further reason to resist PMA utilisation.

The PMA industry view

Nadim Fattaleh, director of international sales at Jet Parts Engineering, agrees that lessor concerns in the use of PMA parts stem from the

Engine OEMs see PMA parts as a threat, and do everything they can to discourage their use. One example is that OEM engine shops will refuse to reassemble engines with PMA parts. This in turn means the PMA parts have to be discarded and replaced with higher cost OEM parts.

potential of residual value risk throughout the ownership period. Some claim that the presence of PMA parts in an aircraft causes asset value reduction during remarketing due to some airlines' hesitation to use PMA parts. He contends, however, that the main reason for this is that lessors themselves limit their customers from using PMA parts, thus reducing the appeal of such aircraft in the marketplace with some airlines. This forces airlines to reject the use of PMA parts, and so establishes a vicious cycle.

Additionally, he adds, lessors state that they do not want airlines to use PMA parts, when they really mean no test and computation (T&C) parts. These are reverse-engineered PMA parts.

All new aircraft that are delivered from an OEM have an inordinate number of licence agreement PMA parts installed. Unfortunately for lessors, the FAA uses the same term - Parts Manufacturer Approval (PMA) - regardless of which type of PMA part it approves. This has led some lessors to move away from using 'PMA' language in lease agreements, attempting to address their concerns by substituting requirements such as value and utility equivalence.

This in turn brings to the forefront the question of value of those PMA parts.

Fattaleh explains that if the price of an OEM part on the date of original delivery was \$100, for example, and then on replacement some years later the equivalent OEM part costs \$130, while a PMA equivalent is \$105, shouldn't the latter part qualify under the lease terms? He also argues that this ignores the fact that the PMA part may be of higher quality, last longer and may be worth more than the OEM part.

With regard to warranties, Fattaleh argues that in many cases PMA suppliers, such as Jet Parts Engineering, provide better cover than the OEMs, since exclusions of liability in OEM warranty statements are more extensive than such exclusions from PMA companies.

Keith Coleman, president of US-based aircraft parts manufacturer and distributor Dixie Aerospace, a subsidiary of Wencor Group, produces a number of PMA parts for aircraft interiors and bearings and mechanical accessories for some non-critical engine parts that include starters, generators, and cycle



machines. Coleman agrees that the hostility of lessors and financiers to the use of PMA parts is a very real concern for suppliers.

The stance of providers is that as long as PMA parts are certified by the FAA or other regulatory authorities, there should be no issue in using PMA parts because such use is legal. He concedes that PMA is far more widely accepted by US carriers and lessors than elsewhere.

He also explains that Wencor focuses more on interiors and non-critical parts, about which lessors are less concerned.

In some cases, Coleman says he has noticed that lessors that lease aircraft to US carriers often accept PMA parts, whereas the same lessors impose a blanket ban on their use by non-US-based carriers. This is perhaps a function of wider acceptability in the US market and longer operating lease terms, where transferability of aircraft between lessees is less of an issue.

Coleman also agrees that a number of PMA parts are of better quality and are more reliable than the equivalent OEM parts. He says, for example, that this includes a slow-release lavatory seat that is quieter and more reliable than the OEM equivalent.

Greg Kucera, general manager of US-based Aviation Component Solutions (ACS), agrees that to date the use of PMA parts in gas path-critical areas is not acceptable to lessors. He explains that ACS also only produces non-critical piece parts for line replaceable units or accessories on engines and airframes. He confirms that PMAs are more readily acceptable in mature markets such as the US, and to a lesser degree in Europe. He

concedes, however, that there remains wide-spread resistance in much of the Asia Pacific and particularly in China.

Kucera, however, identifies two areas where PMA is proving more successful. While he agrees that cost remains the principal driver to their use, availability and turnaround times are becoming increasingly important as the growth in demand from OEMs to satisfy world demand has meant that lead times have increased for many components. In some cases this has facilitated the use of non-OEM parts.

Second, with respect to OEM PBH programmes, Kucera argues that such products are positive for both the industry and PMA providers in the long run.

While this might appear counter-intuitive in that it locks out non-OEM suppliers, he suggests that in the longer term it could be a benefit. Kucera explains that there is already some evidence that operators that have been enrolled in engine programmes for a number of years, are starting to see engine OEMs installing fewer new replacement parts and having more alternative repair practices approved by designated engineering representatives. As this trend continues, he suggests that carriers will either withdraw from such programmes if they do not see value for money, or apply pressure to reduce monthly payments.

Given the cost pressures faced by airlines and OEMs to provide greater value, this, Kucera believes, could gradually open up the engine maintenance market to more extensive application of PMA. This, in turn, would



leave the blanket ban on PMA by aircraft lessors as an increasingly isolated stance.

Kucera also concedes that there remains a perception in some parts of the world that PMA parts are inferior to OEM components. He says that ACS now applies a new wear-resistant coating to certain parts, which gives them a longer life than some OEM equivalents, but the industry still has much work to do to convince customers that their products are equally good or even better. This means a continuing process of educating customers through, for example, greater exposure to reliability data.

PMA acceptability

Within the leasing and finance communities there is some divergence of opinion at what level the use of PMA parts is acceptable. At the extreme end, there are those that impose a blanket ban on the use for any component, whether critical or non-critical. In some cases non-critical interior parts, such as seats and panels, may be acceptable for PMA utilisation. Some financiers are concerned that non-OEM parts could invalidate their 16G certification. According to the FAA's Special Airworthiness Information Bulletin in 2008, aircraft owners and operators are responsible for safety and airworthiness.

The FAA bulletin states specifically: 'Aircraft owners and operators must ensure that any replacement part installed in the product is approved for that installation'.

Given that some of this onus of proof is therefore placed on lessors, many argue

that they do not have the capability to check the certification of every component.

This means, they contend, that the only way a lessor can be sure that any replacement part meets the necessary requirements is to require that OEM parts are always used.

The blanket ban approach to PMA parts is more prevalent for new aircraft, but older aircraft types and out-of-production types in particular are commonly deemed to be more PMA-friendly.

Cumberlidge explains that PMA utilisation in engines is generally unacceptable to the vast majority of lessors, particularly in critical gas-path sections.

He explains, however, that there is an acceptable face for PMAs in certain non-critical parts, such as a conveyor system in a cargo conversion.

Cumberlidge adds that the use of PMAs can be acceptable for parts that are not safety-critical items, which might include in-flight entertainment systems, seats or other non-rotating parts. As aircraft age, the inclusion of PMA parts for such non-critical parts often becomes more acceptable.

Concluding remarks

For the time being, the use of PMA parts is completely unacceptable for critical gas-path engine components in the case of leased aircraft. Their use may be permissible on non-critical engine and airframe accessories, and certain line replaceable unit (LRU) components for some lessors of older aircraft. The lowest

One concern of aircraft lessors to PMA parts is that their use in an aircraft can limit the remarkatability to other airlines. Some appraisers will even discount the value of an aircraft by an amount equal to the difference in PMA parts and OEM parts.

level of resistance appears to be on aircraft interiors.

Historically the use of PMA has largely been a North American phenomenon, which remains the largest aviation market.

There has been some take-up in Europe, notably from Lufthansa, which does not acquire aircraft on operating lease. This may have enabled Lufthansa to be more active in this market. Other emerging parts of the world remain more resistant.

While the resistance to PMA from the leasing community has somewhat diminished from a safety perspective, the FAA-led regulatory environment has also improved.

The impact of PMA on the ability of lessors to finance, market and dispose of aircraft remains serious. Even export credit agencies, which form a large portion of the aircraft finance market, including aircraft ordered by lessors, are resistant to PMA parts.

Whether the asset-value risk of PMA is real or perceived, there is no incentive for lessors and financiers to balance that increased risk, since there is no scope to increase aircraft rents in exchange.

In the short-term, lessors may even be becoming more resistant to PMAs, with encouragement from the OEMs that are universally increasing their aftermarket presence.

The PMA industry is making some, albeit so far limited, progress in fighting lessors' concerns.

Fattaleh suggests that anything which allows airlines to reduce maintenance costs, while maintaining or improving quality, should be in the interests of the leasing community, since this would leave more cashflow available to service leases or loans.

Fattaleh concedes that while the PMA industry has recently formed an umbrella organisation committee to address lessor concerns, it has not yet made nearly enough progress. It will hopefully be more successful in opening up communication paths with the leasing community in the future to address some of these issues. **AC**

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