

The engine leasing market has grown to a \$15 billion market. It has been stimulated by fleet expansion, the high-cost of new engines, and airlines' desire to own fewer engines. There are more engine lessors in the market and greater choice for airlines.

Leasing options for sourcing spare engines

Engine leasing has now become big business in its own right as distinct from leasing whole aircraft. Bobby Janagan, general manager of Rolls Royce and Partners Finance (RRPF), explains that this is now a \$14-15 billion market, with new leases of \$2.5 billion each year. He adds that about 50% of spare engines globally are now funded on an operating lease basis. This article examines the drivers of growth of this business, the business models of its major participants and the issues and risks that it currently faces.

Why lease engines?

Scheduled and unscheduled engine maintenance are the main reasons that airlines need to access spare engines to keep aircraft flying. Historically the majority of airlines owned their own spare engines and many still do, but since the 1990s carriers have increasingly turned to leasing as an alternative. There are myriad reasons for this trend.

First, if an engine is required only to cover an unscheduled repair, it makes little sense to have owned spare engines available that are just used for short periods of time. This is particularly true for airlines with small fleets of a particular engine type, which only need provision for short periods of maintenance downtime. Many specialist short-term engine lessors and maintenance repair & overhaul (MRO) shops have grown to meet such needs.

The main driver of growth in engine leasing, however, has been purely financial. At the upper end, a new GE90 engine for a 777 now costs close to \$35 million, while at the lower end a used,

mid-time PWC127M engine for an ATR72-500 can cost \$1.5 million, and considerably more if it is new. Given that a new GE90 has a similar acquisition cost to a new-generation Embraer E-Jet, it is hardly surprising that demand for engine leasing has grown. Cash-rich airlines, such as Emirates and others, can raise money to finance engines relatively easily, but smaller operators cannot, especially as banks have recently reduced their exposure to the aviation industry. Furthermore, just as many airlines now lease aircraft because they do not consider the risks and rewards of owning aircraft to be a core business, the same applies to powerplants. Indeed, some operators consider that owning aircraft is part of a core business sector, but owning engines is not.

The financial crisis post-2008 also led a number of carriers that had previously owned spare engines, to move some assets 'off-balance sheet' because they needed increased liquidity. This spawned many sale-and-leaseback transactions for engines. Joe O'Brien, executive vice president of sales and marketing at Engine Lease Finance Corporation (ELFC), which now owns in excess of 280 engines for both narrowbody and widebody aircraft, says that ELFC's core business is leasing engines on long-term contracts to fill this demand. He adds that, since ELFC is owned by a bank, this enables the lessor to access funds at a more favourable cost than is usually available to the majority of competitors. This saving can be passed onto lessees through attractive lease rental rates.

Given that airlines can either acquire spare engines on long-term operating leases and use them as required, or lease

in engines on a short-term basis, how do operators determine which is the most appropriate strategy?

Since early terminations of leases are usually not expected or are expensive, leasing engines long-term could reduce airlines' flexibility to manage their spares provisioning effectively. The risks are considerable. If an airline has sufficient spares in stock, then the risk of not having an engine available when needed is effectively minimised. The cost of holding under-utilised engines, however, is correspondingly high. This means that airlines need to balance the cost of holding spares against the risk of not having an engine when needed. Industry consensus suggests that a utilisation rate of about 70% is needed for an owned engine or one that is leased long-term. If this is not achieved, the cost of that provisioning exceeds the expense and availability risk of procuring a spare in the market as and when it is required.

O'Brien confirms that holding engines on a long-term basis has become a greater issue since 2008, and that there has been a shift by airlines towards more short-term leasing. This means that ELFC now also leases a larger portion of its engines short-term than was previously the case.

One method of procuring spare engines that mitigates the risk of either over- or under-provisioning from internal stocks, is to enrol in a pooling arrangement with other carriers or a lessor. For example, Don Nunemaker, president at Willis Lease Finance Corporation (WLFC), explains that the lessor now offers such pools to a number of customers, including two for North American and Chinese customers. He explains that customers can enrol in a



pool at a fraction of the cost of holding their own spares and access engines as an when they are required. While, he says, there can be no absolute guarantee that a spare of a particular variant will be available when it is needed, the pool is large enough that, in practice, this problem does not arise. This method of leasing, he says, works well for US majors all of which, except United Airlines, are enrolled in WLF's CFM56-7B engine pool. He adds that pooling arrangements also allow members to lease engines from each other, which adds flexibility to the pool structure.

Similar arrangements are possible from other providers, including MROs and original equipment manufacturers (OEMs). Janagan explains that Rolls-Royce flight-hour agreements for engine maintenance can be combined with the provision of spare engines. This could include either long- or short-term spare engine cover, and these arrangements can provide a guarantee of availability.

With the above options available, there are several ways airlines can manage the provisioning of spare engines as a mix of long- and shorter-term arrangements. Care needs to be taken, however, that leasing does not create inflexibility for airlines. Furthermore, since engine reliability is not static, future needs for any given aircraft type and its associated engines are not constant, but random. An aircraft with a new engine type, for example, usually has reliability issues in its early years of service. As the engine matures, unscheduled items decrease in frequency and scheduled maintenance removal intervals increase. This means that, over time, the need for spare engines for new aircraft may fall,

which may be counter to the normal expectation that maintenance needs increase as aircraft get older. However, as engines age beyond their first major overhaul, maintenance inputs usually do increase.

Stefan Rihm, vice president of engine pool services at MTU Maintenance, which has annual engine leasing revenue of \$30 million, from a portfolio of 40 engines, most of which are leased on short-term 60- to 90-month contracts, agrees with most of the above. He adds that coverage ratio is also important, explaining that airlines used to have a spare engine coverage ratio of 10-14%. This created demand for spares on a long- and short-term basis. With better engine reliability, this has now dipped below 10% and can be as low as 7% in some cases. He adds that this also varies among types of carriers. Typically, full-service carriers would invest more in spare engines than low-cost operators.

What attracts lessors?

For some, the prospect of good financial returns has attracted lessors, while for others the motivation has been wider. In some cases, companies that historically focused on parts for airframes and engines now also offer engine leasing services as a form of diversification and vertical integration. For others, such as MRO providers, leasing engines or other high-value components can also be a profitable diversification and a way to protect an existing customer base by becoming a single-source supplier. For others, such as OEMs, leasing engines can be a way to increase or prolong income after the initial sale of an engine,

The large engines are too expensive for many lessors to consider. The leasing of large engines is also an element offered by engine manufacturers as part of their total care packages.

and can allow them to win the initial engine sale in the first place. For OEMs, offering aftercare services reduces the risk for airline customers, and sometimes the additional revenue can be used to discount the initial price.

According to lessors and financial investors in engines, there are certain advantages over leasing complete aircraft. First, the financial returns are greater for engines than for aircraft, in that lease rate factors tend to be greater. Second, if they are maintained correctly, engines do not depreciate in the same way as aircraft.

According to the IBA's Engine Values Book (EVB), a CFM56-7B engine has a current market value of up to \$6.75 million in mid-time condition, depending on the exact variant. Ten years later the appraised value of that same engine is \$4.65 million, or 68% of current value.

The 737, upon which that engine hangs, would depreciate to 50-55% of original value over the same period. Such lower depreciation on engines means that higher financial returns can be achieved, even if the same lease rate factor that a lessee pays for an aircraft is applied. In the extreme, some engines do not depreciate at all. For example, according to the IBA's EVB, the CF34-10E has a current mid-time value of \$5.5 million, and this is expected to be \$5.7 million some 10 years later. At the larger end, certain variants of the GE90 are also expected to be worth more in 10 years' time than they are currently worth.

For other types of engine lessors, leasing engines represents a good way to enhance income from their core businesses. For companies that specialise in tearing down end-of-life aircraft, leasing engines can be attractive if they have life remaining on their major components. Adam Lockhart, director of sales and marketing at GA Telesis, explains that if engines have 'green time' remaining when aircraft are acquired for parting out, it makes sense to use this time before tearing down the engines. Engine leasing also allows GA Telesis to provide its customers with a cradle-to-grave inclusive service by combining leasing services with components and material sales and engine exchanges.

Aeroturbine is a similar service provider.

MTU Maintenance also sees engine



leasing as complimentary to its MRO business. In this light, MTU Maintenance earlier this year announced that it was setting up a joint venture with Sumitomo Corporation to lease out engines on shorter-term leases. This venture is 80:20 owned by MTU Maintenance, whereas Sumisho Aero Engines, which is majority-owned by Sumitomo will focus on long-term leases.

Others, such as Total Engine Support (TES), follow a similar end-of-life business model, but only focus on engines. Craig Richardson, director of sales, marketing and leasing at TES, says that the company partners with a part-out specialist, such as Universal Asset Management, which tears down the aircraft while TES only concerns itself with the engines. He adds that a recent example saw TES acquiring five older A330-300s with PW4000 engines from Malaysian Airlines. TES has taken the engines, and is leasing the remaining green time on some while tearing down the others under an agreement with Pratt & Whitney. Such leases tend to be short-term to cover shop-visit time.

Janagan says that some 50% of RRPF's spare engine portfolio is used to support customers that have enrolled in Rolls-Royce's Flight Hour Agreements (FHA). Accordingly, a large number of engines, he adds, are needed to provide FHA customers with spare engines while their own are undergoing shop visits. These can be either short- or long-term leases to airlines with large fleets where there will usually be at least one engine undergoing repairs at any one time.

OEMs vs lessors

The major OEMs have their own engine leasing units. GE's unit is part of GE Capital Aviation Services (GECAS), and it predominantly provides leasing services for its own engines, including those of joint venture partner CFMI through Shannon Engine Support (SES). It also finances a smaller number of RR, IAE and PW engines. By contrast, RRPF only finances its own engines or those of its IAE partner.

Each leases over 400 engines, and the OEMs now control over 50% of the world's engine lease portfolio by value. The percentage controlled by the OEMs has increased over the past decade, particularly as associated power-by-the-hour (PBH) services have grown.

So how does the presence of the OEMs affect the independent lessors? If the OEMs increasingly control the engine leasing market there may be a contraction in the market for independent lessors.

Janagan says that, not only does the overall growth of this market leave plenty of room for all players, but the OEMs need to service those markets that the independents will not touch. He stresses that independent lessors target popular and mature engines types with a large operator base where there is good liquidity, such as the CFM56, or in RR's case, the RB211 on 757s. Independent players will not generally purchase Trent engines for the A380 or the forthcoming A350 since the operator base is too small.

Furthermore, even certain established engines, such as the GE90, are too

The numerous narrowbody engines, that mainly include the CFM56 family and the V2500, are the core of the independent engine lessors' fleets and portfolios.

expensive for many lessors, when those lessors could buy five narrowbody engines and spread them over five different lessees. This means that only the OEMs are willing to invest in, and lease out, engines with smaller populations and narrower operator bases.

If the OEMs concentrate on their own engines and those with limited applications, independent lessors also need to identify their niches in a competitive market. If, as O'Brien previously explained, ownership allows attractive terms on new-generation spare engines, then it is possible to compete with the OEMs on an equal footing. He adds, however, that the biggest issue for independent lessors with regard to the OEMs is the existence of FHAs, which means that lessees subject to such agreements will not pay maintenance reserves to lessors. This, he explains, means that without those reserves, ELFC needs to focus more on the credit quality of its long-term lessees.

Historically, he explains, FHAs have not been favourable to lessors, since they could not access unused payments for maintenance reserves that were paid made to the OEMs. Lessors could also not insist on maintenance being performed on engines that reached lease termination if this did not coincide with the OEM's maintenance schedule.

O'Brien concedes that in recent years, the OEMs have had to begin addressing lessor concerns, and that the most progress has been made with CFMI. Arrangements still need to be negotiated, however, on a transaction-by-transaction basis with each lessee and each OEM because there is, as yet, no standardised tripartite template.

Nunemaker says that WLFC has been in competition with the OEMs since before OEMs became major competitors with their PBH programmes. For example, he says that SES was a competitor before GE's OnPoint programme came about, so that this is not as great a concern as it may appear. He also points out that WLFC routinely leases engines that have OEM PBH agreements attached.

Other independent providers without the advantage of low funding costs need



to add value for customers in different ways. Clive Richardson, regional sales director at AJ Walter (AJW), says, “We offer the operator short-term leases for maintenance downtimes, with a view to possibly extending the lease to long-term for capital release, as well as assisting operators in reducing their cost of ownership and relieving them of spare engines and injecting cashflow.”

He adds that the market is also witnessing moves by operators that are nearing the end of their total care agreements and are therefore open to alternative, more economical, solutions. Furthermore, participants can also take older engines from operators in exchange and part those out, thereby removing the need to pay for their high overhaul costs.

Lockhart stresses that GA Telesis needs to ensure that it acquires engines sufficiently cheaply to make its lease offerings competitive. They can provide value, however, by adding the services provided by GA Telesis Engine Services, the former Finnair engine overhaul shop. This facility specialises in CF6-80 engines, and has completed 20 overhauls in the past 12 months.

Richardson at TES says that targeting the right variant of a particular engine family is also important in developing a successful independent niche. He explains that, for example, among the CFM56 or V2500 families there are certain variants with an abundance of spare engines available, and that competition to supply them is strong, although other variants are in short supply. TES, therefore, analyses which engines to purchase according to several criteria, including

how many of a particular variant exist and what the industry spares coverage ratio is for that engine. TES will also want to understand how many of those are within OEM FHA agreements, and what proportion are owned or leased. Finally, the number of operators looking to exit the variant over the coming years is also critical.

Future trends

For the future there are a number of encouraging trends upon which lessors can capitalise, but there are also negative factors looming large.

Clearly the growth in demand for new aircraft, clearly visible in the size of the main OEM order books, means that the demand for spare engines will grow proportionally. Janagan says that “the cake is getting bigger”, and that demand in some areas, such as China, India and other emerging markets, is particularly strong so that these markets will need to be provided with spare engines. As an increasing proportion of new aircraft are sold with FHAs attached, this may benefit OEM-controlled lessors more than independent players.

According to others, however, independent lessors can also benefit from serving customers whose FHAs are close to expiry. Many operators now deem that the benefit of FHAs is diminished after 10-12 years, as maintenance cycles become more predictable. This means that while older engines may cost more in maintenance than new engines, the intervals and costs are more predictable so that there is less need to insure against

The GE90 is one of the largest types, and has a list price of \$35 million. This makes it too expensive for many airlines to own spare units, and also out of the reach of many independent engine lessors.

unanticipated failures. This means that a time and materials contract can be more cost-efficient than an FHA. Furthermore, while first-tier operators are more concerned with reducing maintenance cost risk, second-tier operators of ageing aircraft are more concerned with preserving cashflow. This favours maintenance cost expenditure as it is incurred.

As the number of aircraft reaching retirement age also increases, opportunities for end-of-life-engines also increase. Lockhart explains that, increasingly, operators of such aircraft replace run-out engines rather than incurring high overhaul costs. He says that Southwest Airlines now routinely buys or leases used engines and parts with green time remaining for older aircraft. This, he says, has served to maintain the values of engines, while the achievable rental rates for whole aging aircraft continues to decline. He adds that while a typical rental for a 737-400 has now declined by close to \$20,000 from \$90,000 at the beginning of 2013, there has been no corresponding change for engine rental rates.

Richardson at AJW agrees that the company is seeing good demand for such older engines. But Craig Richardson at TES cautions that some variants of the same engine type are far more in demand than others. He also points to a further area of demand created by aircraft lessors: as, for example, many 737NG or A320 aircraft reach scheduled lease termination dates, about 25% of engines need to undergo shop visits just to meet lessor return conditions. Many of these engines have unused green time remaining, which is wasted by overhauling them. Accordingly, the need to meet redelivery conditions not only creates extra work for MROs, for which TES often supplies spare engines, but it can also create opportunities for engine exchanges.

Long-term concerns

There are also many industry participants that bring out a number of concerns. First, larger independent lessors, such as ELFC and WLFC, point to the increasing power of the OEMs in



engine leasing. If this trend continues, they argue, overall growth in engine leasing demand could disproportionately benefit the OEMs to the point that their market could remain relatively static.

Another concern to established players is the growth of parts providers entering the engine leasing business. Furthermore, other mainstream aircraft leasing companies are increasing their exposure to engines. Often this is achieved through dedicated subsidiaries, such as Aeroturbine, which is owned by Amsterdam-based aircraft lessor Aercep Holdings. Such new players serve to increase competitive pressures, so this may be beneficial to airlines. But competitive pressures could drive down returns for all participants and threaten the fundamental economics of their business models.

Janagan adds that new financial players are entering the market, including mainstream lessors that are attracted by the greater returns on engines than on aircraft. This, he argues, could threaten the economic model for existing players.

Another potential concern for both engine and aircraft lessors has been the recent massive increase in aircraft orders. Some argue that many of these aircraft will be ready for delivery during the next economic downturn when they are not needed. Other pundits question how the massive order book can be financed. From an engine perspective this could potentially lead to an oversupply of spares with negative consequences for

values and lease rates.

Attitudes to this risk vary and some players are less concerned than others. O'Brien argues that, while there was great concern about a funding gap post-2008, there is now more funding available to the industry compared to even 12 months ago, since many financiers have recently become attracted to the returns that aircraft and engine financing can offer, compared to the low returns available from other classes of investment.

Janagan agrees, noting that so far the annual delivery stream of 1,200 deliveries from Airbus and Boeing is being financed. He also argues that, from a demand perspective, a large portion of the growth is explained by orders and deliveries to China, India and other parts of Asia. These, he says, are huge domestic markets with poor surface infrastructure; only air travel can meet the need to move the new volumes of passengers in these markets.

There is more concern, according to lessors, with the future economic life of new aircraft. Historically most lessors have assumed a 25-year economic life for narrowbody aircraft. If, however, high fuel prices, environmental concerns and the introduction of new aircraft types hasten the retirement of older or even current-generation aircraft, then this will also affect financial returns unless either values fall or lease rates rise.

From an engine perspective, this would manifest itself through

Engines have a long-term strong residual value retention. Some types can have book and market values in excess of their original purchase price at an age of 10 years.

technological change. Engines have been the component in which the greatest technical advances have been made in terms of fuel efficiency, noise reduction and emissions. Obsolescence for older models is greater than for the rest of the airframe, so concern about economic life very much applies.

Rihm, however, says that MTU Maintenance very much believes that the 25-year principle remains valid. He explains that in the MRO part of the business, there is no discernible trend towards retiring engines at an earlier age. Indeed, he explains, MTU has expanded its mature engines solutions portfolio. In some cases this means tearing down older engines to use the parts on other engines, thereby achieving significant savings over installing new components. As such, he says, there is always significant value in older engines and that the useful life is often longer than the airframe.

Conclusion

The engine leasing sector has grown substantially over the past decades and will continue to do so over the coming years. Apart from overall fleet growth, the main driver for this is the cost of holding spare engines. Many airlines, especially LCCs, do not consider owning spare engines to be their core business. Furthermore, longer on-wing times between major refurbishments mean that spares are needed less frequently for any given size of fleet. When a spare is needed there are now so many options from which to choose, that holding your own stock is less compelling.

The engine leasing community, however, faces challenges. Growth in the market tends to lead to new competitors entering the market. Both MRO shops and aircraft parts specialists have diversified into engine leasing. Above all, the engine manufacturers now control a huge part of the leasing market through agreements made at the time new aircraft were purchased. This has slowed growth for independent suppliers in a more crowded and competitive landscape. **AC**

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