

The global fleet of spare engines numbers about 5,000 units. About 15% are leased. The high capital cost of new engines is expected to stimulate a trebling of this portion over the next 10 years. Few major engine lessors remain to share this bonanza.

Who will share the boom in engine leasing?

All subdivisions of the aftermarket have gone through a large change in the past six years, and the spare engine sector is no exception. The market has transformed from airlines holding some spares and relying on the spot market for others, to a highly structured system of inventory management. One major development has been the increase in number of engines that are leased. Of the current fleet of about 37,000 installed engines it is estimated there are 5,000 spare units. About 700 or 15% of these are estimated to be leased. These are valued at about \$1.7 billion. The prediction is that the number of spare engines that are leased will increase to as high as 50%. If this prediction is proved correct, who will benefit from this boom?

Market evolution

The largest change has been the consolidation of independent spare engine suppliers. This has been led by a rapid entry by the original equipment manufacturers (OEMs) into the market.

In the past, engine inventory management was limited to airline ownership, pooling and short-term leasing or trading. Much of the business with the aftermarket involved spot deals, since long-term engine leasing accounted for a small portion of spare engine provisioning. This was at least the case with General Electric (GE), CFMI and Pratt & Whitney (PW) engines.

Rolls-Royce (RR) has always kept tight control over the aftermarket activity of its engines. Only the largest operators had independent maintenance capability

for RR powerplants, and many of these are now jointly owned by RR. Rolls-Royce also provided airlines with help in spares acquisition, and in many cases retained ownership of spare engines. Consequently the supply of spare RR powerplants on the aftermarket has always been minimal.

The aftermarket in the past included a large number of small engine lessors and traders. These were able to enter the aftermarket with low capital outlay. This was on the basis they could raise debt relatively easily to acquire a small number of JT8Ds for less than \$1 million each. The number of JT8Ds in the global fleet and the high turnover of leases, module or whole unit exchanges and trades, meant that for the capital outlay equal to 2-5 engines, a large volume of transactions could be completed each year. The investment in one engine could therefore be recouped over a short period.

The same reliance for a large volume of activity could be placed on the JT9D. There were large numbers available, which required relatively low capital investment. The large volume of transactions and potential margins made it easier for traders to borrow debt and enter business on a small investment.

Spot market activity dissuaded banks from entering the engine leasing market, since banks were keen to see their assets remain with one operator. Providing spare engines on lease only became a new activity at the end of the 1980s. Increased financial consciousness by major airlines stimulated this market.

This development required capital outlays up to five times that for the JT8D

or JT9D. Major airlines driving long-term leasing were most interested in modern engine types, because they wanted to avoid their high capital outlay. This presented too large a barrier to many traders and brokers in the JT8D and JT9D arena. The new long-term engine leasing market therefore excluded a large number of players. Only a few companies, including Willis Lease Finance Corporation (WLFC) and Engine Lease Finance (ELF), entered the long-term leasing business. The main engine types offered by these lessors were the CFM56-3 and V.2500, in addition to types like the PW2000 and PW4000.

Engine lessors

Engine inventory management in the past was based on ownership of spare units to cover predicted removals plus a portion of unscheduled removals. Airlines relied on the spot market to cover all eventualities not covered by owned engines. Many airlines with small fleets have been totally reliant on the spot market.

With the introduction of long-term leasing, a more sophisticated analysis has been made for spare engine requirements. The pyramid analysis has often been used. This is where all predictable removal events are covered by owned engines. The number required by an airline for these events is the largest portion of the total they require. Predictions of the number required can be made accurately so that all owned spare engines spend little time idle. These powerplants therefore make up the pyramid's base.



The middle tier of engines are those provided by engine lessors. These are leased on terms of about five years. This gives airlines flexibility in fleet planning, and avoids high capital expenditure and residual value risk. These engines therefore reduce the capital investment an airline has to make.

The top tier of the pyramid are engines not required on a constant basis, and so generate low levels of utilisation. These powerplants satisfy emergency requirements such as unscheduled removals, and consequently remain inactive for long periods. Over the short term there are also large fluctuations in the number of spare engines required. It is therefore economic to acquire these engines on the spot market. This provides a market similar to that serviced by traders and brokers of JT8Ds and JT9Ds.

The volume of modern engines, such as the CFM56, V.2500 and PW4000, acquired on the spot market is less than the number of older types acquired in the same way. This is partially explained by high capital costs of new engines, which has prevented traders and brokers entering the market.

Leased engines now account for about 15% of spares held, and the portion is growing. Airlines have sought to reduce their owned engine inventories. The portion of owned and leased engines is about 85%, while those acquired on the spot market account for 15%. Operating leasing of aircraft has also grown, and it is more prudent that spare engines for these aircraft are acquired in the same way over the same lease terms.

It is even possible that leased engines could account for all spare requirements,

except those acquired on the spot market. "Up to 85% of all removals can be covered by leased or owned engines," explains Bob Nicholls, chief operating officer at Aeroturbine. "The remaining 15% can be acquired on the spot market. The leased portion of the 85% of leased and owned engines will increase".

This portion of leased engines has been increasing for several years, and is expected by some to reach 50% of all spare engines. Charlie Willis, president of WLFC estimates that a maximum 15% of spare engines are leased. "This portion is climbing dramatically. There are about \$1 billion worth of spare engines manufactured each year," says Willis. "It is difficult to say what proportion are owned, but airlines no longer want to own the assets. Modern engines are expensive. A 777 powerplant, for example, with quick engine change kit is worth up to \$15 million, and airlines no longer want to carry these assets on their balance sheets. This implies there is a large untapped market for leased engines".

The higher cost of new engines means that while there is a higher demand for leased engines, the number of providers that can meet the challenge has reduced. "It is harder to enter the business of supplying spare CFM56 and other engines compared to older types like the JT8D and JT9D, because capital cost is four or five times higher for new types," says Willis. "This means lessors intending to provide engines on long-term leases will need access to large amounts of external financing, or their own financial resources. Most independent aftermarket players will find this a hard challenge".

The quantity of leased engines is expected to more than treble over the next 10 years. This is estimated to require an investment of \$8 billion. There are currently four major engine leasing companies, and few prospects of new entrants. The challenge to independents will be sourcing enough finance to maintain their market share.

Enter OEMs

The entry of OEMs, in particular GE and P&W, on a much larger scale into the aftermarket in the past 6-10 years has had one of the largest influences on the aftermarket. OEMs were initially attracted by the profit potential of repair and overhaul, but have expanded their services to include spare engine provisioning through leasing.

The OEMs have the financial power and products to support engines from 'cradle to grave', removing all financial risks for the carrier. Maintenance and spare engine contracts can be provided by OEMs at a fixed price to airlines, as well as providing a disposal service for airline-owned engines at the end of the contract.

These risk-free contracts are attractive to many carriers. Coupled with an acquisition of a large portion of the world's independent engine repair shops, the OEMs are able to provide vertically integrated engine services for a large portion of the global fleet. These seamless contracts offered to airlines require high capital investment. This makes it even harder for many independent shops and other lessors to provide airlines with alternative deals on a competitive basis.

Independent reaction

As a consequence of this development by OEMs a few of the major independent lessors and repair providers have become vertically integrated to provide alternative products for the airlines.

Lessors like WLFC and ELF have acquired or become involved with engine shops, as well as banks. ELF, for example, is a shareholder of Aviation Lease Finance (ALF), alongside The Ages Group, Volvo Aero Engine Services and Bank of Tokyo Mitsubishi. Each of these shareholders is able to make a contribution that allows ALF to provide the same fully integrated engine support product as an OEM.

WLFC has its own engine shop, Pacific Gas Turbine, as well as a spare parts business. WLFC also has more recently signed a partnership agreement with SR Technics. This gives Willis greater access to maintenance and spare parts support. WLFC further gains from Swissair's subsidiary Flightlease, which gives WLFC access to financing. This then allows WLFC to match the fully

integrated services offered by OEMs.

“The OEMs want the maintenance business for their own engines to maintain control,” says Willis. “This does not necessarily mean OEMs’ control over the market will continue to increase. Airlines are watching the service they get from the OEMs. Airlines are aware of the dangers of relying too heavily on a small number of powerful OEMs.

“Despite their ability to offer fully integrated services, the OEMs cannot offer it any cheaper than we can,” claims Willis. “The OEMs’ advantage is that they can get in with the airlines right at the start, when they place the engine order. Some airlines are beginning to feel it is cheaper to dissect fully integrated services and acquire support from several sources. A fully integrated power-by-the-hour (PBH) service is probably the right policy for a small airline which cannot justify the cost of the infrastructure required to manage engine maintenance and spare unit provisioning”.

ELF has followed a similar strategy of full integration and aims to provide an alternative product to the OEMs. “Many airlines want all-in support programmes from OEMs, but carriers with the technical resources want to maintain some autonomy,” says John Sharp, chief executive of Engine Lease Finance. “ELF leases engines to four or five independent

engine shops, which in turn lease them to airlines as part of our maintenance cost per hour (MCPH) programme. This is effectively an all-in system like that offered by GE and General Electric Engine Services (GEES)”.

Leasing boom

The current global fleet of installed jetliner engines is about 36,000 units. Sharp estimates that these are supported by 4,700-5,400 spare engines; about 13-15% of the installed number. Other major players in the market have similar estimates of the number of spare units required to support the global fleet.

GE says its global studies show there are about 5,000 spare engines. This spare fleet is estimated to be worth about \$14 billion. The percentage of these that are leased then probably accounts for \$2.1 billion, although GE estimates this could be as high as \$3-3.5 billion, given the increase in engine leasing.

The number of spare engines required is influenced by removal rates. As the fleet grows more engines are required, but this is offset by increasing reliability. The number of spare engines has therefore grown at a slower rate in the few years after modern and more reliable types were introduced. These include the CFM56-5 and -7, modern variants of the

V.2500, CF6-80 and PW4000. The percentage of spare engines required to support the installed fleet will therefore reduce. The number of spare engines could then fall from the current level of 13-15% to about 10%.

The number of spare units will then increase once modern types have gone through their first shop visit and experience shorter on-wing times to their second removal. During this period the global fleet will also grow, further increasing the need for more spares.

Of the 85% that are owned and leased, 15% are leased. The high capital cost of new equipment means that as deliveries of new aircraft continue, the portion of leased will grow. “The industry is going through its largest re-equipping phase it has ever seen,” explains Nicholls. “This is stimulating a lot of off-balance sheet financing. This will lead to a higher portion of spare engines being leased and less being owned. At the same time there is a lot of old equipment being retired by major and secondary carriers. These aircraft used JT8Ds, and this is having an effect on the traditional players, which have relied on the spot market. Being on the verge of the next downcycle also exacerbates retirement of aircraft powered by older engines. The implications of all these factors is that there will be a large change



in the proportions of older and modern engines in the fleet. The high capital cost of new engines means an increase in engine leasing will be inevitable. Airlines also want flexibility. Many aircraft are now acquired on operating leases, and aircraft are often used for only 5-7 years. Airlines therefore want easy return conditions for aircraft and engines.

Predictions of what portion of engines will be leased vary. The highest estimates are that in 10 years up to 50% of spare powerplants will be provided under leases. For the current spare engine fleet, the number leased would then increase by about 1,800 to 2,500. This represents a huge investment, totalling about \$8 billion. The investment in leased engines will therefore have to increase by a factor of five over this 10 year period.

The investment required to meet this challenge will exclude smaller players, which will have to continue to rely on the spot market. Although this is dwindling for the JT8D and JT9D, retirement of MD-80s and 737-300s will put new engines types on the secondary market.

The market for modern engines is likely to further consolidate, since new entrants will be prevented by the large and ever increasing barrier to entry of capital required. This will leave the market to those with the financial resources available to enter the market. The major engine lessors are the OEMs, Rolls-Royce Capital, WLFC and ELF.

"The OEMs have huge financial resources, but also large overheads," says Willis. "WLFC has a strong cash position, and we have accessed the securitisation market in the US. This should allow us to finance expansion of our portfolio. We have 50 CFM56s in

our leased fleet, and expect our fleet to be worth about \$750 million in four years. The largest independents include us with \$0.5 billion worth of engines, Rolls-Royce Capital and ALF/ELF".

ELF has about 120 engines in its portfolio, which is still growing. "This includes all types from regional jet engines worth \$2 million to 777 powerplants which cost \$15 million," says Sharp.

The lion's share of spare engines is owned by GE, which will make it hard for new entrants to gain access to the market. "Another factor preventing new entrants is that CFM56s are in tight supply. It is virtually impossible to buy engines and then compete with GE," explains Nicholls.

Sharp predicts that the major growth areas of leased engines are in regional jets and for aircraft types where GE can provide an integrated service. "I do not think the share of leased engines will reach 50%, but 30% is more likely. Regional jet users are the most probable candidates for PBH schemes, and this will fuel their demand for leased spares. The narrowbody engines will be the next highest in demand, and the lowest will be widebody engines. The challenge will have to be met by specialist engine lessors because it is such a specialised business. To enter the leasing market a provider requires a critical mass of engines to get the financial economies of scale. This in turn means large financial resources are required. We are able to tap financing for engine acquisitions from our ALF partner Bank of Tokyo Mitsubishi. We are now looking for acquisitions to broaden our products, as well as alliances with independent repair shops".

In recent years many independent traders and brokers which relied on JT8D and JT9D spot market activity have left the business. Niche players may increase in numbers again when fleets of MD-80s, 737-300s and PW4000-powered and CF6-powered aircraft retire.

GE shares the view held by many that as many as half of spare engines will have to be provided by lessors. GE believes the portion of leased engines will rise in line with the percentage of aircraft acquired under operating leases. GE makes the point, however, that not all these leased engines will be held under straightforward operating leases, but some will be acquired under finance leases. The portion of engines acquired under finance leases will not be as high as aircraft. Using finance leases is made harder by the fact that the finance lease market has declined in recent years following reductions in tax benefits, especially for cross-border transactions.

The big engine lessors in the market are likely to remain unchanged because of the access to financing that is necessary to acquire large portfolios. Access to the right financing techniques will determine what share the OEMs and three big players take in the predicted boom in engine leases. Independents are at a disadvantage, since OEMs can start negotiating support contracts before an engine order is finalised. Independents cannot make offers to support until they are aware of an order placement. The independents then have to follow this up with engine purchases, which will be expensive straight from the OEMs. Independents will probably have to pay more for spare engines than the OEMs themselves. In some cases independents will have to buy spare engines immediately from airlines. The spare units can then be leased back, releasing the capital invested. These transactions can make substantial margins for lessors (*see Mechanics of engine purchase and leasebacks, Aircraft Commerce, May/June 2000, page 14*). This will be easier economically if the airline is able to get a purchase discount on the spare engines. The independents maintaining a respectable share in engine leasing as the market grows thus depends on airlines' desire for competition in the market, how competitively independents can offer integrated services and what access each player has to the required finance.

Products

With an approximate trebling of the value of leased spare engines to about \$8 billion, more sophisticated finance structures will be required. Based on its

experience with GECAS, GE claims it can offer the broadest array of financial products for engine leasing. GE views spare engines as assets that can be financed, and uses its aviation finance experience to stimulate growth in engine leasing. GE's biggest card is that because of its affiliation with GEES, it can also focus on operational support. GE can therefore provide a level of support tailored to each airline's needs. Operationally GE can offer the correct number of engines in the right configuration at the right time. GE thus claims its services differentiate it from its competitors. GE is able to use an array of financing techniques to aid its expansion in the leasing market. These include operating leases, but also finance lease structures, securitisations, tax-based leasing and straightforward debt.

GE is also able to provide regional pooling to gain economies of scale, which competitors will find hard to match. This can only be done with large capital resources.

GE's competitors claim that they can not only offer equivalent services, but that airlines are also demanding independence. "ELF is currently the second largest engine leasing company in the globe," says Sharp. "We can offer customers a fully integrated and independent service. A lot of airlines do

not want to be beholden to the OEMs. Airlines want competition. This will require a wider range of financing tools to increase the fleet of engines available for lease. I think there will be more financial products used to acquire engines, and these will be various types of finance leasing and Japanese Operating Leases".

The increasing complexity and reliance on large volumes of capital is, however, making it harder for new entrants to enter the market and provide alternatives for airlines. "There are no emerging big players in long-term leasing," says Nicholls. "This leaves the spot market to independents. There has been consolidation in this sector also, since margins on modern types like the CFM56 are thin, because the purchase cost makes deals economically prohibitive".

While barriers to entering the long-term leasing market are likely to remain high, the spot market could see a re-emergence of niche players. While the rapid decline in the numbers of JT8Ds and JT9Ds has precipitated consolidation in the spot market, aircraft powered by the JT8D-200, CFM56-3, early PW4000s, PW2000s, RB211-535E4s, early V.2500s and CF6-80C2s are now approaching 12-20 years. The next few years will see the first retirements of these

aircraft and their spare engines from first-tier carriers. Fleet disposal and retirement will see a large number of engines coming onto the market. These will be at values affordable for niche players to acquire engines in small numbers, thus creating a new spot market. The fleets of retired aircraft will be fragmented and sold to lessors and secondary operators. These carriers will have less capacity for spare engine ownership, and depend more on engine lessors and traders. The nature of their operations and reduced reliability of these older engines will also mean a greater reliance on the spot market for spares support. While the OEMs have the financial resources to acquire these retired fleets, there will also be opportunities for niche players. Retirement of 737-300s from one or two major US and European carriers will increase CFM56-3 availability. Niche players will then be able to make high margins on engine disassembly and component sales. "Retirement of PW4000s and CFM56-3s will give rise to a new breed of engine lessors, but this will only happen when used engine values have dropped," says Sharp. "Not only will a new breed of lessors arrive, but these engines will supply a new line of business to companies such as Ages, which in the past operated in the spot market with the JT9D and JT8D".

