The engine leasing market was predicted to become a booming sector four or five years ago. Examination of growth sources, difficulties in financing engines and lessors' portfolios provides little evidence that this has occurred. The engine aftermarket shows signs of being a steadily growing one.

How is the engine aftermarket evolving?

The engine leasing market is relatively small, with limited a small number of players. Some have predicted the market would grow at a fast rate, with the portion of spare engines that are leased increasing from its current level of about 15% to as much as 40%. It was also predicted that lessors would have to offer fully integrated services of engine provisioning, maintenance and technical management to satisfy increased demand from airlines for all-in engine management packages. One implication is a possible further consolidation of the engine aftermarket. Another is an expansion of engine lessors' portfolios. So how is the engine aftermarket developing?

Engine fleet

The number of installed western jetliner engines is about 37,000-39,000, supported by an estimated 5,500 spare engines. Airlines have traditionally owned their spare engines, but the advent of aircraft leasing has led to these also being leased. This was triggered by a number of factors. Investment in spare engines is high, and airlines prefer to use cash resources for other activities. Also, if aircraft were acquired through operating leases it made sense for spare engines to be leased rather than owned.

The portion of spare engines that are leased is estimated to be about 15%, or 800 engines. These are used for inventory purposes and are supplied on medium- and long-term leases. These should not be confused with engines supplied on short-term leases or for product support.

Fleet evolution

The aircraft and engine fleet has a mix of old and new technology equipment. Old technology aircraft had engines with generally low values. Many of these engine types, in particular the JT8D and JT9D, could be acquired relatively cheaply by traders and used to supply airlines with short-term requirements.

A large portion of these old technology fleets are finally being retired by several carriers over a concentrated period. This has seen the exit of a large number of engine types from the world fleet in recent years.

The new technology aircraft are powered by engines with high market values. The number of engines is smaller, since most types are twin-engined, and are more reliable. The ratio of spare engines to installed engines has therefore fallen from about 15% to 10%. Many airlines have gone through large fleet renewal programmes in the past five years, and are continuing to take delivery of new aircraft. The number of Airbus and Boeing aircraft deliveries reached 850 in 2001, and although the economic downturn has reduced the numbers of new aircraft, there were still about 650 new Airbus and Boeing aircraft delivered in 2002.

In addition about 1,450 new installed engines are also expected to be delivered each year. This implies that an additional 150-180 new spare engines will have to be delivered annually to meet spare engine requirements.

This has to be considered against the retirement of older aircraft, which reduces the number of old technology spare engines required. These simply become surplus on the market. The growth in new leased engines also has to be considered against the declining ratio of spare engines to installed engines as engine reliability improves.

Leasing growth

The number of spare engines that are leased is expected to increase to as many as 40% of spare engines in 15-20 years. "I do not see why the portion of engines that are leased should not be as high as the portion of aircraft that are leased," says Chris Cantwell, senior vice president of sales and marketing at GE Engine Leasing (GEEL). Cantwell points out this growth will come from a variety of sources.

The first of these is deliveries of new spare engines, a total of about 150-180 each year. If 40% of new spare engines are financed through leases rather than paid for with cash, then in the region of 60-70 new spare engines will enter the leased fleet each year. This is actually a relatively small number, and could be absorbed by a handful of the major engine lessors. The number of new spare engines being delivered each year is not enough to trigger high portfolio growth for a large number of engine lessors.

There are contrasting views about the prospects for growth. "Although the engine leasing market follows operating leasing, the engine leasing market will not necessarily grow as fast, since there is actually plenty of debt available for airlines to buy their own engines," says

Engine leasing is unlike the aircraft leasing business. Engine leasing requires a higher level of technical expertise, and engines are harder to finance. This limits growth, despite claims of a potential boom in engine leasing.

Mark Arundell, general manager of engine leasing at Rolls-Royce Partners Finance (RRPF). "I do not think engine leasing could ever be as big as aircraft leasing. The leased portfolio has not grown significantly in the past five or six years. There is also lots of competition between lessors for engines to add to portfolios."

Other lessors take the same position as RRPF. "I do not think the engine leasing market is a boom or bust business," says Charlie Willis, president of Willis Lease Finance Corporation. "Short-term leases provide a pressure release valve for airlines, and this negates the need demand for longer term leases. There is only steady growth in the market for medium-/long-term engine leasing. Engine leasing requires extensive technical capabilities, and this holds back fast growth of many lessors. Debt providers also have to sanction deals for many lessors to buy engines, and this also limits growth."

Another source of growth in engine leasing is sale and leaseback transactions. "Airlines have tended to minimise capital investments and preserve cash for other activities," says Cantwell. "Demand for sale and leaseback transactions has increased in the past 18 months, but this should also remain a long-term feature as airlines continue to generate more cash and divest themselves of a portion of their assets. Engines also have a high capital cost. Although a portion of new spare engines delivered each year will be leased, the bulk of growth in engine leasing will come from engines that are already delivered and owned."

This is also contested. Airlines have several choices when financing spare engines. "Many carriers have done the lease versus buy analysis, and decided to finance spare engines themselves," says Arundell. "I expect airlines want to continue owning engines. The engine leasing market has not grown at an exponential rate as originally predicted in 1998. Even the number of large sale and leaseback transactions available each year is limited. Airlines will also refinance engines themselves with debt, and often find it cheaper, and will also manage the residual value. Airlines are also wary of doing sale and leaseback transactions, since they may later decide to extend the period of operation and then have to pay lease rentals for a period longer than originally anticipated."

Vertical integration

Some airlines have sought combined engine maintenance and leasing deals. This has been extended by a few major original equipment manufacturers (OEMs) to include all engineering services required for engines. These include borescoping, condition monitoring, maintenance management, on-wing support, on-wing repairs, aircraft-on-ground (AOG) assistance, and short-term leases and technical support engines.

These were offered in anticipation of a greater number of airlines seeking to outsource all maintenance and management activities. Airlines have therefore been offered all-in engine maintenance, leasing and management packages in the form of power-by-the-hour (PBH) deals and packages. These are sometimes referred to as total care packages (TCP). It was predicted that this would trigger an increased demand from more airlines for PBH TCP deals, and therefore pressure more engine lessors to vertically integrate their services with engine maintenance providers. This would further lead to other services being provided and greater vertical integration.

This has not happened to the extent that was predicted. "We have a partnership with SR Technics and other maintenance providers to provide engine maintenance for our customers," explains Willis. "We can also provide care packages with our partners for airlines that want them, and can provide most services if airlines require them. Most airlines are, in fact, going away from all-in PBH packages, since they have found them to be too expensive overall. They have found by splitting these activities into smaller groups the total cost of the elements is cheaper than an all-in PBH deal."

Several major airlines have terminated their PBH contracts with OEMs and gone back to sub-contracting different elements of their maintenance, engine management and spare engine provisioning to a variety of sources. This lack of appetite has halted the need for engine lessors to fully vertically integrate their services with all engine maintenance and management activities.

Arundell agrees that vertical integration does not appear to be developing as some had predicted. "The development of the market depends on how big the manufacturers get with TCPs. It is hard for independent lessors to offer all the technical services that manufacturers can. The airlines may eventually offload all the technical services, but the rate has so far been very slow."

OEM lessors

The three major OEMs, GE, Pratt & Whitney (PW) and Rolls-Royce, and a small number of engine lessors dominate the engine leasing market and account for the majority of the 800 or so engines that are leased to airlines.

GEEL's portfolio is the largest of all the lessors', with more than 300 engines. This includes a variety of all types from GE, PW, RR and CFMI. The General Electric Group also includes GE Engine Services (GEES) and GE Capital Aviation

Services (GECAS). GEES is able to offer airlines a variety of services, including the full range of engine maintenance and management services.

GEES offers the full range of technical services and can integrate these with engine leasing. GEES has nine engine shops. GEEL offers operating leases, financing and finances leases for spare engine financing.

RRPF's portfolio of engines available for lease should not be confused with the engines Rolls-Royce keeps for product support. "RRPF's portfolio of engines for leasing is about 130, which includes the V.2500-A1/A5, Tay 650, AE 3007, Trent 500/700/800, RB211-535E4 and BR715. RR has offered vertically integrated services to airlines longer than any other company. It can offer the full range of technical support services for RR engines."

Rolls-Royce is able to offer a complete package of technical services to airlines so that its customers can have TCPs from a combination of RRPF and RR. RR now has two on-line services called Aero Manager, which is a condition monitoring service, and Engine Data Sensor, a health monitoring system.

PW Engine Leasing's portfolio comprises about 125 engines. Thus includes a variety of PW types plus the CFM56-3. "We have recently added the CFM56-5B, are considering the V.2500 and will add more PW4090s," says Tom Clary, general manager of PW Engine Leasing. "The PW4000 accounts for the largest portion of our portfolio. We have about 53 94-inch fan engines, seven 100-inch fan engines and seven 112-inch fan engines. We offer both short-term and medium/long-term solutions to airlines. In addition we offer our fleet management programme. This offers shop maintenance, spare engines through leasing, maintenance management and condition monitoring. Demand from airlines is for a series of types of different services, rather than uniform all-in products. We can offer on-wing repairs worldwide and provide all levels of technical services, as well as maintenance management in our engine management group. We are looking to add electronic fault reporting to improve communications. We have added the V.2500 and CFM56-5B to our leasing portfolio and so will add maintenance capability for these two to our shops, as well as all the technical services that go with these two engine types."

PW is one lessor witnessing an increase in engine leasing. "We are also finding that many airlines are looking to offload aftermarket support to third party providers, including more interest in full services. Airlines are buying less spare engines than would be expected, and this is stimulating growth in the engine leasing market," says Clary. "We expect to grow our engine portfolio as airlines offload their older engine types. Engine leasing is growing in parallel with aircraft leasing. Many small airlines, for example, have little engineering capability and are seeking technical assistance packages from third party providers.

"Despite the growth in engine leasing there are many barriers to entry in the engine leasing market. New technology engines have high capital cost. Types like the CFM56 and V.2500 have market values in the region of $6 million and large fan engines for the 777 have values in excess of $12 million," continues Clary. "These high values make it hard for many lessors to add large numbers of engines to their portfolios and take full advantage of the growth in engine leasing."

Shannon Engine Support (SES) is a wholly-owned subsidiary of CFMI, and has a portfolio of 120 engines, an increase from 88 engines, which it had about six months ago *(see Top engine lessor & portfolio survey, Aircraft Commerce, August/September 2002, page 6)*. These are all members of the CFM56 family. SES's portfolio is used for a mixture of about 50:50 product support and medium-/long-term leases.

The number of new spare engines entering the medium-/long-term leasing market each year is small enough to be absorbed by four or five major lessors. The high capital cost of engines is also a barrier to entry for smaller lessors.

SES can also offer several technical services, including AOG. It does not, however, have any engineering capability itself, but is a product support spare engine provider for GEES and Snecma Services. "Technical services can be acquired and integrated with engine leasing by these two companies," says Roger Welaratne, senior vice president of operations at SES. "We have now increased our services to offer a variety of spare engine solutions. These include engine exchanges, short-term lease/pool engines, and medium-/long-term leases. Engine exchanges are a system we offer of swapping an airline's zero-timed engines for a serviceable or time-continued engine from us. Airlines may choose to do this if they prefer not to incur the cost of putting engines through a shop visit."

Welaratne says SES's fleet has more than doubled in the past two years, and because engine values are depressed there are many opportunities for lessors to buy engines cheaply. "Airlines also need cash and are selling engines and leasing them back, which is allowing lessors to expand their portfolios. About 30% of spare CFM56 engines are leased, and the portion will grow. I expect it could be as high as 50%, since it will probably follow the operating lease market. Besides new spare engines fuelling the growth in engine leasing, sale and leasebacks will also contribute to an expansion in the market. We have grown our portfolio in the past six months through sale and leasebacks. Demand for this should remain with a recovery, since it is a good way for airlines to phase out fleets."

Independent lessors

Engine Lease Finance (ELF) is one of the largest independent engine lessors. Its portfolio has grown in the past six months from 120 to 140 engines *(see Top engine lessor & portfolio survey, Aircraft Commerce, August/September 2002, page 6).* This consists of a wide range of engine types, including all members of the CFM56 family, the CF6-50, CF6-80C2, V.2500-A1/-A5, JT8D-200, PW2000, PW4000-94, PW4000-100, PW4000-112, RB211-535C/E4, Trent 700 and AE3007. "We will remove the CF6-50 and ALF 502, but provide cover for a wide range of aircraft types," says Jon Sharp, chief executive of ELF. "We do not have any Stage 2 or turboprop engines. The engine leasing market has grown steadily, but more so in $ value than in engine numbers. The portion of spare to installed engines is falling with longer on-wing times and a larger proportion of twin-engined aircraft. The total growth in the engine leasing market is probably only $500-600 million per year. This increase is also balanced by a large number of retirements, meaning the net increase is small. This could be catered for by a handful of the OEMs and independent lessors alone. I estimate about 38% of new spare engine orders are going to lessors. Growth in engine leasing is also fuelled by sale and leasebacks and this accounts for a similar volume of engines.

"With respect to our own growth, we are happy to add about $250 million of engines to our own portfolio each year, which is equal to about 40-50 engines. This is a large portion of the total annual growth market" says Sharp. "We intend to offer combined maintenance and leasing, and are planning to link with a major engine shop, so we will be able to offer its technical support services as well. We will thus be able to offer airlines any combination of spare engine and technical services package they require. ELF itself does not offer technical services such as borescope, but we can provide AOG engines. ELF is a pure lessor, and we offer several financial products and leases in a variety of currencies."

ELF's portfolio includes most modern types, and the Trent 800 and GE90 are the only major types absent. "While engine leasing will grow, it is hard to finance engine acquisitions since banks do not like providing debt for engines. This is due to concerns over title issues and the high proportion of maintenance value in the total value of an engine, as well as the difficulty in assessing value because of maintenance, "says Sharp. "For these reasons financing rates are high and have several conditions attached, all of which make it difficult for small lessors to acquire significant numbers of new technology engines. The number of banks active in aviation has dramatically reduced, leaving only a finite amount of debt available."

WLFC's portfolio is about 160 engines, an increase of 10-12 units in the past six months. "We have added the two main regional jet engine types, the CF34 and AE3007, to our portfolio," says Willis. As previously described, WLFC can offer technical services to airlines via its partner SR Technics. Like other lessors, Willis expects continued growth in engine leasing as airlines seek to invest less. This will come from new engines and sale and leaseback transactions. WLFC hopes to complete a securitisation on its portfolio to raise $250-300 million, which it will use to double its portfolio over the next two to three years. "We could comfortably add $100-200 million of engines each year, which is equal to 120-150 engines. We could also expand our portfolio by another $400-500 million without adding many more staff."

Volvo Aero Leasing has a portfolio of about 130 engines. The portfolio also includes the JT8D, PW2000, PW4000, CF6-50, CF6-80, CFM56 and V.2500. It also has a variety of regional aircraft engines.

Volvo Aero Leasing is part of the Volvo Aero Group and so can offer technical services through its partner Volvo Aero Engine Services (VAES) at Bromma and Trollhattan, Sweden. VAES can provide technical services for all engine types except the PW4000, CF6-80 and CFM56.

Besides maintenance, these include borescope, condition monitoring, maintenance management, short-term leases, and parts supply and support. "We may add a PBH service for these engines," says Irvin Lucas, vice president sales and marketing and Volvo Aero. "We may also add the CF34 to our portfolio, since it is now a popular engine. We expect the dependence on full services to increase, leading to vertical integration between engine leasing and sister services. While engine leasing continues to grow, there is prime interest about what additional services can be offered around leasing."

GA Telesis is a relative newcomer to the engine leasing market. Its portfolio is rapidly expanding, with 30 engines having been added in the past six months, taking its total to 55. These include various CF6-50 and CF6-80 models. The CFM56-3B/-3C, CFM56-5A, JT8D, JT8D-200, PW4000 and V.2500. The CF6-80, CFM56, PW4000 and V.2500 are all newcomers to its fleet.

GA Telesis offers a mixture of short-term/pooling and medium-/long-term leases. "The values of engines have been falling and this has allowed us to increase our portfolio. We expect a further increase in the number of leased engines," says Abdol Moabery, president of GA Telesis. "Besides growing our portfolio, we are looking to add vertical integration with an engine shop in the long term. We also want to add technical services, such as line maintenance and small repair capabilities. We do not, however, think airlines are showing a high demand for complete one-stop shop services, since they are afraid they cannot get the lowest total cost this way."

In respect of continued portfolio growth, GA Telesis may also add later models of the CFM56 and CF6080. "Our goal is to have about 100 engines by the end of 2003, but this has a huge financing requirement." If this is achieved it will put GA Telesis in the top five of independent engine lessors in terms of numbers of engines. "We are already adding another 14 engines in March 2003, and using equity and debt to finance portfolio growth. We plan to add the CF34, PW2000 and RB211-535E4 to our list of types, as well as additional models of the CF6-80 and CFM56. We see more lenders becoming interested in leasing engines. Engines are easier to re-market than parked or returned aircraft, and there is also not the same level of market saturation with engines that there is with aircraft. Engines also hold their residual values better. Lease rate factors for engines are also higher for engines than for aircraft, especially for short- and medium-term leases. The growth in engine leasing will be particularly fuelled by the increase in sale and leaseback transactions, and if we can finance engines in these volatile times we can expand our market share."

Summary

There is little evidence to show that medium-/long-term engine leasing is growing the levels predicted four or five years ago. The number of new engines being delivered each year and entering the medium-/long-term leasing business can be absorbed by a few lessors, and is not enough to fuel growth of a large number of portfolios. Engine leasing is also unlike aircraft leasing, since engines are more difficult to finance and a higher level of technical capability is required.

The evolution of vertical integration between engine leasing and technical services providers is progressing at an even slower pace. Most airlines are wary of TCP packages, and prefer to divide sub-contracted between several providers. AC