

The engine MRO market has witnessed large-scale consolidation over the past decade. This has been closely followed by a concentration of lessors in the medium- and long-term leasing business. Airlines are now interested in vertically integrated MRO and spare engine provision. How will the market respond?

Preparing for the next evolutionary step in the engine aftermarket

The engine aftermarket has evolved in recent years to one where both maintenance repair and overhaul (MRO) and spare engine provisioning have been consolidated into a smaller number of major players. At the same time airlines are now increasingly looking to revert to their core businesses. One consequence of this is that many carriers are looking for vertically integrated engine MRO and spare engine provisioning from single source providers. This could lead to MRO providers being forced into providing spare engines, either through their own portfolios, or through partnership with engine lessors. This will inevitably put pressure on MRO providers that either lack the financial resources to acquire spare engines for their customers, or are unable to form partnerships with lessors. Further consolidation in the engine aftermarket could then follow.

Aftermarket development

The current fleet of installed engines, powering aircraft with 95 seats or larger, is about 35,000 units. This is divided between new and old technology units. The fleet of new technology engines is dominated by the Tay/BR715, JT8D-200, CFM56-3/-5/-7 series, V.2500, JT9D-7R4, CF6-80, PW2000, PW4000 family, RB211-535, Trent 700/800 and GE90. The combined total of these is about 21,000 (see *Engine shop visit demand & capacity, Aircraft Commerce, August/September 2001, page 25*).

The earlier generation comprises the JT8D, CFM56-2, earlier JT9D variants,

CF6-6/-50 and RB211-22/-524. There are about 13,700 of these engines installed.

The amount of later generation engines will steadily increase as older types retire. This process will be accelerated after the recent parking of older types, in particular more than 250 727s.

These installed engines are supported by about 5,000 units. This spare inventory will grow approximately in line with the installed fleet.

The engine MRO market has changed in the past 10 years to consist of a smaller number of larger providers. This has been stimulated by original equipment manufacturers (OEMs) acquiring or forming partnerships with airline or independent engine shops. General Electric Engine Services (GEES), for example, has nine facilities around the world. Snecma Services and Pratt & Whitney Engine Services each have four facilities. Rolls-Royce has four and has formed another four joint ventures. The independents have also consolidated. MTU now has four shops. Meanwhile, the number of airlines involved in the engine MRO business has decreased. British Airways, Braathens, SAS and South African Airways are just a few examples of airlines that have left engine MRO to third party providers.

Other airlines left in the third party MRO business have either been successful in expanding their share, or have attempted to form joint ventures with OEMs. Lufthansa now has two facilities and a joint venture. KLM was unsuccessful in forming a joint venture with Pratt & Whitney.

In line with the consolidation of

providers, the remaining dominant engine MRO facilities have managed to concentrate their capabilities on the major later generation types. These are the CFM56-3/-5/-7 family, the V.2500, CF6-80 and PW4000. These engines will account for an increasing proportion of the engine overhaul market, which totals in the region of 11,000-13,000 shop visits per year. Later technology powerplants account for about 7,000 of these shop visits. The CFM56 market alone, for example, is about 2,000 shop visits per annum. There are several major providers: GEES, with about 500 each year; Snecma Services (300); Lufthansa Technik (100); Air France Industries (100); United Services (100); MTU (250); and a number of other European airline shops, and Air Canada and Qantas. The CFM56 market is expected to grow to about 4,000 shop visits per year.

Like the number of installed and spare engines, the amount of shop visits accounted for by these later technology engines will increase. This process will therefore increase the total market share for facilities that have managed to attain capability for one or more of these engine types. The OEM's entry into the MRO market has made it harder for other facilities to acquire MRO capability for the CFM56 and other dominant types. The supply of spare engines is also tight.

Engine shops that have relied on the JT8D and JT9D market for many years would like to attain capability for types like the CFM56. Their ability to acquire this capability is almost linked to long-term survival.

General Electric, however, has offered airlines single cost maintenance

programmes for airlines for the CFM56 and other major engine types through GEES. GEES has therefore maintained a large share of the CFM56 MRO market. This has made it hard for other facilities to acquire CFM56 capability.

This has been a main catalyst for the formation of joint ventures, many of which are between OEMs and airlines. Both parties benefit from securing greater market share and swap capabilities for dominant types. Inability to acquire capabilities for new engine types may lead to an erosion of market share. Large airlines that have kept their engine MRO capacity can still acquire new engine capability for the new types their fleet acquires. It will be more difficult for independent shops that have not formed joint ventures.

Further development in the engine MRO business is therefore likely to see the facilities with capability for the dominant later technology engines increase their market share at the expense of those other providers that are unable to repair the same engines.

Leasing

In parallel with this process, the profile of the spare engine market has changed. Airlines traditionally owned most of their spare engines and relied on

the spot market for short-term spares requirements to cater for unscheduled removals. Spurred by the growth in aircraft leasing, an increasing number of owned engines for long-term spare provisioning has been substituted by engines on medium- and long-term leases.

Medium- and long-term engine leasing has grown more slowly than aircraft leasing, because of bankers' reluctance to finance engines. This has changed in recent years, and more relaxed attitudes may see more financing being provided for leased engines.

About 5,000 spare engine units service the fleet of 35,000 installed engines. It is estimated that about 15% of spare engines (about 700) are now powerplants on medium- and long-term leases. This represents an investment of about \$1.7 billion.

Another stimulus to this development has been the desire by airlines to divest in spare engines. While older types represented low capital investment, modern types can cost \$7 million or more. Airlines need an engine inventory equal to 10-15% of their installed fleet size. Spare engines for modern aircraft therefore represent a large investment for an airline.

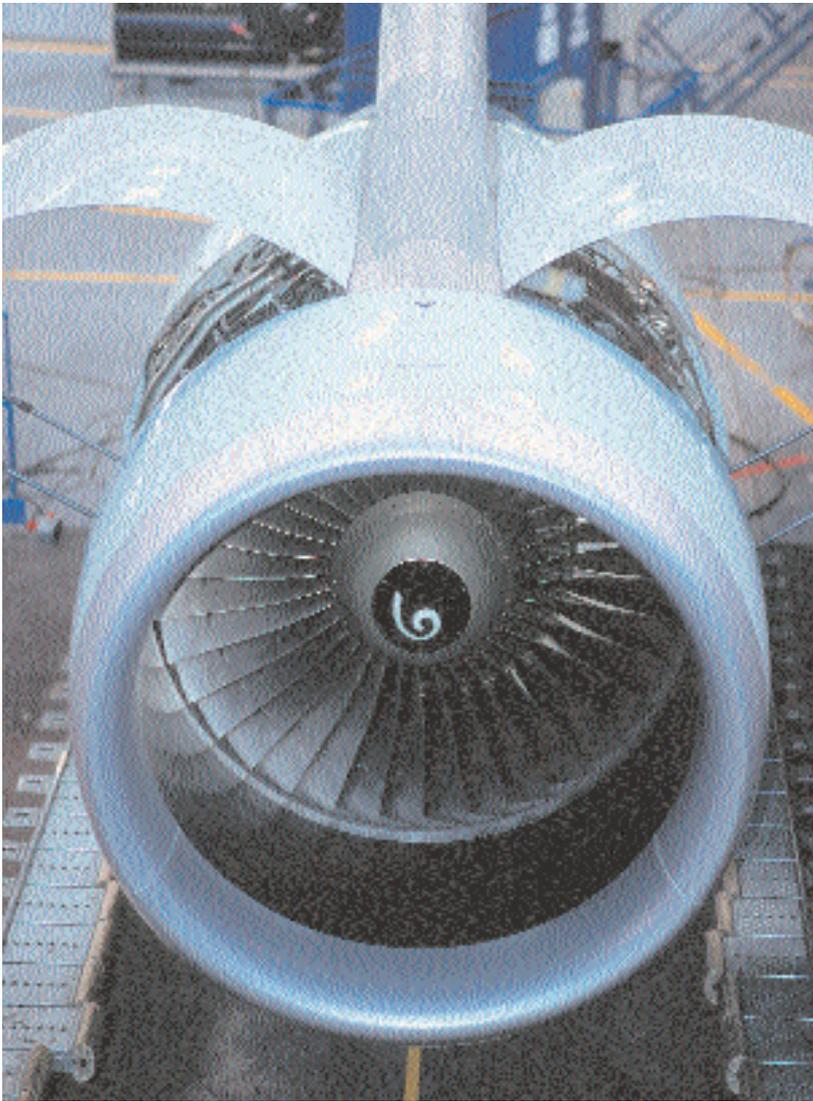
The trend towards reduced ownership is expected to continue, and it is estimated that the number of spare

engines on medium- and long-term leases will increase to as much as 50% by 2010. This would therefore account for about 2,500 engines, worth about \$8 billion, which is a quadrupling of the current investment.

The spare engine provisioning market has already changed in a similar way to the MRO market. A large number of small spare engine providers relied for many years on low capital cost engines like the JT8D and JT9D. These were used in the spot market and were consequently involved in several transactions per year. Lessors had relatively small investments and recouped them over a short period.

The demand from airlines for longer term leases of higher capital cost engines has made it hard for the majority of small lessors to enter the market. The high investment also presents a high barrier to entry for prospective engine lessors. This has left the medium- and long-term leasing market to a small number of major lessors. These include GE Engine Leasing, Rolls-Royce Partners Finance, Willis Lease Finance Corporation (WLFC), Engine Lease Finance (ELF) and Aviation Lease Finance (ALF).

These lessors account for the majority of the 700 leased engines. GE and RRPF each have a portfolio of about 200 engines, WLFC has about 100 engines and ELF about 120. Most of the 700



engines are the CFM56-3/-5/-7, V.2500, RB211-535E4, PW4000 and CF6-80C2.

Like the engine MRO business, the engine leasing market has consolidated into a few players concentrating on later technology engines that have the largest installed fleets.

This has left many other lessors out of the long-term engine leasing business, with few signs so far that many other lessors will emerge because of the high financial barriers to entry. In addition, there will be pressure on non-OEM lessors to maintain market share because of the predicted rise in leased engines.

ELF, for example, has a business plan to double its portfolio of about 120 engines valued at about \$500 million to about \$1 billion in the next two years. WLCF has a similar plan to acquire about \$450 million of engines in the next three years.

These expansions require large financing capability, but are required to maintain their market share against stiff competition from OEMs, in particular GE.

Vertical integration

Airlines continue to concentrate on their core business of carrying traffic. Although many large carriers have opted to remain in the often lucrative MRO market, others have already off-loaded their maintenance facilities. Smaller airlines, which have never had heavy airframe, component and engine maintenance capability, have been offered increasingly sophisticated support packages. These are intended to include more predictable maintenance pricing contracts, engineering, spare parts provisioning and management support.

In the case of engine MRO, small airlines have not only been provided with engine repair, but also engine management by their MRO providers. This has included removal timing, shop visit workscope definition and parts replacement decision making. Airlines using third party engine MRO also rely on their providers to supply access to engines on a short-term basis for unscheduled removals. South African

Consolidation has occurred both in the engine MRO and leasing market. Independent shops have found it hard to acquire CFM56 capability, while lessors are finding it difficult to acquire engines at reasonable values to build their portfolios.

Airways, for example, has divested its engine business and outsourced its engine MRO to Sabena Technics for some of its engines. "We have access to an engine pool for unscheduled removals. This pool is provided by the engine maintenance facility," says Joe Van Niekerk, manager technical marketing at South African Airways. "We prefer this to short-term leasing, since it is expensive. We still own our spare engines to cover for scheduled removals, but would rather not own any spare engines. We would prefer our maintenance provider to supply all our spare engine requirements."

Following consolidation among engine MRO and engine leasing providers, it is now anticipated that the next stage of evolution in the engine aftermarket will come as a result of airlines wishing to further divest themselves of owned assets. While it is estimated that 15% of the current fleet of spare engines are provided on medium- and long-term leases, the growth of this amount to 50% over another 10 years will be spurred by airlines finding ways of investing less in spare engine inventory. The investment in these spare engines is higher than in older technology powerplants, and airlines prefer to preserve cash wherever possible. Airlines will look to MRO providers, as well as engine lessors, to provide them with a larger proportion of their spare engine inventories. "Nobody really wants to own spare engines," explains Franz Weinzierl, senior vice president marketing & sales at MTU Maintenance. "Small airlines have little or no capability to finance spare engines. Many airlines now want long-term leases."

Although demand for more leased engines will put pressure on engine lessors and OEMs to increase their engine portfolios, there will also be pressure on airline and independent MRO providers.

RR and RRPf have already provided airlines with the facility of integrated engine MRO and spare engine provisioning for many years. GE and GEES already provide a vertically integrated service of combined engine MRO and spare engine engines. That is, airlines have a single-source provider for

all their engine management needs and dispense with the need to own any spare engines. While this product hands over full control from the airline customer to the engine MRO and spares provider, it enables airlines to avoid the high investment in spare engines. Spare engines are thus leased.

It is now expected that airlines will seek more of these vertically integrated services, allowing them to divest themselves of their spare engine inventories. This will trigger a new stage of development in the engine aftermarket.

This demand for vertical integration will put added pressure on other MRO providers, since airlines will find such vertically integrated engine packages attractive. Airlines will thus put their MRO providers under increased pressure to offer similar services to GE/GEES. This will require extensive investment in spare engines, and many MRO providers will have neither the financial resources nor the appetite to make such large investments. They will, however, need to offer this service to maintain market share.

Development

It is anticipated that vertically integrated services will be the next stage of development in the engine aftermarket,

and the most aggressive MRO providers in the market are already investigating ways to offer them. Lufthansa Technik concluded a sale and leaseback transaction of some engines with one of its customers, Air Lanka, in mid 2001.

GE is not alone in offering this service. WLFC has already formed a strategic partnership with SR Technics, which now owns 7.5% of WLFC. This equity injection has provided WLFC with leverage to raise further debt. This will enable it to acquire a planned \$450 million of assets over the next three years. "We already have a partnership with SR Technics where we provide spare engine provisioning for their engine overhaul operation," says Charlie Willis, president of WLFC. "We certainly expect an increased demand from airlines requiring their MRO providers to supply more spare engines on lease in a vertically integrated package. Even big airlines, which traditionally have not leased spare engines, are now getting into more sale and leaseback transactions. We are now looking for other partners to expand this integrated service. We are trying to increase our relationships with MRO providers and OEMs."

The demand for these integrated packages pose serious threats to MRO providers unable to form relationships with engine lessors. WLFC is in the

process of forming lease engine pools, and Willis says that MROs could sign up to this pool for short- and medium-term leases to offer its customers a larger number of spare engines.

MTU has already established a business group called Engine Pool Services. "This is for unscheduled events. It is expensive for MTU to invest in a portfolio of engines, but we are part of Daimler Chrysler and so this makes it relatively easy for us to borrow money because our parent has a high credit rating. We currently have an inventory of 20 or more engines on short- and long-term leases. We will increase this further by sale and leaseback deals," says Weinzierl "but we will probably need a partnership with an engine leasing company to offer long-term leases."

AAR also sees vertical integration between engine MRO and leasing as the next stage of evolution in the aftermarket. "A number of US and European airlines have been looking to support their MRO customers with more complete services, and there has also been growing interest in this from airlines in the past 12-18 months," says Bob Peart, senior vice president and general manager of AAR Engine Sales & Leasing. "AAR is trying to take advantage of this by trying to support this expected development. We have been active in shorter-term engine

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leases, that is those up to one year, for some time. We are now aiming to balance this with medium-term leases, those between one and seven years. The important types are the later technology engines, which dominate the MRO market. These include the CFM56-3/-5/-7, CF6-80C2, V.2500-A1/-A5, PW2000, PW4000 and to a lesser extent the RB211-535E4.”

Historically, demand for vertically integrated services of this nature has come from smaller airlines. “Interest is being shown by airlines of all sizes,” says Peart. “Airlines want a one-stop shop. The large carriers offering MRO want to compete with OEMs, but also want leased engines for their own purposes. We lease engines to Delta for its own needs, as well as to service its customers. There are large airlines that sub-contract their engine MRO and these have also expressed an interest in vertically integrated MRO and spare engine packages.”

AAR is attempting to position itself so that it can grow this portfolio. “Our portfolio is currently about 35 engines, but we intend to expand this by more than another 40 units of the most important types. This will be done over the next 24 months. The average price of an engine of the types mentioned is \$4-5 million, so the investment will be in the region of \$250 million. We have decent liquidity and so far have used regular bank loans to finance engines, but could use securitisations for larger acquisitions.”

Besides financing, non-OEMs will face problems in acquiring engines when expanding their portfolios. Independent lessors and MRO providers can buy engines direct from the OEMs, but are likely to pay high prices. Alternative methods are concluding sale and leaseback transactions with airlines. Airlines will either no longer want to own engines or will be phasing out certain engine types.

Consolidation in the MRO sector and engine leasing has occurred to such an extent that those not involved in the dominant engine types will find it increasingly hard to maintain market share and presence. The important types are the CFM56-3/-5/-7, V.2500, CF6-80, PW2000, PW4000 and RB211-535E4.

MRO & lessor imbalance

The most significant problem faced by MROs is that their numbers far outweigh the major engine lessors, of which there are only five or six. GEES is vertically integrated with GE Engine Leasing, while Rolls-Royce Aero Engine Services is integrated with RRPf. This leaves the remaining engine shops to form partnerships with ELF/ALF and WLFC, which will put pressure not only on MRO providers, but also on these independent lessors. ELF/ALF and WLFC, however, already have plans in place to expand their portfolios by a factor of about two from the current levels of 120 and 100 to 240 and 200 engines each. To maintain their market shares they will each need to have grown their portfolios to about 375-400 units in 10 years if the projected market of 2,500 leased engines is reached.

“Maintenance providers are in general looking at how they can provide combined MRO and leased engines in a single package,” explains Jon Sharp, chief executive of ELF. “Airline and independent MRO providers will either have to lease engines themselves, or get involved with lessors like us.”

The imbalance between engine lessors and MRO providers could stimulate the emergence of more engine lessors. Peart sees no reason why other lessors cannot emerge. The limiting factor in engine leasing has been banks’ unwillingness to provide financing. Several new aircraft lessors with banks as parent companies have emerged in recent years, and several new engine lessors could follow on the same basis. Managing engines under lease, however, requires high technical expertise. “Engine leasing companies require a high level of asset management capability, as do current engine lessors. This would have to be considered for potential new start-up engine lessors,” says Peart.

Weinzierl agrees that there is probably no reason why more engine leasing companies could not emerge, but also stresses that they would need more asset management skills than would aircraft lessors. “Engine leasing is more complicated than aircraft leasing, and an engine lessor would need a strong technical branch.”

