

The entry of OEMs into the engine aftermarket in recent years has made a dramatic impact on the smaller players. These have relied for years on the JT8D and JT9D, but with these now diminishing, they will be more challenged to find new business.

Is there life after the JT8D & JT9D?

For many years there has been a plethora of engine traders, brokers and lessors that have survived on the back of the JT8D and JT9D aftermarket business.

The players are too numerous to mention, but include AAR, Ages, American Aircarriers, Aviation Sales, Avteam, International Air Leases, Kellstrom and Willis Lease Finance Corporation.

Because of a variety of factors, the large volume of business from these two engines has collapsed in recent years. Engine manufacturers have also entered into the aftermarket of other types on a large scale. What options are there now for JT8D and JT9D aftermarket specialists, and how must they evolve to ensure their survival?

JT8D & JT9D business

The volume of aftermarket business for these two engines remained plentiful for many years.

The JT8D, in particular, provided players with many opportunities. The engine powered all narrowbody types for an extended period, and a large number were manufactured. Despite their high cash operating costs compared to modern counterparts, the 727, 737-200 and DC-9 maintained their position as workhorses. The bonus was the 727's natural progression to the freight market. This kept the JT8D active.

Pratt & Whitney left the aftermarket to independents. The number of engines was so large that most of its operators could depend on the aftermarket for ad-

hoc support. This was an alternative to the more conventional management of maintaining an inventory of spare engines, managing shop visits and buying spares and parts from the original equipment manufacturers (OEMs). Airlines sought a large number of support options from the JT8D aftermarket.

These included short-, medium- and long-term leasing, engine swapping, module exchange, teardown for parts, sale and leaseback and straightforward purchase.

The JT9D enjoyed similar status in the widebody sector for the same reasons. The JT9D powered all early versions of the 747 and large numbers of various other types that remained popular.

The JT8D and JT9D remained buoyant on account of strong traffic growth and demand for used aircraft powered by these engines.

Because of their large numbers, the JT8D and JT9D became engines that airlines could depend on for the aftermarket and thus avoid having to hold spares and putting them through shops. This led to a rollercoaster of engine supply, values and lease rates.

When supply became tight and values had peaked, airlines found it more economic to lease spare engines rather than buy and put them through the shop.

In these circumstances, the aftermarket quickly adapted to breaking engines for parts and selling them to repair shops. Engines could also be leased for short terms at high lease rate factors, or even sold for high market values.

A short supply of freshly repaired or time-continued engines would thus lead

to an increase in shop visits, leasing and breaking activity. This would be followed by a rise in the number of repaired engines.

A larger supply of useable engines would reduce values. Aftermarket players would change their activity from leasing and breaking to buying engines at low values. They would also take advantage of an increasing number of airlines that wanted to avoid expensive shop visits, and seek module exchanges and swaps of run-out engines for time-continued ones.

JT8D & JT9D decline

The rollercoaster of values and business was generally accepted as a way of life for those in the engine aftermarket, and never gave too much cause for concern. In recent years, however, values and lease rates have fallen faster and more steeply and recovered to a smaller degree than they did in the past.

This has been due to a number of factors. The 727 was expected to continue being converted to freighters in the same numbers as in the past, but recent ageing problems and the availability of other types has diminished the number being converted. Noise issues and general ageing of the 727 has also persuaded some freight carriers to retire them. The same issues have also limited the aftermarket for the 737-200 and DC-9, thus stifling the JT8D aftermarket.

There were also large 727 fleets operated by major passenger airlines, which were suddenly all retired. The age and condition of many has meant they are not attractive conversion candidates.

SUMMARY OF GLOBAL ENGINE FLEET, SHOP VISITS AND SPARE INVENTORY

Engine type	Number of installed engines	Number of annual shop visits	Number of spare engines
PW4000	1,964	614	249
JT9D-7R4	278	122	51
JT9D-7	1,641	646	244
GE90	178	95	39
CF6-80	2,733	916	353
CF6-50	1,287	449	173
CF6-6	734	247	93
Trent 700/800	220	70	32
RB211-524G	510	174	70
RB211-524	296	156	61
RB211-22	522	106	43
PW2000	758	298	113
JT8D-200	2,362	1,061	387
JT8D	7,316	1,752	648
JT3D	1,988	196	76
CFM56-5	680	231	89
CFM56-3/5	6,252	1,471	539
CFM56-2	424	52	22
RB211-535	1,038	226	87
V.2500	1,090	293	115

These effects have all combined to cause an oversupply of JT8Ds, and it is estimated about 300 engines passed out of operation in 1999. It is also anticipated a similar number will come out of the active pool this year.

The JT8D-powered aircraft have suddenly, therefore, finally reached their inevitable retirement, albeit more abruptly and earlier than anticipated.

The early 747s and other models powered by the JT9D have met a similar fate. The 747 secondary market has always been limited. Delivery of new widebodies to first-tier passenger carriers caused an oversupply of freight capacity, thus diminishing demand for 747 freight conversions. Older aircraft that had failed to get converted were too late, and large fleets belonging to carriers such as United and British Airways only had the option of being cannibalised for parts, leading to a further glut of JT9Ds.

The 747 freight conversion market remained slow long enough for any 747-200/-300 coming on to the market becoming surplus to requirements. The exception has been the expansion of Atlas Air, albeit with strictly CF6-powered 747-200s. This spurning of JT9D-powered aircraft exacerbated the JT9D's oversupply.

Besides aircraft retirement and general oversupply, the aftermarket has also been changed by the entry of OEMs on a large scale. OEMs have changed the shape of the business by offering airlines fixed rate power-by-the-hour (PBH) maintenance, and spare engine and parts provisioning deals. These deals can be extended in some cases to include buying all spare engines when a fleet is retired. This has reduced airlines' need to find spare engines, parts and shop visits on an ad-hoc basis from the aftermarket. The OEMs have also acquired many of the larger and prominent aftermarket players. The overall effect has been to reduce the volume of aftermarket business for the remaining independents.

Market evolution

The lack of competition from OEMs made it easy for aftermarket players. The JT8D and JT9D market could be entered with relatively small amounts of capital when engine values had reached a trough. The volume of business from these two almost guaranteed values would increase again. This would generate profits and make it possible for players to increase their portfolios.

The entry into the aftermarket of OEMs with large amounts of capital has

posed a serious threat to aftermarket players. OEMs can offer a vertically integrated product — and can afford to undercut the aftermarket. The only way aftermarket players have been able to respond is to become vertically integrated themselves and offer a similar range of products.

Besides evolution of strategy, the other important issue for the engine aftermarket players is what engine types will provide them with the same volumes of business that the JT8D and JT9D have.

The first indication of this is to analyse the number of each type of engine in operation. Naturally the most numerous will provide the biggest opportunities. This is a simplified way of looking at it, however, since OEMs have captured the aftermarket of certain types.

A summary of each engine type, its installed number on the global fleet, the estimated number of annual removals for shop visits and estimated number of spares required to service each fleet is given (*see table, this page*).

A quick examination reveals the CFM56 is the only engine with a similar volume to the JT8D that could provide aftermarket players with a similar amount of business. The number of delivered CFM56s is also due to increase by at least another 3,000 units.

The other engines that exist in large numbers are the CF6 series, PW4000, and JT8D-200.

Sheer numbers do not provide a simple answer. RR is one OEM that has always maintained control of the aftermarket of its engines. This rules out any aftermarket activity by independents.

With respect to other engines, certain considerations have to be taken into account, such as: the age of the fleet, if it is being phased out or remains popular, if a type is popular in the freight conversion and secondary market or whether the secondary market opportunities are unclear, and whether or not the OEMs have already dominated the aftermarket.

Narrowbody engines

The first natural successor to the JT8D would seem to be the MD-80 engine: the JT8D-200 series. There are about 1,100 MD-80s dominated by 11 large fleets. These have just begun to be retired, but the secondary market for the type is unclear. It is unlikely to become popular in the freight conversion sector.

"The future for the -200 series is bright," claims Charlie Willis, president of Willis Lease Finance Corporation. "There were only a finite number produced, and as they get retired and split up more support will be required in terms of parts provisioning and engine leasing. The key to survival in the engine aftermarket is integration into parts

service and overhaul, as well as leasing”.

Not all players see the JT8D-200 as a good gamble. “The soft market for the baby JT8D has been followed by the -200,” explains Bob Peart, senior vice president and general manager of AAR engines sales & leasing. “This is because of retirements by major airlines, leading to inventory engines becoming available. The demand for -200s is now more for just short-term leases and aircraft on ground (AOG) situations. Airlines phasing out their fleets are taking the risk of not having spare engines in the last years of operation. This has softened short-term lease rates”.

This leaves the CFM56 as the only major narrowbody engine with potential of providing a high volume of stable business. “The CFM56 is the JT8D’s natural replacement,” says Bob Nicholls, chief operating officer at Aeroturbine. “This does not make transition from one to the other easy. The CFM56 has stable market values in the \$5-6 million range, while the JT8D could be got into more easily when values were in a trough. This, and encroachment by the OEMs, means the number of new entrants will be limited. Successful companies are likely to be the established ones and those that have diversified into parts and overhaul, although this requires lots of capital.

“The main business in the CFM56 is leasing of all type of lease terms. Their high values mean it always makes sense to put them through the shop, rather than do engine or module exchanges. It is also too early to buy engines and break them for tradable parts. That is, the supply of engines is tight and values are high. The CFM56-3’s list price also went up by \$1 million. It will be another 5-10 years before the CFM56 becomes a trading engine”.

The CFM56 is still a workhorse and spare engines are hard to find. The situation is likely to get harder, since on-wing times are getting shorter. This also makes it difficult for aftermarket players to get into the CFM56 business. “These factors are making airlines feel exposed, and this is driving demand for one- and two-year leases,” explains Peart. “Longer leases of 5-7 years are also good, because airlines prefer them and they make good residual value profits for investors. While CFM56 business is profitable, it is limited in quantity. This is because many airlines and engines are tied up in PBH maintenance and spare engine contracts”.

Widebody engines

While business for early JT9D variants has fallen, there are still some

business opportunities. “The -7J and -7Q are still good for exchanges. There are some grounded 747s and lessors have needed to swap engines to make aircraft serviceable, but values are right down,” says Peart. “Business for -7R4s is still good”.

The first engines to follow the JT9D are the CF6-50 series. Dominated by the 747-200, A300B4 and DC-10-30, there is now a surplus of engines. Although the CF6-powered 747-200s are popular, large numbers of scrapped and parked A300B4s and DC-10-30s have caused a glut of engines. The number of A300B4s converted to freighter is only likely to be another 20, while the rate of DC-10 conversion is lower than forecast. “The CF6-50 market is soft, which has made it easier for competitors to enter the market and offer airlines exchange deals,” explains Peart. “As a consequence, shop visit activity is down. There are still a few opportunities in CF6-50 business, but this is basically in displacement of overhauls”.

The later CF6-80 series powers more types of a greater number of active aircraft than the -50. “The -80 is still in high demand and values are high. This rules out exchanges,” says Peart. The CF6-80 is good for medium-term leasing. Some airlines are now beginning to phase out the aircraft types and are looking for



sale and leaseback deals on engines. There is still an acceptable level of risk for lessors. Some lessors are prudent and pay only discount rates for -80s, since sale and leaseback deals depend on residual values. “The CF6-80 is coming to the forefront,” says Bill Cumberlidge, executive vice president of The Ages Group. “There are few spare engines in the fleet because of the long time between overhauls. This shortage could provide traders with some opportunities. One good one is buying engines for teardown and selling parts”.

This leaves just the PW4000-94 as the last major engine for traders and aftermarket players to exploit business opportunities. “The PW4000 is akin to the CF6-80, in that both power a similar number of the same aircraft types,” says Peart. “It is hard to find homes for complete engines and quite a large number are coming out of the Asian market following fleet changes

to larger types. One particular example is MD-11 retirements. This has led to a lot of teardown activity for parts sales”.

While the PW4000 and CF6-80 are natural JT9D replacements, the later engines have higher values and so present an obstacle for many traders. “Many JT9D players will attempt to become CF6 and PW4000 traders,” says Nicholls “but there will be a smaller number because of capital limitations. Another problem is the diversification of OEM support activity, making it harder for traders to get into the aftermarket”.

Long-term view

Besides analysing what engines might be able to provide short-term business opportunities, engines traders have to take a look at the long term.

“The aftermarket is depleting in its scope to provide players with business,”

Engine aftermarket players will only be able to compete with OEMs for business in the most popular engines by offering fully integrated repair, spare engine, parts supply and financing products.

says Cumberlidge. “The problem is, engines like the CFM56 which should replace the JT8D are being tied up by the OEMs in PBH deals for maintenance, parts and spares. Also, technical advances like longer on-wing times also means fewer spares are required, making it harder for traders to find newer technology engines.

“Overall, it is harder to get into the aftermarket. Traders have to get into deals right at the beginning with airlines and offer a fully integrated service in the same way the OEMs do. These are cradle to grave services, which include repair and overhaul, parts provisioning, spare engine leasing and financing and trading of used engines,” Cumberlidge explains. “Examples of opportunities that still exist are buying engines from mega aircraft lessors that have secured purchase discounts, and then leasing the engines. Another is doing a deal with an airline on engines when it does sale and leaseback on aircraft”.

Vertical integration is generally accepted as being the way forward to compete with OEMs. “Airlines want service from their point of view, comments Willis. “Airlines want alternatives to the OEMs to maintain a level of competition. Providing a real alternative is only way forward for most players”.

