

There are large numbers of quality aircraft available at attractive rates, and several airlines have taken the deliberate policy of operating used fleets. Analysis shows these have competitive cash operating costs and can provide airlines with reliable capacity for a low capital outlay.

# Used aircraft: risk or a bargain?

The surplus of aircraft on the market over the past three years has led to a drop in lease rates, and values and provided airlines with an opportunity to acquire aircraft at bargain rates. This drop applies to all aircraft types generally, and so the most modern types have been available at attractive rates. Older types have also experienced reductions in lease rates and values, and have been available at even more economic rates. Despite the older technology of types like the Fokker 100, MD-80 and 737-300, some carriers have taken advantage of the situation and developed fleet strategies around these aircraft. This raises the question of whether their higher cash operating costs affects their overall economics, and if there might be possible problems relating to technical support.

## Market conditions

The surplus of aircraft in the recent downturn differs from previous recessions. In previous industry slumps, the quantity of surplus aircraft, as well as market values and lease rates, was a reliable indicator of the depth of the recession. The majority of stored and available aircraft were potential candidates for returning to operation. The current recession differs in that parked and available aircraft have included a large number being parked as a result of final retirement. These include most 727s, DC-9s and 737-200s. This has given the incorrect impression of the numbers of available aircraft on the market.

There has also been a large number of

second and third generation narrowbodies available. Second-generation aircraft include the Fokker 100, MD-80, 737-300/-400 and 757-200. Third-generation aircraft include the A320, 717 and 737NG.

The number of parked aircraft rose dramatically after 11th September 2001, but was also added to by airlines like Swissair, Sabena and Khalifa ceasing operations, and by the difficulties of a continuing industry slump. Moreover, few aircraft have been taken up for conversion to freighter, despite low values.

The 737-200 is less attractive than the Fokker 100 and MD-80, because of its age, and EFIS-equipped flightdecks. The 737-200 is also overshadowed by the younger 737-300 with lower cash operating costs and higher seat capacity.

A total of 278 Fokker 100s were built. The largest fleet was operated by American, which had 75 and now has 37 left. The airline lost one aircraft and has five going for salvage. Fourteen were purchased by AirFleet Credit for lease to Helvetic. Others were purchased by Austrian Airlines and Jetsgo. American has leased in four aircraft, giving it a fleet of 37.

There are other major fleets, and several other airlines are considering acquiring the Fokker 100. USAirways has now placed 36 of its 40 aircraft, and Midway and Air Liberte have also disposed of most of their fleets. TAM in Brazil now has the largest remaining fleet, but may continue to operate its aircraft for some years. Portugalia also has a small fleet, and Mexicana may replace its aircraft with Fokker 100s.

There can be no doubt about the large number of MD-80s in operation, and the adequate supply of good examples with almost 1,200 built. Several fleets have already been dispersed in recent years, and more aircraft are becoming available. As an example, there is a request for a proposal to sell more than 20 SAS aircraft.

## Market rates

With availability of aircraft high, airlines have had a lot of aircraft to choose from. One key issue is the difference in lease rates of latest- and older-generation aircraft. Only a large gap in lease rates between the group that includes the A320 and 737NG and older types such as the Fokker 100, MD-80 and 737 Classics would favour the older types. The large number of all available aircraft has meant all airlines have been able to acquire modern-technology fleets.

Lease rates for older types were already under pressure prior to August 2001 due to a general lowering of rates for modern types by the major operating lessors.

MD-80 series market values and lease rates have progressively fallen, with aircraft constantly being coming available. MD-80s broadly fall into the two categories: older, non-EFIS flightdeck aircraft; and younger, EFIS-equipped aircraft. Market values of older examples are in the \$2-4 million range, with lease rates about the \$50,000-80,000 per month level.

Market values for Fokker 100s are at a similar level. Estimates for current market values for MD-82/3s in an as-is



*Helvetic is one carrier that has a strategy which enables it to operate with used aircraft. The airline has a philosophy of simple management and only operates a single-type fleet. The Fokker 100's capacity suits its requirements and was the most economic option available.*

condition are in the region of \$5.5 million, although some aircraft can be acquired for less than this. This capital cost is low when the average age of nine to 10 years is considered.

The 737-300 suffered with the slump. Market values have struggled to reach base values, and are currently in the \$10-13 million range, with lease rates correspondingly at \$65,000-110,000 per month.

Younger aircraft came under pressure, although rates for some have begun to increase again in recent months.

Prior to the onset of the downturn, market rates for 737-700s were in the region of \$250,000 per month, and as low as \$85,000 per month for 737-200s. Market rates for A320s were in the region of \$150,000 for some examples, a drop of more than 50% from pre-recession levels. Although demand for aircraft has improved, some lessors still have deliveries of large numbers of aircraft, and production rates by Airbus and Boeing are still high. Airline utilisation rates are relatively low and could increase with demand. This indicates that traffic recovery still has some way to go before demand for additional aircraft increases at a higher rate.

The A320 family aircraft accounted for one of the largest surpluses during the recession. Market values and lease rates are still soft due to supply. Aircraft built in the early 1990s have values in the \$12-15 million region, and lease rates are about \$125,000. Better quality, younger aircraft equipped with more recent engine models have market values of more than \$20 million.

Values and lease rates of 737NG types were similarly hit, but did not fall

to such low levels. Production of A320s has remained high, while the number of 737NGs being manufactured were cut back, and values and lease rates were held up to a degree.

Values of 737-700s/-800s are back up at base value of about \$34 million, and lease rates have risen to \$300,000. This compares to rates of \$220,000 that were available in 2002, the lowest point of the recession.

### Operating economics

The age and technology levels of older aircraft account for their lower lease rates, but for airlines to consider them, types like the Fokker 100, 737-300 and MD-80 need to have lower costs per available seat-mile (ASM) than the modern alternatives.

On a comparative basis, similar-sized older and younger aircraft will have the same crew-related costs, and so fuel and maintenance will be the main operating cost elements that influence total costs.

Older types have to be examined in relation to alternatives. The Fokker 100 is slightly smaller than the 737-200. Modern alternatives to these are the 737-500, 737-600 and 717. The Embraer ERJ-190/-195 will also provide similar capacity, but the ERJ-190 is not due to enter service until 2005, and will become available to airlines in larger numbers a few years after this, so it cannot realistically be considered.

The Fokker 100 has the lowest fuel burn of all these aircraft, which is not surprising given the Fokker 100's low gross weight. By comparison, the 717 has a 4-5% higher fuel burn on stage lengths of 200-500nm, the 737-600 about 6% higher burn, the 737-500 13-14% higher

burn and the 737-200 45-55% higher burn.

The three main elements of maintenance cost are airframe, engine and component charges. Engines account for a large percentage of maintenance costs. The Fokker 100's Rolls-Royce Tay 620/650 engines have average removal intervals of 8,000-10,000 engine flight cycles (EFC) which contribute to competitive maintenance costs. Engine maintenance reserves total about \$280 per flight hour (FH).

Fokker Services provides extensive airframe check and component support for the Fokker 100, as do several other maintenance suppliers. Total cost for airframe and component maintenance cost is in the region of \$450 per FH.

Alternative aircraft have similar engine removal intervals. Mature CFM56-3B1s operated on the 737-500 will have engine maintenance costs in the region of \$125 per engine flight hour (EFH) (*see CFM56-3B1/B2/C1 maintenance cost analysis, Aircraft Commerce, February/March 2004, page 27*).

This compares to the CFM56-7B18/20 powering the 737-600. The engine's high exhaust gas temperature (EGT) margin means initial removal intervals are expected to be long, and will probably be about \$90/EFH for the first two removals, rising to \$145/EFH thereafter (*see CFM56-7 maintenance: a preliminary analysis, Aircraft Commerce, April/May 2002, page 20*).

The 'Baby' JT8D series powering the 737-200 will have engine maintenance reserves in the region of about \$125/EFH.

Total cost per FH for airframe and component maintenance for the 737-500 is in the region of \$550 per EFH, while it

is lower at \$510 per FH for the 737-600 (see *737NG delivers promise of maintenance efficiency, Aircraft Commerce, December 2003/January 2004, page 25*).

The 737-200's airframe- and component-related maintenance costs will total in excess of \$600 per FH.

Overall, the Fokker 100 is therefore able to offer competitive fuel and maintenance operating costs compared to its closest competitors. Other cash operating costs, such as flight crew, may be less than the various 737 variants because of the Fokker 100's regional aircraft status. Combined with its low lease rate this gives it a trip cost and ASM cost advantage over other 100-seat aircraft.

The alternatives to the MD-80 and 737-300/-400 are the 737-700/-800 and A320. Again, all costs other than fuel and maintenance will be similar for these types. The MD-81/82/83 has the highest fuel burn of all these types on a 600nm sector. The 737-400, which is closest in size to the MD-80, has a fuel consumption that is only about 6% lower than the MD-81's and 9% less than the MD-83's.

The A320 is the next closest aircraft, and has fuel burn 20% lower than the MD-80's. The MD-80's size puts it halfway between the 737-700 and -800. The -700 has a 20% lower consumption and the -800 a 12% lower burn. Overall, these differences put the MD-80 at a disadvantage of about \$100-300 per trip over the alternative aircraft at current fuel prices.

In terms of airframe- and component-related maintenance costs, the MD-80, 737-300/-400 and A320 are all similar at

about \$550 per FH. The MD-80 and 737-300/-400 both have a large number of maintenance facilities and component support suppliers that reduces the risk of operating these aircraft. The 737-700/-800 has a lower cost of about \$70 per FH.

Engine maintenance costs account for the largest differences in maintenance costs between these aircraft. The JT8D-200 powering the MD-80 has reserve of about \$165 per EFH. This is with removal intervals of about 4,000EFC. These can be longer with good engine management, and so approach \$135 per EFH.

This compares to about \$125 per EFH for the CFM56-5B and \$134 per EFH for the V.2500-A5 powering the A320, \$135 per EFH for the CFM56-3B2 powering the 737-300, and \$125 per EFH for the CFM56-7B powering the 737-700/-800. The JT8D-200's reserves can be up to \$30-40 more per EFH compared to other engines. The MD-80's engine maintenance can cost \$60-80 per FH more than the alternative aircraft. With good engine management and longer intervals between shop visits, the JT8D-200's simplicity can reduce its disadvantage to \$10-20/FH, however.

The MD-80 can thus overall have similar maintenance costs to the 737-300/-400, and maintenance costs about \$80 per FH higher than the 737-700/-800 and A320.

The MD-80 can thus have combined fuel and maintenance costs about \$100-200 per FH higher than the 737-300/-400, \$380 per FH higher than the 737-700/-800 and A320. The MD-80 can offset these higher fuel and maintenance costs by its lower market lease rate. At

utilisation rates of 220FH per month, the MD-80 would need a lease rate \$25,000-45,000 per month lower than the 737-300/-400 to have similar trip costs.

### Indirect operating costs

Besides direct cash operating costs, airlines have to consider other indirect costs that are influenced by the aircraft selection decision.

One cost element is for support in inventory of line replaceable units (LRUs). This is determined by several elements, including the reliability, market value and repair costs of the LRUs. While the MD-80's LRUs, for example, may have poorer reliability than those of the A320 or 737NG, components used on older aircraft are generally in higher supply and are cheaper to acquire. Investment of LRUs is also related to fleet size and the ability of aircraft to share parts. Modern aircraft families can offer different seat numbers and share components. The alternative of a mixed fleet of 737-200s and MD-80s does not allow this, and so requires a larger stock of LRUs for support. Their initial acquisition cost may overcome this, however. This is not an issue where airlines operate a single type or fleets of each type that number more than about 30 aircraft.

The disadvantage that older aircraft may have in respect of LRU inventory and technical support is that it may become more expensive and harder to acquire as aircraft age. This is largely a function of the total number of a type built and its geographical spread and number of airlines that operated it. The MD-80, 737-200 and 737-300 are in a



*The MD-80 is operated in large numbers by a small number of airlines. MD-80 market values have fallen to less than \$5 million and airlines are able to acquire sisterships in large groups. This combined with its durable airframe and engine reliability makes the MD-80 an attractive proposition for airlines.*

strong position in this respect. The Fokker 70/100 were built in relatively small numbers and operated by a small number of airlines, and so may be viewed as having a higher risk element. This may partially explain why their market values and lease rates are low compared to their age.

Another indirect cost to consider is that of pilot training. Gaining an initial rating will incur similar costs for all types, but transition training to a new type is much higher between aircraft that have no flightdeck commonality or are not members of an aircraft family. Airlines which operate several older types will incur costs of transition training when their pilots acquire a rating for a new type, while those flying the 737NG and A320 families or single fleet types will not incur these charges.

## Airline strategies

The similarity in fuel and maintenance costs and low lease rentals of older aircraft indicates there is a market for them where they suit the strategy of some airlines.

A number of carriers have acquired used Fokker 100s and MD-80s in recent years. While it is usual for second- or third-tier airlines to operate used aircraft as a deliberate policy, Austrian Airlines has acquired nine Fokker 100s as an intermediate aircraft to suit its 100-seat requirement.

Austrian is a member of the Star Alliance and several carriers were evaluating large regional jets. The evaluation campaign was chaired by Vagn Sorensen, president and chief executive officer of Austrian Airlines. "Lufthansa, Austrian, SAS and Aircraft Canada had

an explicit need for large RJs, and Austrian negotiated a deal with the manufacturers that was available to the rest of the alliance members. The intention was to get a common specification for the selected aircraft," explains Sorensen. "Air Canada has already chosen ERJ-190s and CRJ700s, while Lufthansa and SAS have yet to decide which aircraft they want. Austrian selected the Fokker 100 as an intermediate aircraft. Ideally several airlines would choose the same aircraft, but this is difficult. The Star Alliance is also not a legal entity and so cannot place orders for aircraft. Selecting a single type would make operations easier, however, since several members could share an aircraft on their network when it met their requirements. One example is the 7E7 for which more than half the airlines in the alliance are potential customers."

Austrian has acquired nine Fokker 100s and placed an option for another six. The first nine aircraft are operated on the carriers' short-haul routes to Central, Eastern and Western Europe by its regional subsidiary Austrian Arrows, which operates aircraft with less than 110 seats. Sorensen explains that the Fokker 100s have been used to replace Fokker 70s on routes where traffic volumes have grown. The airline also had a fleet of MD-87s, but Sorensen points out that these were relatively expensive and the option of Fokker 100s provided commonality with the Fokker 70. Austrian Arrows' cost structure makes the Fokker 100 cheaper to operate than the marginally larger MD-87, which would be operated by Austrian Airlines with a higher cost structure.

"We also examined the ERJ-190 and CRJ900," says Sorensen "but these have

a high capital cost and the Fokker 100 provides an economic solution as an intermediate aircraft for the next four or five years. The ERJ-190 will then become available in larger numbers by this time.

"The enlargement of the European Union meant we needed additional capacity straightaway. The Fokker 100s are ex-American Airlines aircraft and were refurbished at Fokker Services' Woensdracht facility. We have configured the aircraft with four-abreast seating in business class, which is wider than the CRJ700 and the technical support provided by Fokker is adequate."

Although Sorensen does not disclose the acquisition price, he makes the point that the aircraft were competitively priced, with nine aircraft having the same acquisition cost as one A319.

The majority of airlines that have followed the strategy of acquiring used aircraft are start-up airlines with small operations. New Swiss carrier Helvetic, which began operations in 2002, has acquired four Fokker 100s, and will have added another three aircraft by June 2004. "The fleet could grow to 11 aircraft with the possible addition of four more in 2005," says Peter Pfister, chief executive officer at Helvetic. "The aircraft are ex-American and are leased from AirFleet Credit Corporation. We operate a small network from Zurich with twice-daily frequencies to Vienna, Brussels, Amsterdam, Rome and Nice. These are at either end of the day, and in the middle of the day we operate to leisure destinations in Spain. We also fly charters during the weekend to Greece, Turkey and Spain. The aircraft are equipped with 100 seats at 34-inch seat pitch."

Pfister explains the aircraft were acquired for \$6 million. This price

included zero-timed engines, a full D check and interior and exterior refurbishment. Since the Fokker was already operated by Swissair there is no problem sourcing technical support in Switzerland. "The acquisition price is one-fifth or one-sixth the cost of a new ERJ-190, and the aircraft is not really available yet," says Pfister. "The Fokker 100s are nine to 10 years old, and have a low acquisition cost. The 737-600, by comparison, is more expensive to operate and heavier." Pfister dispels any concerns over the ability to source adequate technical support for the Fokker 100 by making the point that it operates with a technical dispatch reliability of 99.2%.

Helvetic plans to add another six destinations to its network, but the actual routes added depend on what happens to Swiss. Pfister explains that Helvetic has a lease contract for eight years, which could be extended depending on what aircraft are available when the lease expires.

Canadian low-cost carrier Jetsgo operates domestic Canadian and trans-border US routes in competition with Air Canada and WestJet. The airline has been growing aggressively since starting operations in 2002, and has a mixed fleet of 14 MD-83s and 18 Fokker 100s.

"Like all other low-cost carriers we are growing fast," says Michael Granshaw, vice president of corporate development at Jetsgo.

"The MD-83s are used on our longer routes of three or four hours across Canada and into the US. We use the Fokker 100s on routes of up to three hours. Our strategy has been to operate on routes with the heaviest traffic and we have connected all the main Canadian

cities. We have so far experienced annual growth rates exceeding 100%. We need to continue adding frequencies in the future to attract business passengers. Our mixed fleet of Fokker 100s and MD-83s means we have aircraft with 100 and 160 seats, which allows us to match demand. Our chief executive officer Michel Le Blanc has previous experience of both types, and we find that passengers like the MD-83's five-abreast configuration and low internal noise due to the rear engines. The current market has also meant there have been good opportunities to acquire sisterships of MD-80s and Fokker 100s at very low lease costs and market values. This allowed us to realise a low introductory cost. Moreover, several other 100-seat types are not available for another 15 months. There is still plenty of availability of used aircraft at attractive lease rates and market values, with a good pool of spares and engines. The other advantage of the Fokker 100 and MD-80 is that we can operate these aircraft for at least 10 years, and so will not have to decide what to replace them with for a long time. The secondary market means we can still acquire sisterships with uniform specification for some time."

The MD-80 fleet's 11 main operators have been in the process of disposing of it for a few years, and its low market values have allowed several other carriers to acquire aircraft at bargain rates and compete with other carriers with low unit costs. Lion Air in Indonesia operates a fleet of 19 aircraft, and has grown fast.

Allegiant Air based in Las Vegas, Nevada, began operations in 1998 in Fresno, California with DC-9s, but restructured in July 2001 and re-fleeted

with two MD-87s. "We launched with a charter agreement and in late 2002 added MD-83s. We started scheduled operations in early 2003 and added more charter services," says Andrew Levy, managing director at Allegiant Air. "We now have a fleet of nine MD-80s, which are a mix of purchased and leased aircraft. The leased aircraft have purchase options. We are interested in buying the MD-80s because we believe in operating them for the long-term, and there is also no alternative. At low market values the aircraft have no residual value risk. By owning the aircraft we also do not have to pay lessors' maintenance reserves, which we think are inflated.

"We were able to acquire aircraft with good engines and with all major airworthiness directives terminated," says Levy.

Allegiant Air's chief financial officer examined the economics of alternative aircraft, and this included used A320s. "These have good fuel efficiency, but no other benefits in operating performance or economics," says Levy. "New aircraft may have better reliability, but the costs do not work with our current business model. We would need a high daily utilisation of 14 or 15 flight hours (FH) per day to justify new aircraft, whereas we generate about 10 hours per day, or about 2,600FH per year. We also have plans to acquire more MD-80s, with a growth plan for the next 12 months and the addition of another two to six aircraft. We have no reason to replace the MD-80s, since there is no alternative aircraft type on the horizon. There will also be a good supply of MD-80s in the future, with several hundred American and Delta aircraft still in operation." 