

CFM56-3 values & aftermarket activity

CFM56-3 lease rates & values have improved following the re-activation of stored 737 Classics. Factors affecting values & rates are examined.

The aftermarket for the CFM56-3 family of powerplants began rebounding early in 2004, after being depressed in 2002/2003. The supply of engines has shrunk as demand has strengthened, but long-term lease rates are unlikely to see their 2000 highs again.

Chapter 11-driven retirements of large numbers of 737-300s/-400s/-500s by United Airlines and US Airways in 2002 and 2003 made many run-out CFM56-3 engines available. "The CFM56-3B1 variant was particularly favoured then, as it is now, for tear-down," says Austin Willis, president of California-based jet engine parts and trading company JT Power. "Although the -3B1 is cheaper to buy than the 22,500lbs thrust -3B2 and the 23,500lbs thrust -3C1, because it offers less thrust, it also shares many of the same life limited parts (LLPs) as its siblings, and also most of the same non-limited-life components."

The 22,500lb-thrust CFM56-3B2 is also a more attractive target for tear-down specialists than the CFM56-3C1, the highest-thrust member of the family.

"All CFM56-3s built from 1994 until production ceased in 1999 were the -3C1 variant," says Andrew Pearce, director of Dublin-based Macquarie Aviation Capital. "Although the engines sold as -3C1s, rather than -3B1s or -3B2s, they continued to incorporate some key differences such as a reset fan blade angle, turbine-blade cooling holes, a timing kit and a steel compressor case. CFM International relied on operating licences to provide most of the thrust (and price) differentiation among the three variants. As a result of this build policy, later-build -3B1s and -3B2s can act as a particularly valuable source of replacement parts for all three CFM56-3 variants, even though they originally cost less." Pearce estimates that buyers of new CFM56-3s paid the manufacturer about \$300,000 extra for each thrust rating increase.

An additional incentive to buy the two lower thrust variants is that the cycle lives of their rotating LLPs depreciate at a slower rate than do the same LLP part numbers in -3C1s, because CFM56-3B1s and -3B2s operate at lower exhaust gas

temperatures (EGTs) and higher EGT margins than do -3C1s. Pearce estimates that for each cycle a rotating part depreciates in a -3B1 or a -3B2, the same part depreciates at a rate of 1.33 cycles in a -3C1 operated to its maximum thrust.

"This difference can create up to a couple of years of extra flying with a -3B1," says Tom MacAleavey, senior vice president of sales and marketing for the Americas, Europe and the Middle East for Willis Lease Finance Corporation.

Overall, younger and higher-thrust CFM56-3s have better residual value performance than older ones because they remain more attractive to airlines that are interested in continuing to operate the engines. Willis notes that older engines tend to have accumulated more cycles and wear in non-replaced parts, such as turbine cases, than newer ones. They also often require larger and more expensive repairs if purchased for continued operation. Willis also comments that buyers of engines for tear-down find that non-replaced parts in older engines are scrapped at a higher rate than parts in younger engines. Parts cannot be repaired three times, so those that have already been repaired twice must be scrapped. The older the engine, the more likely it is that its non-rotating parts have been repaired more than once.

Jon Sharp, chief executive of Engine Lease Finance, notes that there are two leasing markets for the CFM56-3, which are mainly counter-cyclical to each other: the long-term market for leases of one to five years; and the short-term market for leases lasting less than a year.

The short-term 'spot' market, in which parts companies often participate, looks to generate revenue from engine leases of six months to a year. Owners seek to obtain rental revenue and maintenance reserves from engines that have some 'green time' remaining until their next scheduled shop visit, when they will be torn down. Non-replaced parts with acceptable wear and LLPs with remaining life are sold.

"Conditions in the short-term leasing market are determined by engine supply and demand," says Sharp. "If 10 aircraft are suddenly parked, 20 engines will immediately become available, thereby

causing the bottom to drop out of values and short-term lease rates." Willis notes that in 2002 and 2003, when engine supply was plentiful, parts companies were able to buy CFM56-3B1s and -3B2s cheaply because the market was valuing stored aircraft at purely the tear-down value of their engines.

Market conditions are different today. Virtually every 737 Classic not scrapped during the recession has been pressed back into service, and lease rates and market values for this aircraft have now soared. "Availability of engines for tear-down or short-term lease has become so tight that there is now a perceived shortage of engines," says MacAleavey.

Combining estimates given by each of the executives contacted, it appears that short-term lease rates for a CFM56-3C1 are \$1,600-1,800 per day and, according to MacAleavey, can exceed \$50,000 per month. A typical short-term daily rate for a -3B2 is \$1,400-1,600 and \$1,300-1,500 for a -3B1.

These ranges apply to any CFM56-3 engine with more than three months remaining to its next shop visit. To obtain maintenance reserve payments to help pay for a shop visit or for repair of torn-down parts, short-term lessors sometimes offer airlines pricing incentives to take an engine on a 'stub lease' when the engine has less than three months remaining to its next shop visit. Willis comments that such powerplants are often unattractive to lessees, because of the work involved in swapping out the engine after a short period on-wing and the unanticipated problems that often occur as an engine approaches a shop visit. A 30% lease-rate discount for a stub lease is normal.

"The long-term lease market is fundamentally different from the short-term market," says Sharp. "The rate offered by a lessor depends on four factors: the lessor's cost of funds; its depreciation rate for the engine; its overheads; and the level of competition in the market. Competition has become intense with about 10 new competitors entering the market since 2002.

"Long-term lease rate factors for engines today tend to be lower than those for aircraft," says Sharp. Rates for engines typically fall to 0.75-1.0% per month in terms of current market value. According to MacAleavey, long-term lease rates for the popular CFM56-3C1 variant reached \$60,000 a month before the onset of recession in 2001. Even after recession hit, lessors were able for a while to persuade airlines to take a short-term lease at \$60,000 a month, rather than spend up to \$2 million on a complete overhaul on a run-out engine before re-leasing it. This was a boom time for parts companies looking to buy and tear down run-out CFM56-3s, as airlines and lessors shed their run-out engines in numbers.

"Airlines are now having to perform their deferred overhauls. While nobody has parked an aircraft for lack of an engine, people are not confident about the future availability of CFM56-3s for their 737 Classics," says MacAleavey. He says that monthly rentals for leases of six months to one year on -3C1s have risen to \$42,000-45,000. Pearce says longer-term rates are in the \$35,000-40,000 range, but MacAleavey notes that with a few exceptions in Latin America, airlines are not contracting new leases of much more than six months on CFM56-3s.

Despite an improvement in long-term lease rates, it is clear to MacAleavey that they are unlikely ever again to reach \$60,000 a month, even for -3C1s. "Most 737 Classics are back in service and you have to assume they have gone back with a lot of time on their spare engines," he says. Airlines have had time in the past two years to overhaul their powerplants. Demand for long-term leases of CFM56-3s has probably peaked.

The situation affecting trading values is subject to similar factors. Purchase prices paid for run-out engines are dependent on the availability and value of parts with remaining lives, and the maintenance reserves that can be collected before the next shop visit.

Willis says that parts companies today

would pay about \$700,000 for a 'really weak' -3B1 engine for tear-down, but \$1.2-1.3 million for one with a 'strong disc stack' in terms of remaining cycle life, and 'more recent parts numbers' on its non-replaceable parts. Pearce says that a 'strong' disc stack would have at least 6,000 cycles remaining, enough for at least three years of continued operation.

MacAleavey suspects parts companies would pay \$1.8-2.0 million for a run-out but strong -3C1 in today's market, depending on just how good the engine's condition is. This estimate is a function of availability and the cost of adjusting an engine's non-replaceable parts and the LLPs in its disc stack to half-life condition. This is \$1.4-1.5 million in total. This adjustment range implies a current market value of \$3.3-3.5 million for a -3C1 in half-life condition. Lessors and traders do provide estimates of \$3.4-3.5 million for a half-life -3C1 in today's market. According to MacAleavey, good-condition, half-life CFM56-3B2s and -3B1s would trade for up to \$700,000 less, but should still fetch \$3 million or a tiny fraction more.

Sharp adds that 60-70% of each engine's total value is accounted for by the operating time the engine has accumulated since its last shop visit, and the total number of cycles the engine has

operated since new.

Even though Pearce estimates that a half-life value adjustment is worth \$1.4-1.5 million, he stresses this does not imply that a CFM56-3C1 fresh from a shop visit could be sold for \$5 million in today's market. Freshly overhauled or repaired engines are worth only about \$4 million today, he says. One reason for this is that instead of spending \$5 million on an engine freshly zero-timed after a scheduled shop visit (less an adjustment for test-cell running time), airlines and lessors would rather buy a half-life engine, run it down on-wing and then control the engine's rebuild standard when it next visits the shop.

Another reason for not buying a zero-timed CFM56-3 is that even though examples of the 737 Classic family are expected to remain in service for at least another 20 years, the CFM56-3 is no longer in volume production. Today may thus well represent the top of the future market for the CFM56-3 family as it gradually enters its declining years.

Sharp suggests as much. "Virtually all remaining CFM56-3-powered 737s are back in service. Mass retirements of 737 Classics and their CFM56-3 engines are expected to start in 2015," he says. Engine Lease Finance plans to end its CFM56-3 exposure several years before that. **AC**

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