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Expansion is on the flight plan, but will be patchy

Hard landing: overbuilding between 2003 and 2008 has created a lasting oversupply of small jets Dreamstime

Market for larger jets remains buoyant while mood is positive longer-term on sales of smaller aircraft, write *Jane Wild* and *Rohit Jaggi*

The business aviation sector has yet to escape the turbulence it entered with the global economic downturn. Yet, while some areas of the industry are resigned to stagnation in the short term, others are flying higher. And many participants and observers are allowing themselves renewed optimism for overall prospects in the longer term.

Private jet traffic is still well below its 2007 peak, so many in the industry are hopeful of a return to those heights. They point to the fact that the world business aircraft fleet is expanding as an indicator that activity will ramp up again.

Richard Aboulafia, vice-president for analysis at the US-based Teal Group aerospace consultancy, says leading US indicators such as corporate profits and equity markets support the view of the optimists.

But in this heavily fragmented market a number of stories make up the whole picture. The most obvious example is the growing divergence between classes of corporate aircraft – large jets continue to sell well, while midsized aircraft were hit hard by the economic crisis and have yet to rebound. The outlook for smaller aircraft is less certain, says Mr Aboulafia.

"There is still no evidence of a sustainable recovery for the bottom half of the market in terms of sales, prices or production rates," he says. "The top half of the market, by contrast, wasn't damaged at all by the crisis and is still benefiting from modest growth."

Deliveries of the most expensive aircraft, costing $26m or more, increased by 0.3 per cent between 2008 and 2012. On the other hand, deliveries of jets costing between $4m and $25m plunged 56 per cent.

Mr Aboulafia says: "The problem with small and medium-sized cabins is that there was serious overbuilding between 2003 and 2008, thanks largely to very easy finance terms.

"The result is a lasting overhang of available jets, but there, too, we are finally seeing some progress in reducing this inventory."

> 'In the short term there has been some stagnation, but over the longer term there is a great deal of optimism'

Honeywell's Business Aviation Outlook, released this week, seems to support the optimists. The aerospace supplier's forecast expects a modest 4 per cent rise in the number of aircraft delivered next year, compared with 2013.

It also sees the trend towards large-cabin jets continuing, with more than half of the 600-625 business jets delivered in 2014 being super-midsize or above.

One business aviation analyst says: "In the short term, there has been some stagnation, but over the longer term there is a great deal of optimism."

Mr Aboulafia agrees. "If the US economy's recovery continues to accelerate in 2014, we could see a turnround in these depressed segments," he says.

Around the world, the outlook varies. Honeywell's forecast casts doubt on the ability of some emerging markets to prop up sales. It expects North America to take 61 per cent of business jet deliveries next year, a rise on 2013, and Latin America to hold steady with 18 per cent. But Asia Pacific's 5 per cent and the Middle East and Africa's 4 per cent, plus Europe's 12 per cent, will all represent falls.

In China, business aviation has been transformed in just a few years from a quiet market to an area considered to hold promising potential for growth. The country has already made clear its intention to manufacture its own business jets.

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Demand for top mechanics set to grow

Maintenance

More complex aircraft need a better trained workforce, writes *Liz Moscrop*

Private aviation is an opulent business that does not like to get its hands dirty, yet one that much depends on maintenance, repair and overhaul, or MRO, for its success. This is nowhere more so than in the US, the world's largest consumer of such services.

The requirement for skilled staff is expanding. According to the latest Boeing Pilot and Technician Outlook, North America is going to need another 97,900 technicians in the next 20 years, and there are concerns about where the next generation of mechanics will come from.

The World Commercial Aircraft MRO Market 2013-2023 study by ASD Reports points out that newer, more complex aircraft, will eventually require maintenance providers to invest in new training techniques. That does not augur well for smaller, third-party providers that may lack the necessary finances to beef up their skills. Additionally, the original equipment manufacturers (OEMs) are also entering the market in increasing numbers, so MRO in the US is starting to change shape.

Beechcraft has eight factory-owned centres across the US. This network offers maintenance training, full-factory engineering support and MRO, paint and upgrade services on the full line of Hawker and Beechcraft aircraft.

Allen McReynolds, vice-president of Hawker Beechcraft Services says MRO is an important part of the manufacturer's service offering and that he has seen a change in the market. The recent dip has led to many fleet sales and this switch in ownership has meant refurbishments. Consequently, upgrades have been all the rage in hangars across the US.

"As aircraft have changed hands, more operators are looking for cockpit and cabin systems upgrades," says Mr McReynolds.

Teamwork: Christi Tannahill

"People are looking to modify their existing fleets with state of the art avionics, and entertainment and connectivity systems."

Christi Tannahill, senior vice-president of Beechcraft's global customer support, says the company will continue to support the out-of-production Hawker aircraft. This will be with its own service centres and by teaming up with third parties, sometimes with an international presence, such as the Gama Group, which offers MRO, and modification certification services from facilities in the US, Middle East and the UK. The thirst for better-connected, more advanced machines will add more pressure to the labour force, since there are significant changes afoot for small aircraft and avionics certifications. These are due via proposed updates to the federal airworthiness standards regulating smaller aircraft. Requirements for the 14 Code of Federal Regulations part 23 rules date back 80 years and were drafted under the assumption that small aircraft were less complex than larger transport category aircraft. That is no longer true. Since part 23 represents the most diverse range of new aircraft, it is ill suited for certifying today's systems.

The potential changes will subdivide part 23 (which governs airworthiness standards) into different certification tiers, depending on complexity and performance. For avionics manufacturers, this should reduce certification costs, and allow the Federal Aviation Administration (FAA) to dedicate safety resources based on a risk-based approach that calls for increased oversight of more complex systems. The suggested new rules are due out this year, with implementation soon afterwards. That may prove difficult since the government shutdown of the FAA aircraft registry is causing disruption. Without sales and some inspections of aircraft on the flight line, a rising number of aircraft and helicopters are grounded.

This is hurting, since business aviation and its support services are a vital part of the US economy. In north America the sector is a major fiscal driver. It employs 1.2m people, and contributes $150bn to US economic output. In some states and regions, the industry is a significant generator of employment and local investment. A case in point is Kansas, where aviation accounts for $7.1bn, or nearly one-third of the state's economy.

On the plus side, despite the recent economic downturn, insiders say the US's most well known MRO companies are thriving. Brands such as Jet Aviation, Duncan Aviation, Comlux Aviation and Standard Aero are all busy and competing hard with one another for customer dollars. Jet Aviation in St Louis has started producing and installing custom items such as divan cushions and carpeting for aircraft that may never even land at its facility. Its upholstery shop sends technicians to any location to measure and cut patterns to fit, return to the shop to produce the items, and then return to the aircraft to complete installation. "This means our customers don't have to worry about 'down time' for their aircraft," says Chuck Krugh, senior vice-president.

Indianapolis-based Comlux Aviation Services says it is ready to tackle wide-body completions, adding to its portfolio. "We have been looking at this side of the market for some time and are already in discussions with several potential customers for our first project," says chief executive David Edinger. "We are doing so well that we have had to restructure our company to use our manpower more efficiently."

Competition rises in tough marketplace

Profile
Cessna

Jet manufacturer believes investment will pay off, says *Robert Wright*

It is not perhaps surprising that Brad Thress sighs when asked when the market for corporate aircraft will pick up.

Mr Thress, senior vice-president of business jets for Cessna, one of the industry's best-known names, has followed hopeful signs for the company in each of the past three years – and watched them turn into an insignificant rise in sales, whether for the industry as a whole or Cessna.

Also, Cessna, part of industrial conglomerate Textron, faces stiffening competition.

Once-minor players such as Brazil's Embraer are making the formerly narrow, uncompetitive market for corporate aircraft far more crowded.

Some observers fear that more companies will suffer the fate of Hawker Beechcraft, which was forced into bankruptcy protection in 2012 and had to close its corporate jet business.

However, Mr Thress insists that Cessna's unique strengths – its wide range of products and heavy spending on product development – mean that it will be well placed to benefit when a recovery finally arrives.

It returned an operating profit for 2012 and 2011, although it reported a $23m loss for the second quarter of 2013 and a $50m loss for the second quarter because of a changeover between models of its longest-haul Citation jets.

"We keep our products competitive from a direct operating cost perspective, from an acquisition cost perspective, from a modern avionics perspective," Mr Thress says. "We're constantly improving the product we have out there."

At the heart of the problem facing companies like Cessna, according to Loren Thompson, an industry analyst for the Virginia-based Lexington Institute, is newly intensified competition.

"It's becoming true of almost every manufactured product," he says. "As the barriers to trade come down, you compete with just about everybody. I'd like to know how they distinguish their product in such a crowded marketplace."

Cessna's product range lacks the focus of some of its rivals. Beechcraft, which emerged earlier this year from bankruptcy shorn of its lossmaking Hawker jet business, now operates purely in the less competitive market for piston-driven and turboprop propeller aircraft, where it has a strong record.

Canada's Bombardier enjoys a commanding position in the very long-range, intercontinental market, which it pioneered with its Global series of aircraft.

Mr Thress insists, nevertheless, that Cessna's breadth of offerings – from relatively small propeller aircraft up to Citation jets with a range of more than 4,000 nautical miles – offers it a unique opportunity to win customers' long-term loyalty.

About 70 per cent of the company's orders come from repeat customers, according to Mr Thress. Customers who start by buying a small business jet – such as the five-seater Citation Mustang or seven-seater Citation M2 – often move on to a larger aircraft in the same range.

"We've had people move through four or five airplanes during their career as airplane owners," Mr Thress says.

The company also maintained investment after the 2008-09 financial crisis, according to Mr Thress, and will bring three propeller-driven and three jet-powered aircraft to the market in the next few months.

The jet aircraft include a new, upgraded version of the Citation Sovereign, a nine-seater aircraft with a 3,000 nautical mile range.

"We stayed the course," Mr Thress says. "We continued to invest in our future."

Introduction of the new types should stem the losses that Cessna recorded in the second quarter. At that point, it had finished deliveries of the earlier version of its Citation Sovereign and Citation X aircraft but had yet to start deliveries of the upgraded versions.

Deliveries of the new

> 'We continue to see encouraging signs [but] the industry will improve when it improves'

Sovereign will start in the fourth quarter of this year, while customers will start receiving the Citation X early next year.

"This is kind of an odd year for us," Mr Thress says. "In the middle of the year, we lacked our large-cabin, larger-value aircraft."

On the Citation Longitude aircraft scheduled for introduction in 2017, the company plans to use the new Snecma Silvercrest engine which it believes will provide fuel savings of 15 per cent compared with the most efficient engines in its existing fleet.

"We absolutely believe we can compete on any innovation level with anyone in the industry," Mr Thress says.

Yet the problem remains that, no matter how sparkling the product line-up, companies facing a sputtering world economy and regular fiscal crises in the US appear unlikely to invest in new business aircraft in large numbers.

"We continue to see encouraging signs," Mr Thress says, citing high demand for second-hand aircraft and continuing strong corporate profits.

But, pointing out how long those positive signs have misled the industry, he concludes: "The industry will improve when it improves."

Austerity takes toll but growth prospects still encourage

China Although buyers may be taking longer to buy, the private market appears to have weathered the storm, reports *Liz Moscrop*

Florist shops are disappearing from Chinese cities as the government drastically prunes its entertainment budget. Ostentatious shows of wealth are frowned upon, which – at first glance – seems to have had a negative effect on private aviation.

The market has slowed since 2012, with 18 per cent growth forecast for 2013, against 40 per cent in 2012. Last year saw 96 aircraft added to the fleet, whereas there have been only 37 newcomers so far in 2013.

This appears, however, to be no cause for alarm. Dominic Lee of Hong Kong law firm de Bedin and Lee, says: "The greater China market will see less growth this year but it is a developing sector and we must not lose sight of the fact that that growth will be impressive."

The recent sluggish growth comes from the slowing Chinese economy and "austerity measures" introduced by the government. Also, as buyers get savvier, they are taking longer to choose an aircraft. Jeff Lowe, general manager of the Asian Sky Group (ASG), a Hong Kong consultancy, says: "The China market has been a little overhyped, but is settling now."

A report prepared by his company on the first half of this year shows Gulfstream is still flying highest. Of the 37 business jet deliveries into China this year, 13 were Gulfstreams, 10 Bombardiers and nine Dassault Falcon Jets (DFJ). Three Embraers, and two Boeing types made up the number. Gulfstream and Bombardier are the strongest players with 35 per cent and 27 per cent of market share respectively but DFJ has taken off, grabbing a share of 24 per cent – a climb of 18 per cent over 2012.

Cessna sales have been bruised by Citation aircraft undergoing technical upgrades, and awaiting validation type certificate data sheet approvals from the Civil Aviation Administration of China (CAAC). The manufacturer, however, is forging ahead with production plans via its joint venture Cessna-AVIC Aircraft, which will assemble Citation XLS+ jets in Zhuhai, and Caravan turboprops in Shijiazhuang.

Beechcraft is anticipating a healthy Chinese appetite for its products. According to Richard Emery, its president for Europe, Middle East, Africa and Asia Pacific, the original equipment manufacturer (OEM) has seen a resurgence of sales of its King Air C90GTx, particularly among training schools. "We are seeing a lot of flight training operations springing up," says Mr Emery.

Minsheng Financial Leasing Services' (MFLS) chief aviation lawyer David Tang and his colleague, Chris Buchholz, are keeping a watchful eye on the fledgling training industry. "The King Air is a fantastic aircraft. The avionics are as good as a jet. It is also good for smaller companies to use as a commuter," says Mr Tang. Mr Buchholz believes there could be a problem with the lack of accessible airspace, adding that students need to practise flying longer cross-country routes during early training.

Gulfstream's spokesman, Steve Cass, would like to see more change. "Relaxing airspace restrictions will lead to faster flight approvals, more direct routings and more usable airspace, especially at higher altitudes, which generally provide a smoother ride, better weather and greater fuel efficiency."

Although airspace restrictions are problematic, Mr Lowe says the relaxation of rules governing lower altitude airspace in some provinces means that helicopter orders have flourished. ASG is due to release a new rotorcraft report at the National Business Aviation Association (NBAA) and says helicopter sales have increased enormously.

There is some good news for buyers. The government has opened regional offices to deal with import approvals. This means reducing processing times to about four months. The number of air operator's certificates has also risen. These are mostly CCAR91 (private), with just a few CCAR135 (commercial). The bad news is the rumour of a potential new 25 per cent "luxury" tax that could be imposed on new aircraft.

Government has chartered fewer aircraft, a move that has hurt larger operators, some of whom have been forced to place aircraft outside China on short-term leases.

"The continuing crackdown on corruption and government spending on luxury travel has resulted in a short-term oversupply of the mainland charter fleet," says Mike Walsh, chief executive officer of AsiaJet.

However, Bjorn Naf, chief executive of Hong Kong's Metrojet, believes the maintenance, repair and overhaul (MRO) market is maturing. His company has opened up new bases in Zhuhai and the Philippines. "The market may have slowed down, but we are still extremely busy," he says.

Despite deliveries being low, the number of movements is up, which Carey Matthews of Shanghai Hawker Pacific, a business aviation service centre, believes is a better market barometer. "We have seen our flight activity increase by double-digit percentages in 2013. There has been no slowdown in our operations. "I feel the strength of the industry should be focused on how much people are flying. By that measure, the business aviation industry is doing well."

MFLS's Mr Tang points out that his company is in the process of building a new business aviation airport near Beijing, scheduled to open in 2015. "Slot constraints are a major issue, but this will really help."

Forging ahead: Cessna's William Schultz (left), and Qu Jingwen, general manager of the AVIC

Expansion is on the flight plan, but will be patchy

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This year, China's fleet has grown by 37 aircraft, up from 336, the majority split almost evenly between Gulfstreams, Bombardiers and Dassault Falcon Jets.

Chinese regulations are still holding back growth, however. Further relaxation of the rules will be necessary to speed flight approvals and ensure more direct flight routings and better use of air space.

There are other negative indicators for the Chinese market: its slowing economy and culture of austerity have weighed on obvious displays of wealth – a pattern that is repeated across the world.

Companies have had to appear restrained during a time of austerity, although very wealthy individuals have still been buying.

Other observers have reservations about China.

Kenn Ricci, head of Directional Aviation Capital, an investment company that bought Flexjet, one of the leading fractional ownership and aircraft management company's from Bombardier in September, says global expansion is on the agenda, though not in China or Asia.

"The Chinese market, we think, will evolve much more slowly than a lot of people are predicting," Mr Ricci says. Instead, he sees potential in the developing markets of South America.

He also sees scope for growth in Europe, although European Business Aviation Association figures show that total flight activity was down 3.4 per cent in the year to September, compared with the previous year.

But one place where the sector has held up is Australia, supported by mining exports to China. Australia's small fleet of about 400 aircraft has been growing and, with demand for natural resources rising, is set to expand further.

David Bell, chief executive of the Australian Business Aviation Association, says: "We are a small part of the overall business aviation community, but we are quite strong and growing."

An aircraft manufacturer making the most of tough times is Nextant Aerospace, which has built a business selling remanufactured aircraft based on the Beechjet 400A/XP. Its $5m 400XTi has new engines, avionics and interior. The Ohio-based company has delivered 30 so far and has an order backlog of $175m.

Nextant will take this a step further by announcing at the US National Business Aviation Association convention in Las Vegas this week a strategic partnership with GE Engines to create a range of remanufactured jet and turboprop aircraft.

The first model, also launched at the convention, is the C90XT, based on the Beechcraft King Air C90 twin turboprop. Wisconsin-based Beechcraft, which has only recently emerged from a painful restructuring to concentrate on its turboprop and other propeller aircraft, is bound to see this as a threat to sales of aircraft in its King Air range.

In terms of market shares, Embraer of Brazil is set to make the biggest inroads. Over the next decade Teal Group forecasts it will ratchet up deliveries more than fivefold to take 6.7 per cent of the market. Embraer itself says its forthcoming Legacy 450 and 500 aircraft will be "game changers".

> 3.4%
>
> **European flight activity fall, year to September 2013**

Gulfstream and Bombardier are predicted to hold the lion's share of the market at about 31 and 34 per cent respectively.

Dassault and Cessna are forecast to notch down slightly to 13-14 per cent each. The former today unveils its Falcon 5X, which will be the basis for a new family of long-range aircraft, while Cessna says its growing range of products will help it retain customers.

Other clouds remain over the industry. Boeing last month warned that, with many pilots due to retire, there would not be enough to allow for expansion plans. The pipeline of aviation engineering skills also needs development.

Financing, however, has shown signs of improvement. Investor interest is returning, with banks, pension funds and insurance funds showing greater willingness to lend. But that does not apply across the sector. Banks are not keen to fund purchases on older aircraft and the charter market complains of difficulty in obtaining bank financing.

Overall, the signs of encouragement are patchy, and many in the industry must wait for the overall economy to take off.

Dassault goes green with new 5X

Cabin class Simple ideas give long-range aircraft the edge in turbulent times, says *Rohit Jaggi*

One distinctive feature of the Falcon 5X aircraft, unveiled by French manufacturer Dassault today, casts a light on the thinking behind the long-range business jet.

Its skylight in the forward roof of the cabin, though it echoes the bubble windows that navigators of early aircraft used for taking sightings of the stars, is unique among business jets. But it solves the problem of unlighted entranceways through the cabinet-lined galley area that make jet interiors look initially dark and uninviting.

Dassault has a vast history to plunder for both simple and sophisticated ideas. Founded in 1929, it has been making executive aircraft for 50 years, with about 2,275 twin- and triple-engined business jets delivered so far. The 5X was initially conceived in 2007 as a super-midsize aircraft. But after the global financial crisis struck in 2008, only the market for large-cabin, long-range jets emerged almost unscathed, while that for smaller aircraft was left with an oversupply from the boom years of 2003-08.

Thus the 5X project was recast as a twin-engined, long-range aircraft with an unusually large cabin, plus all the Dassault refinements of handling and technology that the manufacturer can carry over from its experience as a maker of cutting-edge fighter aircraft.

But it launches into a crowded market where other manufacturers have also been tilting their offerings at the upper end of the business jet sector. Bombardier of Canada has extended the range and size of its Global aircraft, and US-based Gulfstream's new G650, ultra-long-range, large cabin business jet has been shaking up the top end of the segment.

The aircraft that the French manufacturer benchmarks the 5X against are the Global 5000 and Gulfstream G450. Dassault, however, is claiming some impressive figures that it hopes will make the 5X a compelling choice – 50 per cent more fuel efficient than its rivals, 50 per cent greener and 30 per cent cheaper to operate.

It is also aiming to bring to business jets the standards of commercial airliners in dispatch reliability and low maintenance. Embraer of Brazil has been setting some of these standards since its decision to branch out from commercial to business aircraft.

Comfort zone: the interior can be arranged to give six full-size sleeping berths

Dassault is also hoping its new aircraft will sell itself on the flexibility that its existing range displays, such as the capacity to operate safely from short and demanding runways. It will, for example, be certified for London City's steep approach. Olivier Villa, Dassault senior vice-president for civil aircraft, describes it as "a twin with the runway performance of a triple".

The 5X can cover a maximum distance in one hop of 5,200 nautical miles. Within Dassault's own jets, that puts it between the 5,000nm of the Falcon 900LX and the 6,000nm of the 7X. But the 5X has been given a more spacious cabin than either of those aircraft – 4 inches (10cm) taller and 10 inches wider.

Its total cabin length (including cockpit and baggage area) is also shorter by only 4 inches than that of its biggest sibling, the triple-engined 7X.

That space should make those long distances in the air more comfortable – its 11 and a half-hour range can take it from London to Tokyo or Los Angeles without refuelling, or from New York to Buenos Aires or Beirut. Plans for the cabin, which is lit by big windows as well as that skylight, show a crisp, sophisticated design that can be configured to give six full-size sleeping berths.

Apart from the bigger fuselage tube, the 5X has an all-new wing with distinctive curved trailing edge and a complex system of slats, flaperons, flaps and ailerons to improve handling quality at high and low speeds. Deployment of all the control surfaces is computer controlled in this fly-by-wire aircraft, using lessons learnt from Dassault's Rafale fighter jet.

There is improved automation in the cockpit and provision for two head-up displays that combine enhanced vision and synthetic vision and make low-visibility landings safer. To make take-offs and climbouts swifter and safer, Dassault has opted for Snecma's new Silvercrest engine, with a more than ample 11,450lb of thrust per side. The commercial airliner standards to which the engine has been designed bring improved efficiency and therefore fuel consumption, and lower noise. Plus, in a first among business jets, constant monitoring of the engines will allow for inspections and maintenance only when needed, cutting time in the workshop.

The 5X, which is expected to have its first flight in early 2015 and entry into service two years later, is an important aircraft for Dassault, whose Rafale is not selling as well as hoped. Fleet orders for the business jet are likely but NetJets, the leading fractional operator of business jets and an important 7X customer, is demanding a bigger and bigger discount for its fleet purchases.

However, the roughly $45m jet will also, according to Dassault, cost $4m less to operate over six years than its closest rivals. That, along with stylish touches like that simple but effective skylight, could be a deciding factor in a sector still struggling to escape economic turbulence.

Engine innovations power fuel efficiency

Technology

Progress in commercial development spills over into next generation business jets, writes *Robert Wright*

When Canada's Bombardier finally staged the maiden flight of its C Series commercial jet on September 16, few of the thousands of spectators that crowded the airfield near Montreal were paying attention to the aircraft's engines. But the flight – the first for Pratt & Whitney's new PurePower engine series, as well as for the aircraft – marked just as much of a turning point for aircraft engine manufacturers as for aircraft makers.

The PurePower engine is the first of a new generation of commercial jet engines designed to use far less fuel than previous engine types. Its main competitor is the Leap-X engine developed by the CFM International consortium of the US's General Electric and France's Snecma.

That competition is set to produce spillover effects in the corporate jet market. Many of the innovations that will slash the fuel consumption of commercial jets, such as Boeing's 737 Max and Airbus's A320neo, are being reworked for corporate jet builders.

Two of the most important engines in the next generation look set to be GE's Passport engine – based on the Leap-X – and Snecma's Silvercrest, its first business jet engine. Both manufacturers have airframe builders – Bombardier for the Passport and Cessna and Dassault for the Silvercrest – signed up to use the engines.

While it remains unclear which type will win over more customers, Brad Thress, senior vice-president of business jets for Cessna, praises the extent of the improvements on offer. Cessna's Citation Longitude is scheduled to make its maiden flight, powered by Silvercrest engines, in 2016.

Incremental engine updates have typically produced efficiency improvements of 1.5 to 3 per cent, Mr Thress says, while Snecma and GE are projecting 15 per cent fuel economy improvements for their new engines.

"There's a significant improvement when you swap generations," he says.

The challenge for makers of corporate jet engines is that high-end aircraft fly higher – hence in thinner air – and faster than commercial jets.

Brad Mottier, GE's vice-president and manager of business and general aviation, says that makes one possible route to fuel-efficiency problematic. It would be difficult, he says, in such thin air and at such high speeds to run an engine at very high bypass ratios – the term for the proportion of air sucked through only the engine's fan to the proportion that also goes through the turbine at its core.

The PurePower engine runs at an unprecedented bypass ratio of 12:1. Engines with high bypass ratios can offer high thrust for a given amount of fuel.

Instead, Mr Mottier says, GE has adopted for the Passport some of the sophisticated materials that allow the Leap-X to run at higher – and more efficient – temperatures than normal. The company has also improved the engine's aerodynamics – an effort that has been helped because GE is producing an integrated power plant. The use of innovative materials has also cut the engine's weight significantly.

The Passport engine is due to enter service on Bombardier's new Global 7000 aircraft in 2016.

Snecma is pursuing efficiency with its Silvercrest through bypass ratios far higher than normal for the segment. The Silvercrest engine's ratio will be 6:1. The main question had been whether airframe makers could fit an engine with the 42.5 inch fan diameter needed to produce such a relatively high ratio, according to Laurence Finet, head of the Silvercrest programme at Snecma.

Engines with high bypass ratios can offer high thrust for a given amount of fuel

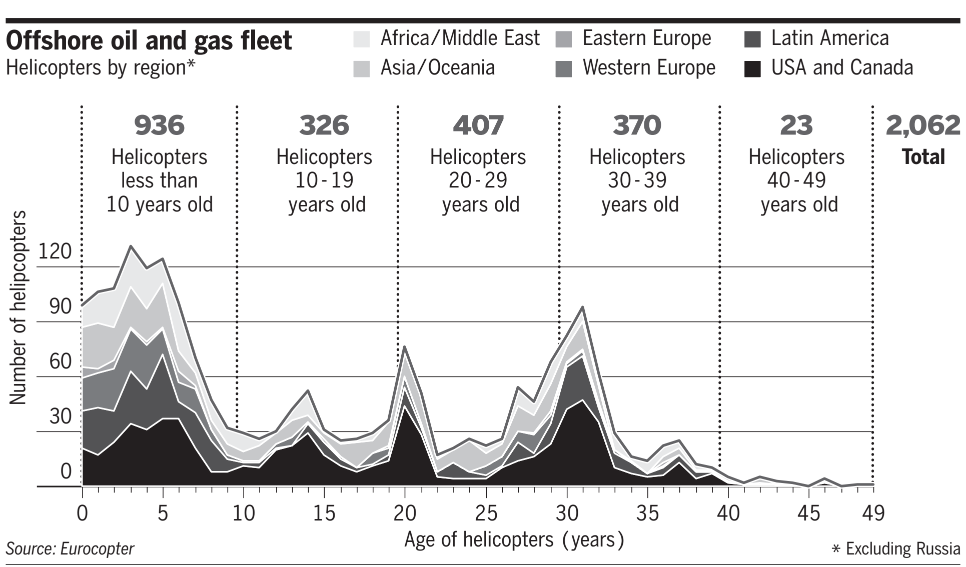
To gain extra fuel efficiency, Snecma has used some components manufactured by three-dimensional printing to keep weight down. The engine also automatically manages the gap between the turbine blades and their housing. In traditional engines, that gap tends to grow as the engine heats up, harming efficiency.

Yet, Mr Thress says, all these revolutionary improvements are likely to be only the start of the process of improvement in fuel efficiency.

Manufacturers battle to stay aloft over treacherous waters

Helicopters

Severe conditions demand an innovative approach, says *Robert Wright*



November 1 each year brings an extra hazard to the already demanding life of the men and women working on the oil and gas platforms scattered along Australia's northwest shelf. Along with the rigours of long distances from shore, often rough seas and operating drilling equipment in deep water, the six months from the start of November bring the threat that cyclones will blow across the Indian Ocean, making the platforms dangerous and uninhabitable.

The conditions are typical of the severe environments in which oil and gas producers increasingly operate, as high oil prices and better drilling techniques allow them to work further and further from shore.

There are similarly tough conditions in offshore parts of the Arctic, Russia and the North Sea. The launch of an inquiry by UK and other European regulators last month into five helicopter crashes in the North Sea over the past four years underlines the risks involved.

The operations depend on a rising number of large, heavy-duty helicopters operating at the very limits of their safe ranges from land and capable of handling conditions that would once have been considered impossibly dangerous.

The market is a duopoly comprised of the US's Sikorsky, a subsidiary of United Technologies, and Eurocopter, part of Europe's EADS. No other manufacturer makes aircraft with the 10-tonne take-off capability required to serve the most distant platforms.

The question is whether the two can maintain their strong market position while meeting oil producers' demands for aircraft capable of hugely demanding tasks – such as evacuating distant oil platforms quickly in the face of a cyclone.

"These long-distance, deepwater finds are usually in remote places, with a harsh environment," says Thierry Mauvais, Eurocopter's head of oil and gas market development. "In this environment, there's an almost systematic element of challenge."

Dan Rosenthal, president of Milestone Aviation, a helicopter leasing company, says demand for such long-range, heavy-duty helicopters continues to grow. "As the platforms move further and further offshore, you can see the demand line for helicopters increasing in parallel."

The requirements are tough, according to Carey Bond, president of the Sikorsky division that makes some of its heaviest duty civilian products. The longest range missions require enough fuel to reach rigs and to fly back if landing is impossible. They must also carry an extra safety reserve.

"We're looking at it in that light," says Mr Bond. "How do we get out to that point a full load of passengers and keep up safety and get the high reliability rate that customers demand?"

At the heart of the manufacturers' efforts, according to Mr Bond, has been work to improve fuel efficiency. As the efficiency improves, the proportion of an aircraft's weight devoted to fuel can drop.

With one of its newest products, the S-76D medium-sized helicopter, Sikorsky improved efficiency by about 15 per cent through a new engine, better aerodynamics and more sophisticated rotors. The improvements allow operators to fly to rigs far faster.

Sikorsky has developed for its S92 heavy-duty helicopter an entirely automated system for landing on rigs – known as "rig approach" – to make landings safer. "It's a safety breakthrough and it's a productivity breakthrough," says Mr Bond. "If you can get an aircraft that can [land] in even worse weather conditions, that's going to be key for our customers."

'As platforms move further offshore, you can see the demand for helicopters rise'

Fuel efficiencies are helping builders of smaller helicopters – including the US's Bell Helicopter, part of Textron, and Finmeccanica's AgustaWestland – to nibble at the edges of Sikorsky's and Eurocopter's long-range market, according to Ed Washecka, chief executive of Waypoint Leasing, a helicopter lessor. Both Bell and AgustaWestland are extending the range of their biggest medium-sized helicopters thanks to fuel efficiency.

However, the biggest risk for Sikorsky and Eurocopter is that a long-term fall in oil prices might deter oil producers from continuing their quest for hydrocarbons from difficult – and expensive – deep-sea fields such as Brazil's new pre-salt fields.

Neither manufacturer expects much fall-off from declining oil prices, not least because most helicopter trips move crews to and from production platforms, which tend to keep working when prices fall.

"We make sure that our range will match exactly the future demand, not only in distance but also mission capability, environment, temperature and so on," says Mr Mauvais. "When we see the investment in exploration, it's huge and it's continuing." As long as that investment continues, Mr Mauvais says, the scale advantages of helicopters with a lift-off weight of 10 tonnes or more – a segment in which only the S92 and Eurocopter's EC225 compete – will remain compelling.

"If you're talking about the market between shallow water and up to about 160 miles, the competition is more open to medium-sized aircraft," says Mr Mauvais. "For long distance, a 10-tonne helicopter is a no-brainer."

Corporate Aviation

Former Marine calls attention to detail

Profile Christopher Miller believes in knowing all he can about his clients, writes *Rose Jacobs*

If you are going to spend as many hours on an aeroplane every month as Christopher Miller does, you would be wise to have some good reading material to hand. Mr Miller, who runs a corporate aircraft financing business for the US investment group Guggenheim Partners and commutes between Atlanta and New York, has just that – in the form of juicy reports on potential clients, assembled by what sounds like the cast of a Jason Bourne film: former State Department officials, ex-CIA agents and local moles among them.

The contents of those pages can be the reason why he and his team turn down deals – rather than being put off by a borrower's bank statement or the collateral, which, for Guggenheim, is always the private jet itself.

Mr Miller, a former US Marine Corps pilot with an MBA from Columbia, is confident that both the structure of the deals he makes and his team's acute attention to ever-changing aircraft values protect his investors from losses in the case of a default.

"The primary focus for us is on aircraft values, and predicting residual values, really being close to those values," he says. That said, he also wants to avoid the Guggenheim name being sullied by the character of a poorly chosen client.

"We are a rapidly growing company, but in some of the countries where we work the little group I oversee is the first Guggenheim entity that people have ever heard of. So, being associated with the right people is very important to us."

It is a fine line to walk since his division's business model relies on backing aircraft purchases by individuals who might not, for a variety of reasons, want to offer the full financial disclosure necessary to strike financing deals with mainstream, or even private, banks.

But because there have been enough of these people out there in recent years, willing to pay higher rates, Guggenheim has found a niche in offering asset-backed loans not just in the US and Europe, but round the world.

Thus all the travel: aside from his domestic commute, Mr Miller makes frequent overseas trips to meet potential customers in Europe, Africa, Asia or the Middle East, catching up with existing clients and checking in with the management companies that run financed aircraft.

"I don't like being away from my family but there's nothing that can beat the face-to-face time," he says.

And relationships with private aircraft operators are an important part of risk mitigation: an operator you know and work with regularly will return an aircraft if the owner defaults on his loan; that is less likely if the management company turns out to be owned by the client's brother, or brother-in-law, or if the client has a stake in it himself.

These are not scenarios unfamiliar to Mr Miller. He joined Guggenheim as an adviser in 2006, just as it was preparing to team up with a large international bank to offer asset-backed private aircraft lending. At the time, demand for corporate jets was growing strongly, particularly in the emerging markets, where the new group aimed to pick up clients.

"Our goal is to establish a leadership position in this space and differentiate the company through innovative financing solutions and a streamlined approval process," said the partnership's managing director in May 2007. But the credit crunch and recession devastated the sector, and the venture was dissolved.

Guggenheim – which today has about $180bn under management – asked Mr Miller to stay on to unwind a troubled portfolio of loans made in headier times.

The experience gave him insight into the blunders of the private-jet financing business, and prepared him for when the fund started lending to corporate aircraft buyers again in 2010.

"It was like a lifetime of experience, not just looking at that business but looking at deals done by other banks, too," he recalls. "That sort of work really prepares you for the next cycle."

Investors were still skittish in 2010, and persuading them of the relative safety of the deals Guggenheim's corporate aviation arm was making took more time than in the past.

But even those fears are abating now on the back of healthy returns – and growing competition underscores the wider sector's rebound.

Mr Miller notes that most lenders have learnt from the ups and downs of the past decade.

"Even the credit-based lenders are moving toward a more asset-based approach," he says. "The days of 100 per cent advances are over."

This new found conservatism means more rivals are offering Guggenheim's style of loan. But Mr Miller welcomes the competition: "It's not a zero sum game and we're not a volume shop."


Leadership position: Christopher Miller of Guggenheim Partners

'Even credit-based lenders are moving toward a more asset-based approach'

Lenders regroup as cash takes back seat

Financing

Market for funds starts to show stability after bumpy ride, reports *Rose Jacobs*

Since the credit crisis and recession plunged the corporate jet universe into crisis, undermining asset values and sending financiers into retreat, recovery has been a step-by-step affair.

Christopher Miller, managing director of business aircraft investments at Guggenheim Partners, says: "2009 and 2010 were really about regrouping, 2011 and last year were when things started to normalise, and this year we've finally had some stability."

That stability is evident on two fronts. First, investor appetite is growing steadily, both among traditional lenders and new entrants, boosting liquidity and driving down rates, particularly on the large jets whose values have held up better in recent years than those of smaller models.

"Last year, we were struggling to even get the Credit Suisses of the world to lend," says Aoife O'Sullivan, a partner focused on aviation deals at law firm Kennedys. Now, she says, not only are the banks back, but pension funds and insurance funds are taking an interest.

The second sign of the financing market's relative health is the number of buyers considering finance-backed aircraft purchases rather than all-cash deals. Even in Asia, where Ascend Online data show that only 13 of 43 business jets delivered last year were bought through finance leases or similar structures, demand is growing.

Minsheng Financial, a Chinese bank that has provided the bulk of domestic financing, estimates that the portion of cash deals to finance deals will eventually flip from about 70-30 today to 30-70, in line with current levels in western markets.

Refinancing will drive some of that shift, predicts Eddy Pieniazek, an aviation consultant: "Post-delivery, the 'cash-heavy' owners are finding they have a growing number of refinancing options – a result of both the increasing confidence that lenders worldwide have in the Asia market and the growth in the number of 'new faces' in Asia."

In the west, refinancing is fuelling much of this year's activity, as owners seek better rates than those they got three or four years ago.

Banks hoping to leverage their backing of private aircraft purchases into wider relationships with wealthy customers accept rates of return as low as 1 per cent, but today's more typical rates are 5-7 per cent.

Helicopter fleet deals offer even better returns – and stability – since the operators buying rotary aircraft are usually locked into service contracts with oil and gas groups, providing a clear view of forward earnings.

Daniel Hall, an analyst with Ascend, sees rising loan-to-value ratios as a sign of a more competitive market, though he doubts the days of 100 per cent LTVs will return soon.

Still, "things are getting slowly better rather than the other way around", with new entrants, such as small, local banks financing the smaller jets that big banks veer away from – either because their values are more volatile, or because arranging the finance package for a $3m jet is not worth their time. "The local banks see smaller jets as a niche opportunity," he says.


Not only are the banks back, but pension funds and insurance funds are taking an interest, says Aoife O'Sullivan of law firm Kennedys

One group still not playing a big role in the market, however, is the leasing companies, in part because commercial aviation is keeping them busy enough.

"In business jets, it's a completely different structure. You'd have to put a dedicated team on it," says Ms O'Sullivan. That is why she is more excited about the prospect of an insurance fund backing a deal. Yes, it would need to hire in aircraft expertise, but insurers fundamentally understand the sort of geographical, political and even reputational risk associated with corporate aviation.

"They're in the business of financing risk," she explains. "And this market is not half as risky as everyone says it is."

Fractional ownership faces slow climb out of recessionary trough

Part-owners

Market has yet to regain levels reached before the crisis, reports *Jane Wild*

Companies offering fractional ownership have had an eventful year.

After a period of relative stability, two well-known names – CitationAir and Avantair – have departed and big shifts in the sector are apparent.

The business of owning a part share of an aircraft to ensure guaranteed access for a set number of hours has been around for almost three decades, with the advent of NetJets in 1986.

And, while the industry is still dominated by the Warren Buffett-owned NetJets and its rival Flexjet, the ranks at the other end of the market – turboprop and flying in the small cabin category – have been thinning. That reflects the growing split in business aviation between the use of larger aircraft, such as Dassault and Gulfstream jets, and smaller, cheaper aircraft, such as Cessnas.

During the downturn, business aviation was badly hit. This was with the exception of the top of the market, where orders for jets priced at more than $26m grew.

CitationAir, majority-owned by Cessna, stopped selling fractional ownership in February in favour of a move towards charter management. And, by June, Florida-based Avantair, which operated about 55 Piaggio Avanti twin-engined turboprops, went bankrupt and ceased flying.

The exit of those companies had a significant effect on the turboprop and small cabin category.

"The fractional ownership market in many ways reflects the bifurcation [in business aviation]," says Richard Aboulafia, vice-president of analysis at Teal Group, an aerospace and defence consultancy.

He adds: "The great bulk of the fractional fleets are bottom half jets, so I think it's telling that fractionals suffered as badly as they did – they reflected the weakness in that bottom half of the market."

Overall, the market has picked up, but it has yet to regain its pre-crisis levels.

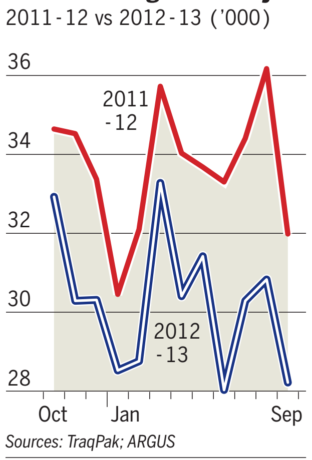
"It's rebounded off the bottom but it's not storming away and that's not surprising because the economy's not storming away," says one aviation analyst.

Data on fractional flying in the US and Canada collated by TraqPak, part of Argus International, a market intelligence company, show journeys are down 10 per cent in the past year compared with the previous year. That drop shows the departure of CitationAir and Avantair.

"We are at the bottom of a trough, looking up," says Mr Aboulafia. Not only was the market hit by the fall-off in demand for lower-end, cheaper aircraft, he says, but companies got pricing wrong, targeting market share rather than making earnings.

Another development in fractional ownership is the move away from companies being tied to manufacturers, suggesting that vertical integration does not work for the industry, says Mr Aboulafia.

Fractional flight activity
2011-12 vs 2012-13 ('000)



Sources: TraqPak; ARGUS

'It's rebounded off the bottom but it's not storming away'

That was illustrated by Bombardier's sale of its fractional business, Flexjet. Directional Aviation Capital, the private investment firm, acquired Flexjet last month, placing an order of about $5.2bn for up to 245 Bombardier business jets as part of the $185m cash deal.

For Kenn Ricci, head of Directional Aviation Capital, the fractional business is looking rosy. His view is that the gulf between the high-end jets and the lower half of the market offers the opportunity to do more business. "There's a market for a bespoke product in our industry," says Mr Ricci. His plans for Flexjet, which will join his other brands Flight Options and Sentient Jets, include working with interior designers for a greater degree of customisation of high-end aircraft.

Global expansion is also on the agenda, with South America a focus. "I don't think Flexjet can be a truly world-class company without having global reach, so I think there's a great opportunity to go into the larger aircraft markets, into long-range and ultra long-range." But for overall growth, in the near term, not much is set to change, says Mr Ricci. "I see three to five years of slow growth...maybe a couple of percentage points a year." Mr Aboulafia strikes a similar note. "I'm cautiously optimistic," he says. "I have a better expectation for 2014 than for 2013."

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