

# EVA

Winter 2020

EXECUTIVE &  
VIP AVIATION  
INTERNATIONAL



Dassault Aviation

Carlos Brana, Executive VP Civil Aircraft

6X: Falcon Redefined

Data Broker: SD – Chris Moore, President Business Aviation

In a League of its Own: Oriens Aviation – Stuart Locke, General Manager, Aircraft Maintenance

Parking Without the Pitfalls: Camber Aviation Management – Tom Chatfield, CEO





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# Contents

Winter 2020



## 4 6X: Falcon Redefined

Carlos Brana, Executive Vice President Civil Aircraft, Dassault Aviation, sets expectations for the Falcon 6X



## 10 Chris Moore: Data Broker

Chris Moore, President Business Aviation at Satcom Direct, explains how the company has been keeping busy



## 14 Time for Tamarack

Nicholas Guida, Tamarack Founder & CEO, talks Active Winglets as the company opens a European Transformation Centre



## 19 Save the Dead Dinosaurs!

Tom Parsons, Commercial Development Manager Low Carbon at Air bp, is on the case of global sustainability

## 22 Upbeat & Understandably Downhearted

James Dillon-Godfray, Head of Business Development at London Oxford Airport, is cautiously optimistic for 2021

## 24 Xtra Large, Xtra Value, Xtraordinary Offer

Benoit Defforge, President at ACJ, and Richard Gaona, Executive Chairman & CEO at Comlux, on the new ACJ TwoTwenty

## 30 In a League of its Own

Stuart Locke, General Manager, Aircraft Maintenance at Oriens Aviation, says he's never seen an aircraft as reliable as the PC-12

## 34 International Gateway to Marrakech

Frédéric Perez, Operations Director Swissport Executive Aviation Maroc, describes the brand-new Marrakech Menara FBO

## 36 Liberty, the New Learjet Standard

Mischa Loeffler, Manager of Product Planning and Strategy, Bombardier Aviation, describes the new Learjet 75 Liberty

## 42 Changing The Charter Landscape

Kathy Leroy, VIP Charter Manager at Chapman Freeborn, on how coronavirus is changing the landscape of private jet charter

## 46 Parking Without the Pitfalls

Camber Aviation Management's Tom Chatfield describes the steps to take and the pitfalls to avoid when storing an aircraft



# Editor's NOTES



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Unless there's something important to say, some piece of carefully considered insight to share, I've always struggled with the editor's comments, editorial, welcome, whatever you'd like to call it, at the beginning of a magazine. I believe the editor's job is to collect and share the thoughts and experiences of other, wiser people.

Which leaves me with the problem of what to write here; honestly, I'd prefer another great photo of jet instead, but that's not how it works. Looking back over this years' editor's comments, I see that in the Spring 2020 edition, the first of the year, I was very excited about the industry's focus on sustainability.

The Summer editorial, written in the depths of the UK's first coronavirus lockdown, inevitably spoke of industrywide challenges, but recorded a glimmer of hope as business aviation mobilised under the pandemic and continued as best it could with the normality of moving people securely, safely and discretely, at speed and over distance.

Which brings us to Autumn, where I bemoaned the necessary cancelling of trade shows and public air shows but did at least pass on a message from someone wise, Avfuel President and CEO Craig Sincock, whose simple advice, "Businesses just need to hang on tight," is still relevant as we look towards 2021 and a continuation of the new beginning the industry seems to be experiencing.

The shoots of that new beginning, or restart,

are emerging everywhere, not least with the announcement that Airbus Corporate Jets has launched its ACJ TwoTwenty. Benoit Defforge, President at ACJ and Richard Gaona, Executive Chairman & CEO at Comlux, share their thoughts on the project in this edition, which also provides a look at the Learjet 75 Liberty, the latest in an iconic line and the first Learjet with a name since the 1980s.

Depending on your preferred reading method, by now, Dassault has either rolled out or is about to roll out the Falcon 6X, the latest in another iconic line and one that Carlos Brana, Executive Vice President Civil Aircraft, Dassault Aviation enthuses about in this Winter 2020 edition.

Otherwise, we have contributions from people who fix, design, fuel, maintain, modify, operate and accommodate business aircraft, from the delightfully humble Pilatus PC-12 right up to the dramatically apparent Boeing 787 Dreamliner. Given this diversity in one magazine, is it any wonder that business aviation is recovering faster than its commercial cousin?

By coincidence, earlier in this mid-November morning I spoke to Dave Connor, CEO of RVL Group, a UK company employing a fleet of turboprop twins on business charter, freight and special missions. A very busy man despite COVID-19, he counts himself fortunate to be in this sector of the aviation industry. I asked for his thoughts on how 2021 might work out and he responded, "I'm cautiously optimistic..."

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# 6X: Falcon Redefined

*On 8 December 2020, just a few days after this Winter edition of EVA was completed, Dassault expected to roll out its all-new Falcon 6X. Carlos Brana, Executive Vice President Civil Aircraft, Dassault Aviation, talks about what the industry can expect from the company's first 'ultra widebody business jet'*

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On 7 May 1963, Dassault flew the prototype Falcon 20 business jet for the first time. The company's supersonic, delta-winged Mirage III fighter was simultaneously entering l'Armée de l'Air (French air force) service and so began the precedent for 'DNA sharing' between Dassault's fighter and business jet lines. It is a precedent that continues today and, according to Carlos Brana, Executive Vice President Civil Aircraft, Dassault Aviation, is among the company's greatest strengths.

"Think about how fighters are built," he says, "for manoeuvrability and survivability, with head-up displays and flight control systems that reduce pilot workload and help manage rapidly changing flight environments. Wouldn't you want all of that in your business jet?"

"The fact that Dassault has been flying not just fly-by-wire, but fully digital flight control systems for more than 40 years means we have accumulated more expertise in developing hardware and the critical software for these systems than just about anyone. Competitor fly-by-wire systems are purchased off the shelf. Dassault has made its own flight control systems since the 1950s."

Which means today's Rafale multi-role fighter and nEUROn uninhabited combat air vehicle (UCAV) are perhaps closer in spirit to the latest Falcon 6X than the legendary Mirage III was to the pioneering Falcon 20. And yet we are fortunate to have the 6X at all. The design has risen phoenix-like from the disappointment of the Falcon 5X, a twinjet projected for



Carlos Brana, Executive  
Vice President Civil Aircraft,  
Dassault Aviation



Safran's troublesome Silvercrest and which proved to be just one of that engine's victims. Switching to Pratt & Whitney Canada power, the Falcon 6X has emerged as a longer-ranged, altogether more modern machine.

#### Ultra widebody business jet

Dassault bills the aircraft as 'the first ultra widebody business jet' and among conventional business aircraft its 8ft 6in (2.58m) cabin is notably wide, but the ACJ TwoTwenty has emerged as an unexpected competitor in that respect. At 5,500nm, the Falcon 6X achieves similar range to the 5,650nm Airbus, although the latter was not designed to achieve the Falcon's Mach 0.9 maximum speed. Brana remains predictably upbeat about the Falcon 6X's sales prospects in the face of the newcomer from ACJ.

"The 6X is a big business jet, not a small airliner. It is designed for a wide range of missions best performed by business jets: routine operations at small and challenging airports, for example, even those with runways of less than 4,000ft; and approach speed is as low as 109kt – turboprop speed. Yes, the 6X and the ACJ TwoTwenty fly about the same distance, but the 6X is around half the weight, with related savings in fuel.

"It has the biggest cabin in the 5,000nm-range class among purpose-built business jets and the most advanced digital flight control system [DFCS] of any Falcon, benefiting from the 40-plus year heritage of digital flight control systems in Dassault's fighters. Pilots love the precise handling of all Falcons and especially the DFCS aircraft. Among its many benefits, the DFCS in the 6X reduces pilot workload, allowing pilots to focus on the big picture of safely managing a flight. Pilots believe we build these airplanes around them, and they're not wrong.

"With the 6X we've also built an unsurpassed passenger experience. Cabin pressure altitude is below 4,000ft at cruise and the cabin is at least as quiet as that of the 8X, which leads the industry. The 6X also has the ability to fly at 51,000ft, above traffic and turbulence. Owners who are not pilots also rightly feel the airplane is all about them."

In fact, Falcon customers, pilots and passengers all take a key role in defining Dassault's new aircraft. "One of our 'secret weapons' is the Falcon Operator Advisory Board, which is quite enthusiastic about supplying input on new programme development. Several pilots and potential owners have been in our flight deck and cabin mock-up and given it rave



The Falcon Operator Advisory Board enjoys considerable input into Dassault's cabin designs. The 6X offers an especially wide cabin for the class





Among its unusual features, the Falcon 6X includes a window in the upper fuselage, bringing more natural light into the forward cabin

reviews. Also, our own pilots, beyond their flight test duties, are forceful representatives of the user community and have a strong influence on all aspects of the design, well beyond the flight deck.”

#### December roll-out

As these words were written at the beginning of November, Dassault was looking forward to rolling out the first Falcon 6X early in December, ahead of first flight in the New Year.

Confirming the timings, Brana was quick to correct the assumption that the aircraft would be a prototype, asserting instead that it was the first of three pre-production aircraft destined for the flight test programme. “They are built on production tooling – there are no longer prototypes thanks to the accuracy of the digital design process. The first aircraft will initially be devoted to opening up the flight envelope before flying a variety of missions, including system tests.” Referencing the impact

## Competitor fly-by-wire systems are purchased off the shelf. Dassault has made its own flight control systems since the 1950s

of COVID-19 on the programme, Brana spoke of Dassault’s staff and suppliers: “They kept to schedule all year and deserve immense credit”.

He expects the three-aircraft flight test programme to take more than 12 months, with certification in 2022. Data for certification will be collected from the first flight onwards. The timescale is typical for a clean sheet bizjet design and Dassault is ensuring continuity by equipping the first two machines to a similar standard.

“They will be outfitted with flight test equipment so they can be flown interchangeably. If one is in for service, the other will be ready to fly, a capability that will be particularly useful when the desired weather conditions develop for certain trials; it’s difficult to find just the right conditions for testing in strong crosswinds, for example. We’ll always have one aircraft ready to dispatch and that will help keep the programme moving.”

The third jet will have a full interior, for cabin system trials, and Brana says the intention is to expose it to a wide range of flight conditions and extremes of temperature. “We’ll be able to cold soak it on a 10-hour flight, for example, and use infrared cameras to map cold spots and adjust insulation, if necessary. We’ll also be able to map the interior acoustically. All the test aircraft will assess function and reliability, but the



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Carlos Brana believes Dassault's military experience strengthens its Falcon line. Here the nEUROn UCAV, two-seat Rafale B fighter and Falcon 8X encapsulate the company's aviation expertise



third in particular will fly long missions intended to evaluate the aircraft in as wide a range of conditions as possible.”

Modern flight test programmes are generally more concerned with verifying aircraft behaviour and data compared to computer models and ground-based rig trials; manufacturers expect little in the way of surprises. Brana confirms: “We have multiple ‘iron bird’ test rigs for all systems, including those in the cabin. And we have two test benches for the flight deck, one in our engineering centre at St Cloud, outside Paris, and the other in our flight test centre at Istres, in the south of France. Our pilots and engineers already have thousands of hours of experience with these. They function as simulators and procedures trainers, and before the 6X flies, our test crews will have rehearsed all the normal mission and emergency scenarios.”

#### Sustainable start

Now that the industry is adjusting and adopting new ways of working around COVID-19, there is much talk in business aviation of a restart, a new beginning in which sustainability takes precedence. The Falcon 6X will be among the first all-new jets to appear in the post-COVID world and therefore ought to be

## The 6X is the first business jet with an on-board server that collects diagnostic data. FalconScan monitors more than 100,000 parameters

setting a sustainability standard. According to Brana, “Fuel efficiency and low emissions are strengths of the entire Falcon line. They are optimised for efficiency, with the most advanced aerodynamics and low weight.”

Living up to the sustainability challenge ought not to be a challenge for the new jet then. Brana promises that the Falcon 6X's engine, the Pratt & Whitney PW812D, from the PurePower PW800 family, “delivers a cleaner burn and lower emissions thanks to its advanced combustor, which also ensures double-digit improvements in fuel efficiency.”

After first deliveries in 2022, the Falcon 6X will quickly enter service on a global basis, at which point customer support

becomes as important as delivering a quality product. It's an area of its business in which Dassault has made considerable strides and regularly wins awards. “These days it's not enough to build a great airplane if you want to sell everywhere in the world,” Brana says. “You have to have a great support infrastructure. We now have more than 60 locations for factory and authorised service. The Dassault-owned ExecuJet MRO facility in Kuala Lumpur, for example, just received Falcon maintenance authorisations for Vietnam-based aircraft. That's typical of how we are ensuring strong support all over the map.”

Dassault has taken dramatic steps to improve its customer support in recent years, especially through MRO acquisitions, including the Kuala



Right: Dual head-up displays and sidesticks are in keeping with the latest cockpit technologies and the Falcon 6X's 'fighter DNA'

Below right: Falcon 6X construction has continued under COVID-19 restrictions. All Falcons are built in France and completed in Little Rock, Arkansas

Lumpur facility. The 6X will be the first jet newly introduced into this regime, which goes beyond having expert technicians and spare parts readily available in the field. The aircraft has been configured to work with Dassault's worldwide support network, actively collaborating with it to improve safety, increase availability and reduce maintenance costs.

Brana explains: "The 6X is the first business jet with an on-board server that collects diagnostic data. FalconScan monitors more than 100,000 parameters, generating an amazing amount of data even without including that from the advanced engine diagnostics. And if a Falcon needs a replacement part, we have around US\$1 billion in spares located around the world, ready to be dispatched within hours."

Providing a real-world example, he says: "Recently we had a Falcon 8X AOG in Minsk, with a trip to the Philippines scheduled for the next day. We dispatched parts and technicians on one of our two Falcon Airborne Support Falcon 900 aircraft in a few hours and the 8X departed on schedule."

### Twins and trijets

Examine the Falcon portfolio in detail and it's clear the 6X offers almost the range of a 7X trijet and certainly has the legs to cover most 7X missions. Meanwhile, the 6X out-ranges the 900LX with one engine fewer and, presumably, reduced fuel burn. It begs the question of how the 6X's arrival will affect the market prospects of the 7X and 900LX. Brana has a sensible answer.

"These are different airplanes for different missions, budgets and preferences. We now offer twin and trijet aircraft for long-range missions. Customers have a big say in the Falcon product line and some of them are



aficionados of trijet airplanes. We'll continue manufacturing our airplanes according to market demand."

Meanwhile, the Falcon 6X is introducing new technologies and cabin developments to the range; might we expect to see some of these appearing as welcome additions to existing models? "Very possibly," Brana responds. "The 6X just won the International Yacht & Aviation Award for interior design. We wouldn't be surprised to see some of those design elements flow into other models."

Customers have a choice of aircraft from other manufacturers as well as from the Falcon portfolio, but there's no denying, whatever an individual's preference, that Dassault builds particularly distinctive, elegant machines in a market where

aircraft tend to look quite similar. Perhaps it's down to the fighter DNA, or something else uniquely Dassault. Brana has a theory.

"If it were easy, anyone could do it. Developing new technology for more capable, more efficient, safer aircraft is challenging. Dassault is unique in having the same design organisation developing its combat and civil aircraft. It's a depth of experience you won't find elsewhere. Yes, business jets do look similar, but Falcons are unique."

All of which promises exciting possibilities for the next aircraft in the Falcon line. Might we expect a supersonic Falcon 9X? A Falcon 10X hybrid? Perhaps an all-electric Falcon 11X? Brana won't be drawn on the subject. "You'll see," he says.

# Chris Moore: Data Broker

*These past few months, Satcom Direct has been busy building hardware, upgrading facilities and developing new services as Chris Moore, President Business Aviation, reveals*



When the Learjet 23, predecessor of the latest Learjet 75 Liberty profiled in this issue, first flew in 1963, there was no public internet and 'data' simply meant information. The Falcon 6X, also featured in this issue, will fly for the first time early in 2021. It is an aircraft of the internet, digitally designed and built to connect into a data-driven world. Those two aircraft designs, superficially similar and less than 60 years apart, neatly encapsulate our changing perception of data.

The Learjet 23 design team used data, in the form of numbers and words, in their daily working lives. They called family and friends to speak on the phone, wrote letters and typed reports. The Falcon 6X team also designed their jet using data, but with the intention that it should become a data generator, even a data hub, in its own right. They still contact family and friends,

most likely via a mobile device, using voice, messaging, social media or email, relying on their data plan when Wi-Fi isn't available.

The internet enables us to find, generate, move and store data. In doing so, we express the extent of our access to the internet as 'data'. A member of the Falcon team finding themselves unable to connect to Snapchat might discover that they had 'run out of data'. Their access to the internet had been curtailed because their usage of 'data', in this case the capacity their 'data plan' provided for access to and the movement of 'data', had been exceeded. They could no longer access data because they had run out of data.

Is it any surprise then that with business and VIP aircraft better connected than ever before, the means of accessing and moving data have become confused? Enter

the folk at SD, whose agnostic approach to connectivity avoids the pitfalls and complexity by addressing the requirements and expectations of the user with the best matched products.

## More than a data plan

Founded in 1997 as Satcom Direct, the company quickly realised there was more to aircraft internet connectivity than selling data plans. It has since become a provider of apps and hardware designed to help customers extract every last bit of value from their data. Most recently, that proposition has expanded in collaboration with MySky, but SD has also been busy upgrading its Florida network operations centre (NOC, pronounced 'knock') while simultaneously coping through the COVID pandemic.

Chris Moore, President, Business Aviation, notes that while entirely escaping the trials of coronavirus is impossible, SD's work in business aviation, government and defence communications and so, unlike those whose offer revolves around commercial flying, SD is weathering the storm. "Our business has been severely affected," he admits, "but we were in a strong position thanks to our diversity in hardware, software and connectivity, and markets."

Speaking in late October, Moore expressed concern over various European states beginning to enforce new travel restrictions as infection rates again started to rise, but confirmed: "We've really focussed over the past nine months and kept all our support engineering and sales staff; we've kept the team intact and concentrated on delivering the data strategy, software and hardware we've been promising for several years."

Part of that hardware delivery process occurred at SD's major customer event in Orlando. It took place in February, just before the pandemic kicked-off and provided the platform for the company to launch its new Plane Simple antenna series. Available in Ku and Ka versions, the equipment is designed to future-proof terminal installations by standardising the wiring and equipment provisioning. There is also an Iridium Certus unit and a new flat panel antenna under development. "We've made some good headway while the business has been a little quieter than we'd like," Moore notes.





Inside the NOC at SD's Melbourne, Florida world HQ

A significant part of that headway has involved upgrading SD's NOC. Well-known for its large screen, showing data gathered from around the world, it now boasts an even larger, 70 x 10ft display. The screen encapsulates much of SD's customer-focussed activity, as Moore explains.

"Pilots frequently say that it's important to 'stay ahead of the aircraft' and we do a lot of predictive data analysis so we can do the same. We've built support tools around the application interfaces we have with the satellite vendors and our hardware on the aircraft. It's really data management, which we visualise with our own software. It's written so that we can monitor network, terminal and infrastructure performance.

"It brings it all together so that our support guys can take the NOC to the next level. It's becoming almost like an artificial intelligence view of the network. We can visualise an issue very quickly, understand what it is, pinpoint and fix it, often before the customer knows there was a problem. It's predictive, proactive data management – our support staff actually say 'we know before you know', and it's important to emphasise that they are our most important asset, not the big screen."

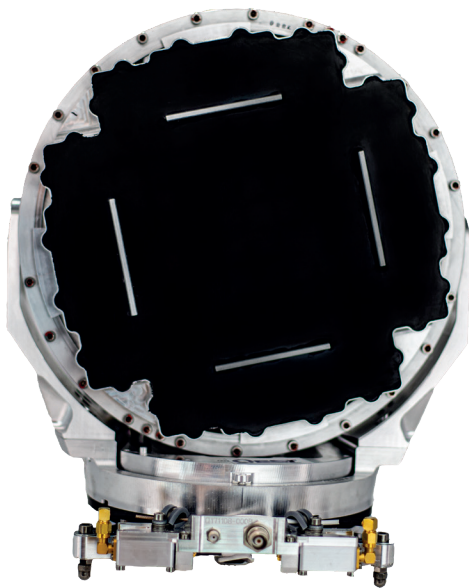


A simulation shows how FDF brings essential data into the cockpit

The NOC screen provides a constantly updated network snapshot, based on data in the moment. The view changes with time, but the data behind it is not consumed, instead it is securely stored for future network analysis and other uses. "Data scientists review our data, examine trend analytics, especially on different networks or between geographical areas. We might, for instance, see a number of issues or performance metrics over the UK and we can analyse the trend to help us understand why. Then we talk to the network

providers, working in partnership with them to help improve their network to the benefit of our customers."

The result of this data-driven process and close working with satellite vendors is a connectivity service optimised for business aviation. Moore believes much of the industry's connectivity is 'handed down' from the commercial airlines, a fact he says has previously also been true of antenna technology. "We've made our antennas



The Plane Simple antenna series offers Ku- and Ka-band options

smaller, purpose designing them for a business jet, rather than taking a design for a large commercial passenger aircraft and then trying to make it work on a business jet, where there are too many boxes, it's not easy to install and doesn't work as well as it could with the infrastructure and network provider."

In line with most industry insiders, Moore recognises business aviation's resilience through the COVID-19 crisis and expects its recovery to pre-pandemic levels to be achieved more quickly than that of commercial flying. Beyond that, it's reasonable to expect expansion, so where does SD go next? A 100 x 10ft screen?

"Everything we do is scalable, but it's not about the screen size... The big thing is that we own our own teleport and ground infrastructures, data centres and POPs – points of presence, where the internet lands around the world – infrastructure. It's all scalable, block-based technology, not unlike Lego. We can build out as we need more space or functionality."

#### Defining data

Returning to the question of what data is and how our interpretation of it has changed, Chris Moore says: "Our job in this is data management. The connectivity pipe enables data transmission, our router collects data from the cabin or cockpit and passes it over the data pipe.

"The transmitted data comes into our data centre, and is then passed through data filtration to its destination. If the customer wants to use Netflix, the data goes to the relevant server, if it's corporate email, it goes to a different server. Essentially, there is connectivity data and operational data, you can't have one without the other, and we handle both. If the operational data can't be transmitted from the aircraft using connectivity data, then it can't be used or analysed."

Fortunately for its customers, SD doesn't expect them to be familiar with the intricacies of POP, IP and data pipes. Instead, the SD Xperience concept expresses connectivity in terms of real-world capability and experience, rather than data and connection speeds. It's an altogether more useful way for customers to identify the right solution for them.

"We're agnostic and open architecture," Moore says, "which means we can maximise the aircraft's capability to enable them to do what they need to do, to achieve the experience they need, from the data. It's their data, their information. You might describe us as data brokers. We collect and distribute our customer's data on their behalf."

#### FlightDeck Freedom

A decade or so ago, the industry was delighted with itself for offering passengers inflight email. Now, movie streaming and

intense gameplay are common in the cabin, while flight crew enjoy advanced connectivity options that deliver a wide variety of critical operational, planning and safety information directly into the cockpit. It comes as no surprise that SD is a veteran in cockpit data services, but the achievement of its 2,000th FlightDeck Freedom (FDF) installation earlier this year is nonetheless remarkable.

FlightDeck Freedom delivers a variety of configurable data to pilot tablets and directly to the flight deck, via secure datalink. Customers are free to customise FDF with SD apps or those provided by other companies, or even with software of their own creation. For Moore, FDF has greater significance than the 2,000 installation milestone alone.

"It was our first step into the open architecture, data passing world. As well as bringing information into the cockpit, FDF allows us to bring messaging into the FMS [flight management system], along with communications and the classic services from Inmarsat, and Iridium services, including a FANS [Future Air Navigation Services] box. FlightDeck Freedom really empowers the crew, just as we empower the maximum passenger experience."

Moore often returns to the themes of open architecture and data distribution. SD has the products and capability to deliver a



comprehensive suite of connectivity and apps, yet remains enthusiastic about interfacing with software of the customer's choice, even when it is sourced from a competitor. His take on the philosophy is interesting.

"We believe that if we build the data architecture and data platform, which is more difficult for smaller companies to invest in, or impossible for those not in communications delivery, then our job is to

distribute data and encourage innovation within the business aviation space. If there's something new that helps our customers achieve the best experience, we'll integrate with it."

As an example, Moore notes SD's recent collaboration with MySky. "They aren't a communications company, but they do a really good job on spending and budget management, providing spend transparency

into the flight department. We've interfaced our SD Pro platform and data management so that clients can have that information pass seamlessly into the MySky system."

It is particularly significant that not once in the course of our conversation did Chris Moore reference the satellite communications packages SD promotes to its clients. His enthusiasm is for moving and exploiting data, using it to optimise the customer experience, whether through the ability to conference call, receive the latest weather information or manage budgets.

"We are in an era when high-speed, reliable satellite connectivity has become commonplace. Now we can focus on delivering the capability our customers need, ensuring they maximise the value of their data and feel secure in its ownership."

## We are in an era when high-speed, reliable satellite connectivity has become commonplace

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# Time for Tamarack

*Tamarack's Active Winglets are remarkable for their apparent simplicity and the performance gains they enable. Nicholas Guida, Founder & CEO, explains their benefits as the company opens a new Tamarack European Transformation Centre at the UK's London Oxford Airport*

If the EVA team's hard work in the face of adversity has paid off, you should be reading these words more or less as Tamarack completes a second Active Winglet installation at its new Tamarack European Transformation Centre and soon after it announces the opening of the Tamarack East Coast Transformation Center at Aiken Regional Airport, South Carolina, during the NBAA's VBACE event on 2 December.

On 27 October 2020, the Sandpoint, Idaho-headquartered company had announced the completion of work on a Sovereign Business Jets Citation CJ2 at the European Transformation Centre, with a Citation CJ1 expected to be ready in November. A CJ1 belonging to a private owner was also scheduled for work that same month.

These redeliveries of modified aircraft mark a significant milestone in Tamarack's history. The company successfully emerged from voluntary bankruptcy in March 2020, after a well-documented period of struggle following EASA and FAA emergency airworthiness directives issued following upset incidents affecting a handful of modified CitationJets. Those difficult times are now behind the Tamarack team and seem to have done little to dent customer faith in the company.

Expansion is a key factor in the recovery process and having added to its authorised installation facilities in the US, Tamarack has turned its attention to Europe, where a small number of companies already offered the Active Winglet kit. The UK, in fact, had two dealers already, but Tamarack describes the London Oxford facility as a Transformation Centre. As Nick Guida explains, that's something quite different.

"We've had great dealers for a while but we're moving towards having our own shops, where we control the process from beginning to end. Having dealers is good, but I've always wanted to have just a few facilities bespoke for our product." Customers using a Transformation Centre enjoy an experience as though they were visiting Tamarack headquarters and Guida draws attention to the new Aiken Regional Airport facility on the US east coast.

## Active Winglets

Today, winglets have become so commonplace in service, on new-build and retrofitted business aircraft, airliners and even military airlifters, that they seldom warrant a second glance. Yet Tamarack's Active Winglets are quite different to the norm. Whatever their configuration, traditional winglets require structural reinforcement of the outer wing, primarily to counter aerodynamic forces and wing bending generated by the winglet. The fuel saving provided by installing winglets compensates for the additional fuel burned carrying the reinforced structure, but the result is less than optimal.

Active Winglets add weight too, of course, around 79lb on a CJ, but the fuel required to carry that small increase is massively compensated for by the performance improvement. A CJ with Active Winglets might reasonably be expected to fly for between four and five hours on the same fuel that would provide three hours flying to an unmodified jet. It will also climb faster, reaching altitudes in initial cruise that a regular aircraft might achieve only towards the end of a flight, when it was light on fuel.

Tamarack counters wing bending using an active load alleviation system, embodied in two small control surfaces – Tamarack Active Camber Surfaces (TACS) – mounted inboard of the winglet. Installing the surfaces requires an extension in wing span, but its response to aerodynamic forces means a larger winglet may be fitted, with an inevitable increase in wing aspect ratio. This, combined with the well understood efficiencies of winglets, enables Tamarack to claim dramatic fuel savings, extending a CitationJet's range by as much as 30%, depending on aircraft and mission profile.

And, because the installation process is relatively simple, downtime is minimised. With its first job completed to the customer's satisfaction, the Oxford Transformation Centre was confident of bringing the time required for subsequent installations down to seven days. "The key," Guida says, "is that the wing doesn't need to be reinforced for stress or deflection – traditional winglets bend the wing more, so there's often a need to modify ailerons and slats too. In some cases the upper wing skin has to be removed before the wing can be reinforced. The critical point for us is that we reduce the bending moments at critical loads, when the TACS pop up. That means there's no structural reinforcement and we only go







Active Winglets transform an aircraft's appearance, with increased span as well as the winglets themselves

into the wing about six inches. So we can do this with one shift in seven working days, including paint.”

For all their efficiency, the Active Winglets also look fabulous. They are large, stylish additions to the jet and cry out for paint or a spectacular finish. Guida is confident in Tamarack's ability to deliver that finish within the seven-day installation timetable.

How? “We have a secret weapon. His name is Patrick,” he reveals. “He’s an artist foremost, then he got into aircraft painting and came to work with us. He’s excellent. As soon as we have a customer saying they’re interested, we start working with them and the results are incredible.”

Surprisingly, Active Winglet-modified aircraft require little if any addition to

their regular maintenance programmes. “It’s all very traditional,” Guida says. “We have electromechanical actuators that are assessed on-condition, so if they’re OK they don’t need replacing; there’s nothing beyond a visual inspection. We may replace the actuators in our fleet leaders just so we can see how they’re doing, but we’ve already tested the actuators to seven lifetimes.”

#### U-2esque mystique

There is no question that Tamarack's winglets look sensational. The extended wing span that comes with them also gives every modified CJ a U-2esque mystique, while operators laud the additional range. And yet the company continues to generate media scepticism over the reduced fuel burn it promises. Guida reckons it's because the industry has been accustomed to the single-digit improvements achieved with traditional winglets, which makes the 20 to 30% he claims seem implausible.

But Tamarack's customers are delighted with their Active Winglets and there seems no shortage of new operators coming forward to place orders. The real irony is that the media, while apparently convinced that miniature drones will soon be swarming to our doorsteps delivering iPads and toasters, or that battery-powered long-haul airliners



Nicholas Guida, Founder & CEO, Tamarack Aerospace Group

are just around the corner, is reluctant to see the benefits of a real-world, customer-proven system based on sound aerodynamic and engineering principles.

So far, Tamarack has focussed on Citation models, but the technology is applicable to almost all platforms, should a customer require it. Guida is keen to expand to other models but says the approach has to make sense. “We have people come to us saying they want Active Winglets. We want to move up the food chain and we want them to have the performance, so we ask: ‘Why don’t you take it to your owners’ group?’ They may have three or four hundred owners in the group and if they work together, we can license the technology to them. Then they control the price and the margins. They’ll want a low price, of course they will, but I can’t give them that as individuals. If lots of owners put deposits down though, then we can do the math so they get a good price and it makes business sense.

“We’re also looking at larger airframes and we have some interesting, exciting military developments. But my goal has always been narrowbody airliners.” By extension that means VIP-configured airliners too, but many of those are already winglet equipped. Is there a nascent winglet replacement market too? “Take them off, put an extension and Active Winglets on,” Guida says. Even in this situation and depending on type, he suggests operators will achieve an improvement in climb rate and 15 to 20% improvement in range under optimum conditions.

Guida is clear that Active Winglets offer significant performance improvements and dramatically reduced fuel consumption, with obvious benefits to aircraft utility and operating costs. But there is also an environmental bonus. A modified CJ burning regular jet fuel, even more so sustainable alternative fuel, would fly a long way with minimal carbon footprint, costing the operator less in carbon offset and speaking to the industry’s sustainability goals.

Tamarack has worked through its fair share of troubles and has its doubters, but as the aviation industry looks to reset for a sustainable future post-COVID, now must surely be its time.



An Active Winglet, with the leading edge of the Tamarack Active Camber Surface ‘flap’ visible inboard



...the wing doesn’t need to be reinforced for stress or deflection – traditional winglets bend the wing more, so there’s often a need to modify ailerons and slats too





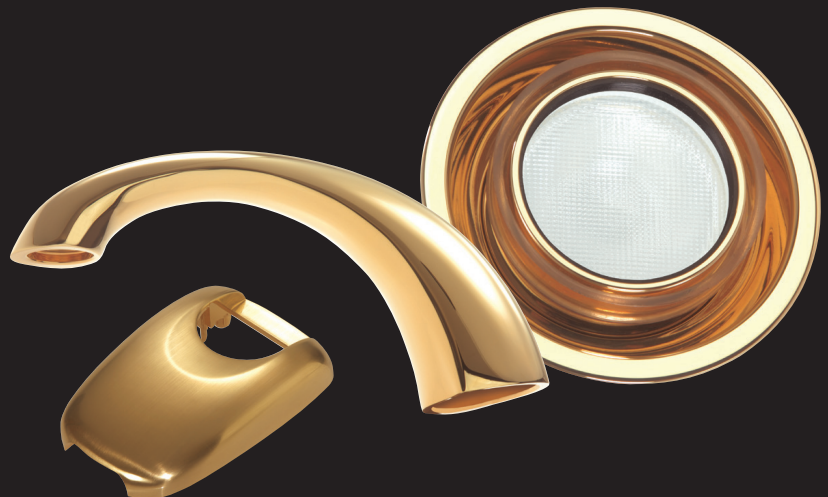
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# Save The Dead Dinosaurs!

*When sustainability is the issue there is always more to be done. Tom Parsons, Commercial Development Manager Low Carbon at Air bp, is very much on the global case*

This is another story about sustainability. It will discuss sustainable alternative fuel (SAF), carbon offset and the ambition of a major industry player – bp – to become a net zero company by 2050. You probably know all this, so rather than wasting time reading it, you may as well move on to the next article. Or maybe not...

Gulfstream has been among several business aviation companies seeking to re-energise and reach out through webinars. It's sustainability episode was engaging not only for its content but also the questions it

generated. Experienced operators were still enquiring over the aircraft modifications needed before fuelling with SAF, suggesting that the message needs further work and perhaps it is worth reading on.

No modifications are required before fuelling with SAF. Again. No modifications are required before fuelling with SAF. Tom Parsons, Commercial Development Manager Low Carbon at Air bp is an expert on all things regarding sustainable alternative fuel. He reiterates: "It is important that owners and operators are aware that

SAF can be blended at up to 50% with traditional jet fuel and all quality tests are completed as per that traditional jet fuel. The blend is then re-certified as Jet A or Jet A-1. It can be handled in the same way as a traditional jet fuel so, as mentioned, no changes are required in the fuelling infrastructure or for an aircraft wanting to use SAF." In 2016, Air bp became the first operator to begin commercial SAF supply through an existing hydrant fuelling system, at Norway's Oslo Airport.

If it helps, think of SAF as 'Sustainable A-1 Fuel'.



Air bp works closely with its operations teams and airports to develop solutions that reduce its carbon footprint



### Where's the saving?

Jet A and SAF burn the same way, producing carbon dioxide as a normal combustion product. So how does SAF save on carbon emissions? It's all about where the carbon comes from. The carbon in all conventional hydrocarbon fuels is extracted from the ground; it's derived from 'fossilised' organic remains, millions of years old. Burning it therefore releases carbon that has long been out of circulation.

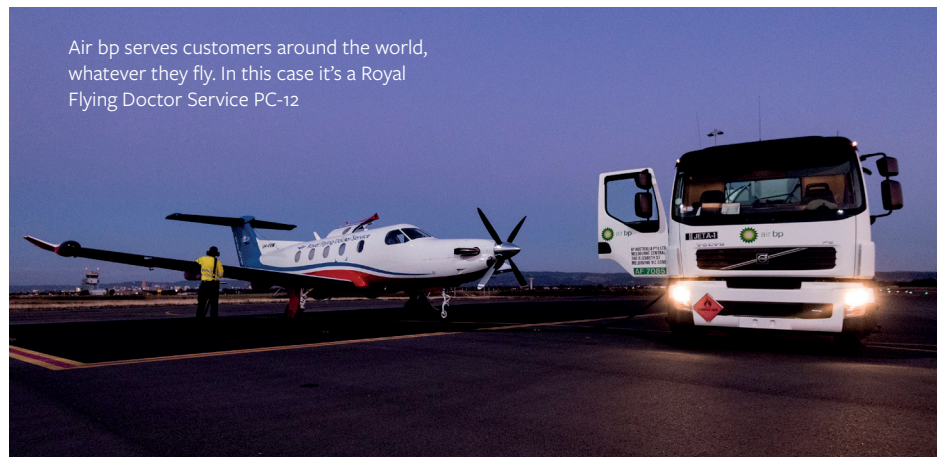
A former US Air Force F-15 pilot once described the long No-Fly patrols he conducted in the 1990s as 'burning dead dinosaurs'. He knew the majority of fossil fuel is derived from plant matter, but 'burning dead lepidodendron' isn't half so catchy.

The carbon in SAF is not derived from hydrocarbon reserves. Instead, it is effectively second-hand, since it has already been extracted for other products, now waste, or from the air, by growing plants.

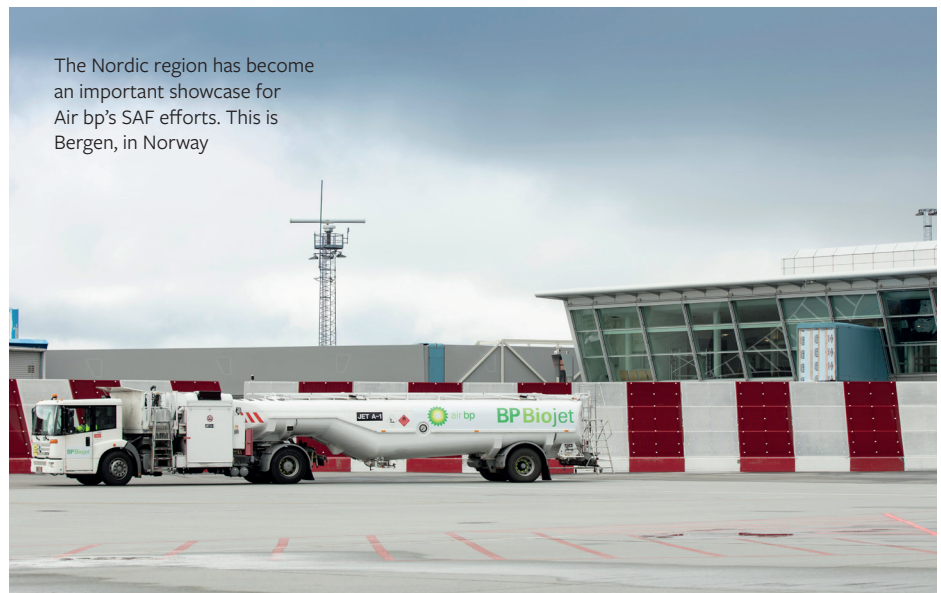
Tom Parsons says: "Depending on the sustainable feedstock used, production method and supply chain to the airport, SAF gives an impressive reduction of up to 80% in carbon emissions over the lifecycle of the fuel compared to traditional jet fuel.

"Typical feedstocks include used cooking oil and other non-palm waste oils from animals or plants, and solid waste from homes and businesses. This might include packaging, paper, textiles and food scraps that would otherwise go to landfill or incineration. Other potential sources include forestry waste, including waste wood, and energy crops, among them fast growing plants and algae. Air bp's SAF is currently made from used cooking oil and waste animal fat."

The industry is gradually waking up to SAF's critical importance in helping it towards the stated aim of carbon neutrality. And yet SAF is still not available widely enough to make a significant difference and, where it is, operators must pay a premium because



Air bp serves customers around the world, whatever they fly. In this case it's a Royal Flying Doctor Service PC-12



The Nordic region has become an important showcase for Air bp's SAF efforts. This is Bergen, in Norway

it currently costs more to produce than regular jet fuel. It's the age old problem of supply and demand, but one the aviation industry and its fuel suppliers must overcome because this time it's not only good business, it's a global imperative.

### Ramping up production

Air bp is ramping up its SAF activities against a declared intention of supplying 20% of the SAF market by 2030. Collaborations with Fulcrum BioEnergy and Neste are helping it towards that lofty goal, as Parsons explains.

"In 2016, Air bp created a strategic partnership with Fulcrum BioEnergy, with an initial investment of \$30 million. The Californian company is building its first plant in Reno, Nevada, which will produce sustainable

transport fuel made from household waste. Fulcrum intends to construct additional facilities and ultimately plans to supply us with at least 50 million US gallons of SAF per year.

"In 2018 we signed an agreement with renewable fuel producer Neste, which manufactures sustainable fuel from 100% renewable waste and residue raw materials. Through this collaboration we are developing new SAF supply chains and will be able to offer a five-fold increase in SAF to customers in 2020 and 2021, compared to 2019. We expect the majority of the sustainable aviation fuel supplied through this agreement to be delivered in the Nordics, as well as some other locations in Europe. Plans to supply locations other than the Nordics will depend on demand."

Air bp has so far supplied SAF at 16 locations, to around 25 different customers across three continents, but Parsons' mention of the Nordics is particularly significant since the region is embracing SAF more keenly than most. "We have supply chains established in Sweden and Norway, from which we are supplying locations across the region, including Arlanda Airport in Sweden and Oslo Airport (OSL) in Norway."

Reducing cost is the key to achieving this greater acceptance and deployment of SAF globally. Parsons is optimistic, but doesn't see a simple fix to the conundrum. "It requires a range of solutions across the short, medium and long term that give investors the confidence to make the big investments required to grow supply.

"These solutions include financial incentives for investment in advanced technologies for processing feedstocks more efficiently at greater scale, and investment in the development of sustainable and scalable feedstock options. Policy incentives are also important, including carbon pricing and realistic and achievable SAF mandates, such as that implemented in Norway this year, which requires at least 0.5% of jet fuel supplied to be SAF."

Nonetheless, there are operators willing and able to use SAF, supplied as a blend with conventional fuel. Supplying SAF reduces emissions but since it needs to be supplied as a blend, there are inevitably some residual emissions which need to be offset to achieve net zero. Carbon offsetting is therefore an essential factor in everyday operations if the aviation industry is to achieve its stated aim of carbon neutral growth from 2020 and a halving of total carbon emissions by 2050, relative to 2005 levels.

#### Compensating for carbon emissions

Carbon offsetting schemes abound and we've probably all seen images of verdant forests, happy families and herds of roaming wildebeest, but how do these relate to cancelling a

bizjet's carbon emissions and what is it that this proliferation of schemes is actually doing?

Tom Parsons provides a straightforward explanation. "Carbon offsetting compensates for your carbon emissions by funding an equivalent amount of emissions saving elsewhere. It can help as part of a broader carbon reduction approach and should be the last step after efforts to reduce and replace have already decreased your emissions.

"In aviation, carbon offsetting starts with measuring how many tonnes of carbon are produced by a flight. This creates the carbon 'footprint' for the flight and each passenger. Once this is measured, carbon credits can be purchased for the same amount of emissions, effectively balancing out the carbon emitted so the net impact on the climate is neutral.

"Carbon credits are bought from projects around the world that are reducing emissions. These initiatives include forest planting, replacing open fires with more efficient cooking equipment, and biogas installations. They often have a broad range of socio-economic benefits as well. For example, when cookstoves replace open fires, wood consumption is reduced, carbon emissions are reduced and respiratory health may be improved."

Air bp actively promotes carbon offset, an effort that includes working directly with airports. Among them, the company announced a particularly significant collaboration with Cascais Airport, Portugal, in October. The aim is to offset the carbon emissions for all the aviation fuel sold at the airport. Parsons says that as far as Air bp is aware, it makes Cascais the first airport in the world where the carbon

## Carbon offsetting compensates for your emissions by funding an equivalent amount of emissions saving elsewhere





emissions associated with all aviation fuel are offset on an on-going basis.

Since 2016, Air bp has been independently certified carbon neutral across its global network of operated into-plane sites and the company is continuing its investment in sustainability as it inexorably transforms from being a fuel supplier to becoming a provider of energy solutions. Parsons reiterates that it is bp's ambition to be a net zero company by 2050 or sooner. "And we want to help the world get to net zero," he states.

Aviation has an important part to play in that but it will require, as Tom Parsons explains so clearly, "Collaboration across the industry, including between airlines, fuel suppliers, OEMs and governments. It is up to all of us to be part of the conversation and advocate for the changes needed."

Carbon credits have helped fund environmental education classes – including forest protection work – in Zambia, with the indirect result of making clean water available to local people





  
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# Upbeat & Understandably Downhearted

*James Dillon-Godfray, Head of Business Development at London Oxford Airport, says the airfield is managing better than some through the pandemic, thanks to a strong summer and business diversity*



Speaking during the afternoon of 3 November, before the UK entered its second period of national lockdown on the 5th, James Dillon-Godfray, Head of Business Development at London Oxford Airport, was surprisingly upbeat but understandably also a little downhearted, while applying a due sense of laissez-faire to the coming weeks.

London Oxford is perhaps a classic general aviation airfield, with an FBO and strong private aviation presence, plus flying schools, a thriving light aircraft community and ad hoc freight business. It is also home to helicopter and fixed-wing charter operators, the headquarters of Airbus Helicopters UK, Up & Away and hullo Aircrew, among others, and a mixed MRO capability. The latter now includes Tamarack, featured elsewhere in this edition, and its newly opened European Transformation

Centre. With non-aviation businesses also on site, this diversity is helping the airport through difficult times.

The airport also provides an interesting take on business aviation traffic in the London area and Dillon-Godfray is typically matter-of-fact about its activity. With government clarification generally creeping like an unwilling schoolboy

sometime after its rule making, little detail on the latest lockdown travel restrictions was available on 3 November, but with work travel unaffected so long as it was along permitted safe corridors, Dillon-Godfray was hoping to see flight numbers remain stable.

“It’s really too early to say, but flight bookings are still coming in. I expect

August was our best month, up 27% over 2019 and although it’s declined since, we ended October still around 10% up on last year. Remarkably, in August we sold our largest monthly volume of fuel ever



A swarm of electric Minis greets BMW executives arriving for a visit to the Mini production line at Cowley. The factory is just 20 minutes by road from London Oxford Airport



it to be like last time though, with the volume of traffic impacted. I anticipate a steady flow of flights, but people are restricted by the very limited number of travel corridors, because with the vast majority of destinations there's still the requirement to go into quarantine when you come back."

As part of its reaction to coronavirus, London Oxford offers COVID-19 testing, turning samples around quickly via a company in nearby Oxford. "It's an option we like to offer," Dillon-Godfray says, "although the government doesn't accept it in mitigation of the standard 14-day quarantine rules. But it provides comfort to people that they aren't carriers. We need a day's notice of someone requiring a test and the results are available within 12 hours, or even faster if it's an early morning test."

#### F1 reflection

COVID-19 testing has been particularly popular with Formula 1 teams, of which a number, including Renault, Mercedes and Williams, are local. Indeed, after a late start to the 2020 season, regular F1 traffic has helped bolster London Oxford's passenger figures, with one team regularly socially distancing around 60 team members on an Embraer 195 airliner. It may not use a private jet, but the operation shows exactly what it is that business aviation can do that commercial aviation cannot. Dillon-Godfray notes that team principals and drivers have also used the airport more regularly than usual.

Where the senior personalities in a team might normally use a mix of private and commercial aviation during a season, this year they've generally abandoned the commercial option. It's a trend that's

also emerging among C-suite executives, where companies are preferring to fly them privately, even if less often, than risk commercial travel.

London Oxford's summer statistics go some way to proving the point. "Along with Biggin Hill, we've seen an increase in business aviation numbers compared to 2019 from the end of July right up until the beginning of November, although I'm sure lockdown will screw that up!" Dillon-Godfray says. "August was our best month, up 27% over 2019 and although it's declined since, we ended October still around 10% up on last year. Remarkably, in August, we sold our largest monthly volume of fuel ever.

"Anecdotally, we've seen lots of new faces using business aircraft seemingly for the first time, usually chartering smaller jets and flying in groups. Passengers are escorted in cars directly to the aircraft, with no reason for them to come through the terminal. The crew wear masks and generally have no physical contact with their passengers. It's pretty much the same at the destination, with cars at the aircraft door and contact with other people kept to a bare minimum.

Contrasting August's dramatic results with the uncertainty of November made for what Dillon-Godfray describes as a 'nightmare'. So how does the airport plan ahead? "It's impossible, although our staffing levels are the same regardless. We run a lean team and bring in more people on overtime when it gets busy, while lots of us in the back office can put on our high viz for a bit of baggage handling or driving as required. The peaks and troughs of our business are crazy regardless of lockdown, with no predictability on what's going to happen in two days' time, but now it's worse. It's Tuesday today and I have no idea what's going to happen on Thursday."

Whatever does happen, London Oxford's future is focussed on business aviation, with its pilot training and helicopter activity remaining as a vital cornerstone. Predicting a bright post-COVID future for private aviation and the airport, James Dillon-Godfray is looking ahead with cautious optimism.



# Xtra Large, Xtra Value, Xtraordinary Offer

*Between them, Benoit Defforge, President at ACJ, and Richard Gaona, Executive Chairman & CEO at Comlux, talk a convincing game for the dramatic new ACJ TwoTwenty*







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Even after almost 25 years of writing about it, the aviation industry has the capacity to take me by surprise. The year 2020 had so far been big on stories of resilience, adaptation and survival and, in too most cases, struggle. So, when Airbus Corporate Jets emailed late one evening, I automatically assumed the worst, as one inevitably does on spotting a favourite actor's name trending on Twitter.

But the email led to a surprising call the following afternoon, with ACJ President Benoit Defforge and Richard Gaona, Executive Chairman & CEO at Comlux. Minutes before dial-in, an embargoed press release revealed this was actually a product launch; ACJ was taking the bold step of introducing an entirely new class of aircraft to the VIP market.

Over lunch in a Dubai hotel two years ago, I'd suggested to Defforge that the A220, then relatively new to the Airbus portfolio after

its previous incarnation as the Bombardier CSeries, had the makings of a fine VIP aircraft. Without committing either way, he noted that the type was in the process of entering into the Airbus industrial system and it was too soon to make any decisions beyond its establishment in commercial service as an Airbus product.

Now, speaking as Airbus launched the ACJ TwoTwenty, Benoit Defforge recalled that conversation, admitting the A220 was already in ACJ's sights and the process of realising a VIP machine based on the advanced airliner well under way. In launching the ACJ TwoTwenty, which it dubs 'The Xtra Large Bizjet', Airbus reckons it has created a new market segment with an aircraft that leverages the high technology base of the standard A220-100 regional airliner. It's a bold statement describing an audacious move, especially in the midst of global pandemic. Why now?

### New value proposition

Speaking on 5 October, Defforge explained: "We know the market well and identified the need for a new segment, a new value proposition. On top of that, we've seen that business aviation activity has been very resilient, back to around 90% around the world since the COVID situation began. And, finally, we've retained all our backlog and continued to sign new customers in 2020."

Thinking back to our Dubai conversation, Defforge revealed that at the time, much work remained to be done on designing in the desired performance and developing a cabin concept for the ACJ TwoTwenty, although Airbus had begun exploring options for a VIP development as soon as it began working closely with Bombardier on the baseline aircraft. "We have continued to develop the A220 and we are working on a maintenance programme specifically for low utilisation, to optimise costs for our ACJ





This club four is one of many possible options for the six-zone cabin

customers. To provide the range performance our customers require, the ACJ TwoTwenty has more fuel, in five additional centre tanks, and increased maximum take-off weight.”

Meanwhile, the aircraft’s cabin has been designed around what Defforge referred to as a ‘package’, essentially an extensive catalogue of options from which customers select options. “It makes for a flexible, comfortable cabin and when you combine that with the aircraft’s range, performance and operating costs, you see this is a fantastic platform.”

Airbus Corporate Jets chose to reveal the ACJ TwoTwenty alongside the type’s launch customer, Comlux. Offering charter, aircraft management, completions and a variety of other services, Comlux launched the ACJ TwoTwenty programme with orders for two aircraft, although Defforge was delighted to confirm that deals had already been struck for six aircraft in total. Comlux will exclusively complete the

**BENOIT DEFFORGE, PRESIDENT, ACJ**

**...the ACJ TwoTwenty can be offered at a very attractive price with a cabin providing more than twice the space of a conventional business jet**

cabins of the first 15 ACJ TwoTwenty jets, which means nine additional airframes beyond the orders so far announced.

#### **Comlux completion**

Comlux has a long and proud relationship with ACJ and the company’s Richard Gaona said that with the ACJ TwoTwenty, he believes Comlux is investing in a product of considerable value. “Discussing the project

with Benoit a few months ago, we became convinced of the aircraft’s position in a new market segment. It has a wide cabin, range and space, and the Airbus cabin renderings are quite amazing, Sylvain Mariat, ACJ’s Head of Cabin Design, did an exceptional job. And on top of that, the A220 is an extremely modern aircraft.”

Ironically, ACJ is not alone in defining an A220 bizjet solution in recent months,



and Gaona explained a little more on why the aircraft's cabin is ideal for VIP completion. "With a conventional business jet there aren't too many options available but, along with Airbus, we're able to offer clients more solutions for defining the ACJ TwoTwenty cabin. I wouldn't say they are modular solutions rather, for the first time, that Airbus is selling fully completed aircraft."

The A220 cabin is wide by design and in VIP applications can be made fractionally wider. It is also long, the two factors together creating a space similar to that of the ACJ319. Admittedly, the latter offers considerably greater range than the ACJ TwoTwenty, but many ACJ missions come nowhere near to exploiting the aircraft's full reach. With the ACJ TwoTwenty offering similar cabin space in a more modern airframe, where does the ACJ319 fit into the portfolio?

"They are very complementary," Defforge said. "With the concept we've been discussing, the ACJ TwoTwenty can be offered at a very attractive price with a cabin providing more than twice the space of a conventional business jet, and intercontinental range.

"If you look at today's ACJ portfolio, we start at 70m<sup>2</sup> and go all the way up to 300m<sup>2</sup>. That positions us across the business aviation industry – it's the most complete portfolio available." Talk with Defforge or listen to him speak about ACJ's product line and you'll not wait long before he proclaims that living space, providing the space to 'live' and move around on the longest flights, is among its key qualities. Now, Gaona reckons that concept is further refined with the ACJ TwoTwenty.

"I believe that connectivity in the ACJ TwoTwenty cabin will be among the major differences that make it stand out compared to other aircraft. It is equipped with a very advanced, fast internet system and everything in the cabin can be controlled by an iPhone. Passengers will be able to check the landing time on their phone, using information from the aircraft systems. And they'll be able to watch their individual movie choices."

Returning to the A220's advantages by design, Gaona noted that the airliner's large windows naturally make for a

pleasant cabin environment. In ACJ TwoTwenty form, the aircraft gains a cabin humidification system, further



This ACJ lounge design exploits the ACJ TwoTwenty's wide fuselage



Modern cabin options match the modernity of the A220 itself. This is an option for the entrance and galley area



improving the passenger experience, while Defforge added that ACJ has made other fundamental changes in the same vein. “The cabin altitude has been lowered compared to the airliner, down to a little less than 6,000ft, which we know offers a significant level of comfort. It’s similar to the ACJ350, which is designed for very long ranges.”

#### Unique performer

Even with its additional fuel, the ACJ TwoTwenty’s field performance

remains impressive. “Landing and take-off performance are very similar to, and in some cases even better than, those of the Global 7500, for example,” Defforge confirmed.

Gaona continued: “You can operate this aircraft off a short runway, in competition with a conventional business jet, fly 12 hours plus, then land on a short runway, with much lower maintenance costs. We already have 20 ACJ aircraft and we know the company very well, but we discussed and checked the details of the ACJ TwoTwenty’s


performance and maintenance costs very carefully before we entered into the agreement with Airbus. As an operator, I can confirm that ACJ TwoTwenty maintenance costs are very competitive. That, combined with range and cabin comfort, can only be achieved by this aircraft.”

Comlux expects delivery of its first green ACJ TwoTwenty by December 2021 and Gaona anticipates completion taking around 14 months. “By the beginning of 2023 we’ll have the aircraft in service,” he said.

Richard Gaona, Executive Chairman & CEO, Comlux

**You can operate this aircraft off a short runway, in competition with a conventional business jet, fly 12 hours plus, then land on a short runway, with much lower maintenance costs.**

The concept of offering extensive choice from a ‘cabin catalogue’ likely means that for subsequent orders the time between contract signature and delivery will be shorter. “It’s a very interesting feature of this aircraft compared to the fully customised ACJ319 or 320,” Defforge added. “It’s part of our strategy for the ACJ TwoTwenty with Comlux. It’s important for us to achieve product visibility, favourable lead times and quality. The resulting aircraft offers the best value for money and the best quality, on time.”



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# In a League of its Own

*During many years of industry experience, Stuart Locke, General Manager, Aircraft Maintenance at Oriens Aviation, says he's never seen an aircraft as reliable as the PC-12*

Sometimes it's a series of coincidences that makes a story seem like a good idea. In this case, the PC-12 is a very cool aeroplane, which is a good start. Also, the latest PC-12NGX variant recently came to market and UK exclusive Pilatus distributor Oriens Aviation has been busily demonstrating it around the country. An interesting, young company, Oriens also happens to be based at London Biggin Hill Airport, an airfield with strong links to the Battle of Britain; 2020 marks the 80th anniversary of that seminal moment in history.

Those who follow Oriens' social media feeds will be familiar with its marketing

efforts up and down the UK and therefore have a grasp on the latest PC-12 model. I decided therefore to find out more about the organisation behind the aeroplane, the maintenance and customer support that Oriens offers out of its friendly, modern Biggin Hill facility.

So far, Pilatus has built in excess of 1,700 PC-12s. The type entered service in 1994 and has remained faithful to a basic premise of practical design, fine build quality and comprehensive avionics, married to a Pratt & Whitney Canada PT6 turboprop engine and rugged, highly configurable airframe.

Beyond the marketing literature, the PC-12 is genuinely recognised not only for how well it is put together but also its reliability, while an engineer of almost four decades' experience recently described the PT6 engine to me as 'bulletproof'.

The logic of an article on PC-12 support was already looking shaky.

But with Stuart Locke, Oriens Aviation's General Manager, Aircraft Maintenance already lined up for interview, it seemed only polite to go ahead. In fact, an initial arrangement had been cancelled when Stuart was called to an AOG and I planned to explore the issue when we spoke. It had actually been a problem with an overseas-registered PC-24 jet and although Stuart and the team spent a morning preparing a fix, the problem was eventually solved without their intervention.

However reliable an aircraft might be though, incidents do occur that keep it on the ground. As such, Oriens offers a robust AOG capability. "The PC-12 represents a growing market," Stuart says, "because of sales in the UK and Europe, with aircraft travelling into the country, and we cover the PC-24 as well. We receive AOG calls from time to time, but it's far from the core of our business. Our



The deeper, two-week PC-12 annual inspection includes panel removal and component testing



primary coverage area is the UK and Ireland, but we also support one or two customers in northwest Europe.”

#### Not Much Doing

Scheduled maintenance is therefore the mainstay of Oriens’ work. “On the PC-12, the majority is carried out on a calendar basis, so we tend to see the aircraft twice a year, once for minor checks and a second time, for about two weeks, when we remove panels, disassemble and inspect sections of the landing gear and other moving parts, and carry out function checks on the avionics, safety and other aircraft systems.”

If my assumptions about the PC-12’s reliability are correct, other than inspecting and replacing worn parts, I anticipate there’s little else for Stuart’s team to fix. “It’s true,” he says, tongue in cheek, “there’s really not much to do. It’s very difficult to run a profitable maintenance business with this aircraft because it is so reliable.”

Unstoppable in his enthusiasm, he continues: “I have experience of Bombardier, Embraer,

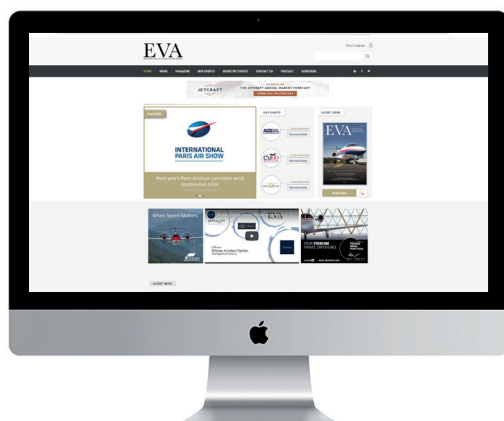
Dassault, Hawker, British Aerospace and other aircraft manufacturers, and nothing compares to the PC-12 for reliability. The way it’s built and protected puts it in another league.”

From personal experience I can confirm that the PC-12 feels very solid; it gives the

impression of being an inherently safe place to be. Which is no bad thing, since solidity and safety are important factors in the aircraft’s natural operating environment, which includes flying off unprepared surfaces. Although most owners use hard runways, there are those for whom grass is



The PC-12NGx, latest in the PC-12 line



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a regular operating surface and presumably the landing gear, antennas and undersides of those aircraft pick up plenty of bumps and scrapes as a result.

“No,” Stuart says, “they don’t.” It’s another disappointing answer. “Because the aircraft is designed for those operations, nothing kicked up from the main landing gear hits anything. We’ve seen no flap or undercarriage damage from unpaved runways. Occasionally we see a little bit of propeller damage, but not more than I’ve seen on other aircraft in the past. I don’t see any real evidence that owners are punishing their PC-12s at all.”

#### **Boringly predictable maintenance**

To recap, so far I’d learned that nothing breaks, even when the PC-12 goes ‘off-road’, and scheduled maintenance is boringly predictable. It was time to turn this non-interview around. I reckoned Stuart was avoiding mentioning how the aircraft’s antennas and other excrescences collect

mud and stones. He wasn’t. “If you look at the aircraft, you’ll see that the antennas are mounted well forward, so for a ground impact to take out an antenna, the landing gear would most likely have to be up. There’s nothing further aft that could be damaged.”

In its marketing, Oriens makes much of the PC-12’s versatility, describing it as a flying SUV and showing photos of aircraft loaded with all manner of baggage, sports kit and even motorcycles through the large rear door. The baggage area must come in for a pounding therefore, providing restorative work for Stuart and colleagues.

“We haven’t seen too many operators carrying lots of cargo,” he admits, “but people do take the back two seats out – the additional seats we call them, since the PC-12 is usually configured with six executive seats and two for extra passengers at the back. We haven’t seen any damage. Protective covers are available, but cargo aircraft are usually

configured differently anyway, while the typical PC-12 customer tends to take really good care of their asset, because they’re so often owner-pilots.”

#### **PC-12NGX**

The PC-12NGX is the third major iteration on the PC-12 theme. As well as an uprated PT6E-67XP engine, equipped with FADEC and autothrottle, the model features improvements to its Honeywell avionics and larger cabin windows. Oriens’ engineers are factory trained in Switzerland and qualified across all three variants.

Occasionally an aircraft will require work beyond Oriens’ scope – a veneer replacement, for example – but the company’s good relationships at Biggin Hill mean there’s always a local specialist available. In-house workshops enable battery servicing, and a wheel and tyre capability is being worked up. Avionics checks and modifications are done completely in house,





including a recent complex instrument change in which the panel was removed and wiring to the wing installed.

“The airframe structure has changed very little between models,” Stuart notes, “but the avionics, interior and engine have all been improved. With the PC-12NGX, Pilatus has also introduced reduced frequency maintenance. It’s still on a calendar basis for regular operators, but for high-intensity users maintenance intervals are extended from 300 hours to 600 hours.” All of which is great news for customers, but less than ideal for maintenance providers looking to make money; “It comes with its challenges,” Stuart admits.

He’s also quite obviously proud of his experienced team. “If you look at lots of the organisations around Europe that maintain the PC-12, you’ll see they’ve worked on smaller GA-type aircraft and moved up to it. But we have people who’ve worked on other business aircraft and regional airliners. They’re very, very knowledgeable. The

maintenance team immediately to hand on the shop floor is six-strong, and then I’m a certified engineer too, plus we use contract engineers when the workload is high.”

Stuart also sees considerable importance in recruiting young people. “We have an apprentice who joined the company in a different role but wanted to get into maintenance. So we created a path for him to do that. We also recently recruited a junior engineer to match our continued growth. Right now, in the pandemic, recruitment is quite easy because so many people are looking for jobs and it’s not difficult to convince people this is a good place to work. A quick walk around the hangar, a look at the aircraft and brief discussion and it’s easy to enthuse someone. Oriens Aviation is a very good organisation to work for. The aircraft and Pilatus brand mirror that.”

Stuart says Oriens has managed through the pandemic by working seven-day rather than five-day weeks in two shifts, one team

on each shift. Thereafter, the arrangement has remained flexible. And that’s true of the PC-12’s owners too. Stuart mentions one who regularly used the train to travel between UK facilities pre-COVID, believing it to be the environmentally responsible thing to do. With restrictions on travel, he switched to using the PC-12 and it has been instrumental in keeping his businesses running and people employed.

The highest-houred PC-12 that Stuart’s seen has clocked just over 10,500 hours, thanks in part to a previous commercial career in the US. At last, it seems I’ve identified a PC-12 that might be causing maintenance headaches... “There’s nothing to show it’s an old aircraft,” he states. “We replace parts that are worn out, but then that’s the case on newer airframes too, parts do wear out. There are PC-12s with 20,000, even 30,000 flight hours around the world and I think the oldest is around 40,000 hours. The PC-12 is a workhorse.”

AOG response is an important, if seldom exercised service in Oriens Aviation’s portfolio





# International Gateway to Marrakech

*Frédéric Perez, Operations Director Swissport Executive Aviation Maroc took a guiding hand in creating the company's brand-new Marrakech Menara FBO*

Swissport Executive Aviation opened a brand new VIP terminal at Marrakech Menara Airport on 1 February 2020. A significant development for the company and for business and VIP aviation in Morocco, as well as the whole of North Africa, the bespoke facility became available just as the country entered into a strict pandemic lockdown.

Demonstrating the resilience that has become an industry characteristic, Frédéric Perez, Operations Director Swissport Executive Aviation Maroc, is stoically looking forward to showing the beautiful facility off to the world.



The entrance to Swissport Executive Aviation Maroc's Marrakech Menara Airport FBO



After winning an Office National Des Aéroports (ONDA) international tender for commercial aviation ground handling on behalf of the Moroccan airport authorities, Swissport Maroc was established in 2012. Swissport International subsequently responded to an ONDA tender released for the construction and management of FBOs across the country.

The tender was split and awarded to Swissport International, and a competitor, late in 2016, with the result that Swissport Executive Aviation Maroc was established in the first quarter of 2017.

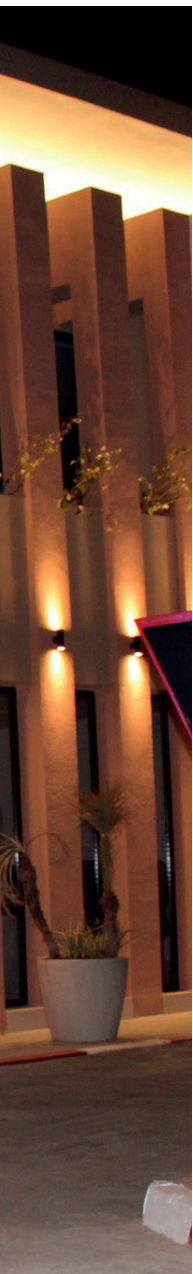
Swissport Executive Aviation Maroc opened an FBO at Casablanca, working out of an existing, shared facility, before starting work on the construction of a general aviation handling and FBO site at Marrakech Menara. The establishment of Swissport Executive Aviation Maroc spoke to Swissport International's ambition for network growth and its Swissport Executive activities, plus the company had observed rapid expansion in the region's business aviation market over recent years. Added to that, Perez says: "There is a real will from the Kingdom to offer its VIP visitors international FBO standards of service and infrastructure."

Swissport Executive Maroc worked with architects ZAZ NAMANY to define the new FBO building, a process about which Perez reveals: "Having the chance to build and design your FBO from scratch is a huge opportunity, but also a challenge. We wanted to create a facility that satisfied the needs of VIP passengers and crew, and provided an efficient workspace for our FBO and operational control centre – our operations throughout Morocco are managed from Menara – while sticking to the budget.

"Compared to taking over existing infrastructure, building a new FBO basically allows you to do almost anything you want. I told the architects what was required in terms of facilities, equipment, size and layout. They immediately understood what was needed and it worked like magic.

"We optimised the new building with a wide, dedicated space for crew members on the first floor, with a view over the runway. Many FBOs focus primarily on their VIP areas, but for me it was very important to provide a comfortable, private space for crew. The result is an area of 150m<sup>2</sup> with TV and media corners, a pool table, kitchen and mini bar, two private snooze rooms and a pair of large shower rooms."

Menara's VIP facilities occupy 220m<sup>2</sup> on the ground floor and include three accessible private bathrooms, a bar, a buffet and a media corner, and a view out to the runway. A 50m<sup>2</sup> VVIP lounge on the first floor incorporates a terrace for passengers seeking additional privacy. "Our customers also have the possibility of shopping," Perez notes. "We've



We're working towards IS-BAH Stage 1 certification... We were supposed to have our first audit late in March



entered into partnerships with high-end Moroccan brands for jewellery, cosmetics and deli, and a niche Italian luxury perfume brand, all of which have booths in the FBO.” The décor throughout is a blend of traditional Moroccan and Western design.

#### On the ramp

Swissport Executive has an agreement with the Moroccan branch of a French company for aircraft cleaning, while Perez says catering is provided by various partners on the airport or from outside, ‘depending on the customer’s budget and requirements’.

Ground services, including ground power units, toilet and water service, air conditioning service and so on, are provided on a shared basis by Swissport Maroc, while subcontracted hangarage is available for aircraft up to G450 size, subject to available space. In addition, Perez adds: “We’ve partnered with a new maintenance company that provides nitrogen and oxygen refills, together with support in case of an AOG, although there are no certified general aviation maintenance companies at Marrakech Menara Airport.” Security on the GA ramp is assured by a 24/7 Gendarmerie Royale (Royal Military Police) presence.

Although Menara is the only Swissport Executive site in Morocco boasting an exclusive FBO, the company operates the shared facility at Casablanca and has people on the ground at Tangiers and Rabat. Regardless of station, Perez says his team offers consistent levels of service, albeit restricted by facility size and equipment. “All station and operational control centre staff are used to booking hotels, while our FBO implementation manager works with our hotel providers and ensures the availability of limo services, helicopter transfers, shows, restaurants, flowers and the satisfaction of special requirements, including surprise wedding trips and private FBO access.”

All Swissport Executive Aviation Maroc staff are trained in-house to Swissport International standards and requirements. “We don’t subcontract staff,” Perez insists, “to ensure we offer our customers a constant high level of safety, quality and dedication.



“I work with our CEO on the selection of managers, and alongside the managers when we are fulfilling supervisor and agent positions. We generally look for people from within the industry, but also have managers from outside aviation with a VIP customer service background.”

Swissport Executive Aviation Maroc is far from unique in feeling the impact of COVID-19, although the opening of its Menara FBO could hardly have suffered worse timing. Adding further to the

challenges Perez faces, he says both the Menara and Casablanca sites were on the verge of gaining international recognition pre-coronavirus. “We’re working towards IS-BAH Stage 1 certification at both. We were supposed to have our first audit late in March, but everything was postponed owing to COVID. We are ready for Stage 1, just waiting for the borders to open so the auditor can visit us.” The same is true for the majority of the company’s VIP clientele, for whom a treat is in store at the brand new Menara FBO.





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# Liberty, the New Learjet Standard

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*Bombardier's recently released Learjet 75 Liberty is the latest in a long line of Learjets and also the first in a long time to carry a model name. Mischa Loeffler, Manager of Product Planning and Strategy, Bombardier Aviation, describes the new jet*

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Looking forward from the Executive Suite towards the cockpit



The original Lear Jet 23 first flew in 1963. It shared design elements with the Swiss FFA P-16 fighter aircraft of 1955. Since then, successive Learjets have been produced by Lear, Gates, LearJet and, since 1990, Bombardier. How significant is that 65-year heritage to your customers and the people building today's Learjet 75?

Mischa Loeffler responds: Bombardier has always been proud of the Learjet's rich heritage and iconic status as the pioneer that launched the business jet industry. In the decades since the Lear Jet 23 first took flight, no other business jet has captured the public imagination quite like the Learjet. In 2017, Bombardier hosted a celebration marking the historic delivery of the 3,000th Learjet manufactured and we continue to celebrate this amazing aircraft.

Among our employees at Wichita, where the Learjet was born under the Lear Jet Corporation and where it continues to be manufactured, the sense of pride is palpable, from the production line to the executive office. Part of that pride stems from the fact that the Learjet is not just an icon – it continues to lead the way in performance, range, speed, ramp appeal and comfort.

And the Learjet brand continues to evolve. The Learjet 75 Liberty is the latest incarnation of the platform, embodying all this history while carving out a new future by moving within reach of more customers and operators than ever before. Our customers are aware of the aircraft's rich history, and recognise it as an unparalleled business tool.



Learjet 75 Liberty pilots enjoy a high level of standard equipment, including EVS



**Not since the 1980s' Learjet 55 Longhorn has a Learjet carried a name. Why is the latest Learjet 75 named Liberty? What was the process of choosing the name and what is its significance?**

Bombardier put a lot of thought into naming its newest Learjet. On the one hand, we wanted to keep the '75' to highlight the performance attributes of the Learjet 75 that this new aircraft would continue to offer. On the other hand, we wanted to emphasise that this latest aircraft represents a new chapter for Learjet – for the first time, light jet customers who thought the Learjet was out of reach now have access to what we believe is the world's best light jet. The word 'Liberty' speaks to the aircraft's value proposition, since more light jet customers and operators now have the liberty to own a Learjet.

We think 'Liberty' also relates to the spaciousness of the cabin's Executive Suite, which provides passengers with unprecedented freedom to stretch thanks to almost 3ft of leg room.

Finally, 'Liberty' is a nod to the aircraft's US roots and the role it plays in the country's history of innovation, especially in Kansas.

**Its cabin innovations are probably among the attractions for customers coming to the Learjet 75 Liberty. The two-place Executive Suite has a pocket door separating it from the galley and cockpit. But is the Suite separated from the aft cabin too?**

The Executive Suite is separated from the cockpit and galley by the popular, noise-reducing pocket door, which comes as standard on the Learjet 75 Liberty. The Executive Suite is unique in that its two forward-facing seats are located at the front of the cabin, with no visual connection to the Club Suite, for a more private experience. As well as the extensive leg room, Executive Suite passengers enjoy

foldable ottomans for rest and comfort, and extra-large concealable side tables for productivity and entertainment.

**Your marketing material does a great job of 'selling' the Learjet 75 Liberty, but if a customer stepped into the aircraft's cabin today, how would it stand out for them as being a noticeable improvement over that of a pre-Liberty Learjet 75?**

The main factor is the six-seat configuration, which allows for the two-seat Executive Suite, although the popular eight-seat configuration is still available. This allows for a cabin that feels more spacious, offers considerably more leg room and has foldable ottomans. The pocket door, now standard, is the other major difference. Closed, it provides a noise-level benefit in the Executive Suite of up to 8dB SIL. In flight, passengers enjoy the same smooth ride that the Learjet 75 provides.

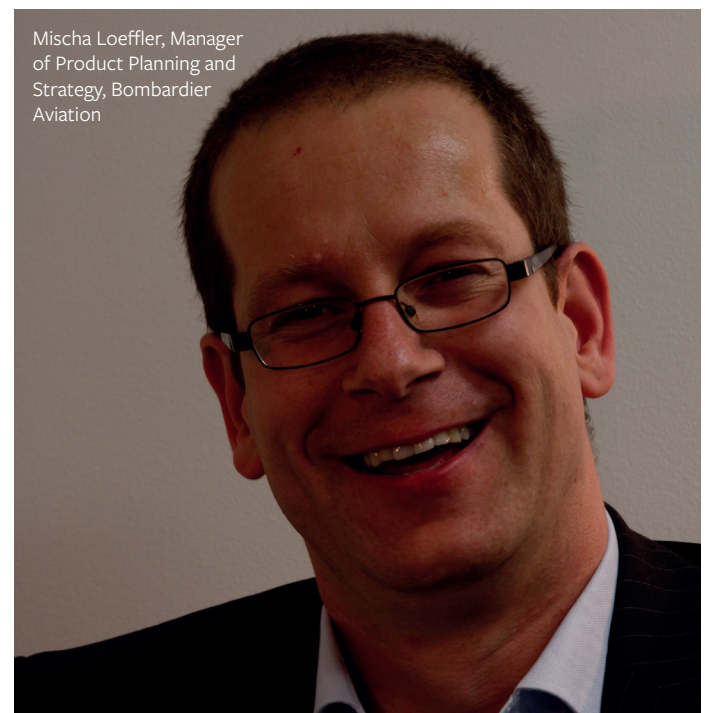
**The Learjet 75 Liberty appears extremely well equipped for a light jet, with EVS as standard, among other systems. How is it possible to offer such equipment levels while remaining competitive on price?**

We worked hard to offer the Learjet 75 Liberty at an exceptional price point and with operating costs similar to those of competitor aircraft that offer less – our jet has the longest range and highest speeds and, we believe, smoothest ride in the light jet category.

We also leveraged the experience and know-how of our world-class Wichita employees and worked in collaboration with our suppliers. And we've also made some features, including the APU, optional.

**What connectivity options do Learjet 75 Liberty buyers have?**

Gogo Business Aviation's next-generation, 4G air-to-ground internet system, Gogo AVANCE L5, is an option on the Learjet 75 Liberty, as it has been on new Learjets since 2019. It is also available as a retrofit for in-service Learjet 40, Learjet 45, Learjet 70 and Learjet 75 aircraft.



Mischa Loeffler, Manager of Product Planning and Strategy, Bombardier Aviation



# Changing The Charter Landscape

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*Kathy Leroy, VIP Charter Manager at Chapman Freeborn, looks at how the coronavirus pandemic is changing the landscape of private jet charter*

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Responding swiftly to different demands from clients during the pandemic has been an important part of the private jet charter sector's journey over the last six months – and there's no doubt the industry is evolving. At a time when COVID-19 is at the forefront of every passenger's mind, focus has shifted from the luxury benefits of private jet travel to the increased safety and hygiene offered when you charter your own aircraft.

It doesn't mean that clients don't expect luxury, of course, but it does mean they value hygiene and social distancing above all else in a world where the pandemic has an impact on all our decisions – including how we travel. In addition, the new 'normal' has created an increased pool of potential clients who are chartering private jets, even though they may not have considered doing so before.

This creates a new challenge for the sector as it embraces new clients, perhaps with an alternative perspective and different needs. Here are five key ways the pandemic is reshaping the private jet charter industry:

#### **A greater focus on safety over luxury**

Travelling by private jet will always be seen as glamorous, and private jet charter specialists pride themselves on the kind of customer service that will delight even the most demanding pop icon, millionaire, movie star, footballer or business tycoon. However, what has been noticeable during the pandemic is that clients have become less concerned with the extra frills and luxuries, and more



**Kathy Leroy**  
VIP Charter Manager at Chapman Freeborn





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interested in additional hygiene measures to protect them from the virus.

Travelling by private jet, of course, comes with built-in social distancing. Clients often avoid crowds by flying from airports with private executive facilities, wait in a private lounge and take a private transfer to their plane. Once on board they have the aircraft to themselves.

When it comes to extras, the focus is now on personalising hygiene measures – for instance asking for cabin crew to be tested before take-off and to wear face masks or visors. Some

clients have even asked for no cabin crew at all, which is feasible on some aircraft.

Perhaps the biggest attraction for private jet travel right now is that it avoids the virus hot spots of a crowded airport and a potentially full scheduled flight cabin. Excellent and personalised customer service only amplifies that attraction.

#### **More enquiries for first-time charters**

There has been a noticeable increase in enquiries from people considering private jet travel for the first time, primarily high-net-worth individuals looking for an alternative

to a planned holiday trip or wanting a new way to reach their second home abroad. They have discovered that switching from a long-haul scheduled flight in first class to taking a private jet to the Mediterranean can be cost effective and, given the nervousness over social distancing, more relaxed.

This is inevitably becoming more and more difficult as so many European countries introduce and modify travel restrictions or quarantine regulations. We are also reaching a time of year when Mediterranean destinations are in off-season. However, there is strong demand from people with second homes, for whom quarantine is not such a big issue when they expect to stay for several months.

#### **More CEOs taking private jets**

New flyers are not restricted to holiday makers. CEOs and high-level businesspeople have also been using private jets for the first time – for private meetings that have to be conducted face-to-face or to visit offices abroad. This demand has also been influenced by a fear of rapidly changing quarantine rules. Executives don't want to risk being stuck away from home or having to frantically search for a

**Perhaps the biggest attraction for private jet travel right now is that it avoids the virus hot spots of a crowded airport and a potentially full scheduled flight cabin. Excellent and personalised customer service only amplifies that attraction.**



last-minute scheduled flight if the destination they are travelling to is suddenly removed from the travel corridor.

#### More internal flights

Internal flights have always been part of the private jet charter environment, but there's no doubt there has been increased demand in some countries and especially in the US. Clients there are taking private jets for holidays within the country, for travel to second homes and for business purposes.

Regularly commuting to work on a private jet is no longer unusual.

But the trend not confined to the US. Internal flights are increasingly popular in many countries, including South Africa, where wealthy individuals want to reach their safari lodges.

Even in smaller countries, including the UK, private jets can be a convenient and cost-effective way to reach destinations quickly,

especially in areas where train travel is not an option.

#### Increase in private jet travel for expats

The pandemic has seen many expats feel they want to return 'home', whether they were abroad for work or leisure. One example is long haul flights from the US and Caribbean back to Europe. Some expats have returned temporarily, others permanently, and although these passengers would normally have chosen a commercial airline, they wanted the extra safety of a private jet and its potential for greater social distancing.

**...switching from a long-haul scheduled flight in first class to taking a private jet to the Mediterranean can be cost effective and, given the nervousness over social distancing, more relaxing.**

It is clear there is a new cohort of private jet travellers emerging. Not all new enquiries are translating into sales, since private jet travel is not for everyone and the cost remains prohibitive for some. But taking into consideration the potential financial and time-saving benefits of flying direct, the convenience of private jet travel and, crucially, the in-built social distancing of chartering your own plane, many new customers are finding it makes sense.



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# Parking Without the Pitfalls

*Parking an aircraft, placing it into storage for an extended period, requires careful consideration and a proper maintenance programme. Camber Aviation Management's Tom Chatfield describes the steps to take and the pitfalls to avoid*

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In EVA's Spring and Autumn 2020 editions, Gary Crichlow, Arc & Co's Director of Aviation Finance, examined the options for aircraft ownership if liquidity becomes tight. Now, Tom Chatfield, CEO at Camber Aviation Management, details the physical realities of parking, or storing an aircraft, from the seemingly obvious, simple steps that are nonetheless often missed, to commissioning a suitable programme of in-storage maintenance to keep the machine healthy and ready to fly with minimum investment once times have improved.

A licensed aircraft maintenance engineer and pilot, Chatfield has 35 years' of industry experience behind him, during which he's seen many aircraft parked and frequently advised clients. "There are really two ways of doing it," he begins. "The first is to make a conscious decision not to use the aircraft for a specific period of time. The storage criteria then depend on whether it's parked short- or long-term."

Good planning is key to storing an aircraft cost effectively and well. In planning a storage event, owners may be able to move their aircraft to a less costly airport for the storage period and should contact their power-by-the hour maintenance suppliers to request reduced rates during the storage period, since PBH subscriptions are based on actual flying hours. The owner's insurance provider should also be advised that the aircraft will be stored and the insurance policy adjusted accordingly for the period.

Considering an imaginary ACJ319 that's to be parked for a month, he explains: "You'd perform so-called seven-day checks, which means that there are tasks every seven days and after the 28th day the process of removing the aircraft from storage and preparing for flight begins." The nature of the work also depends on whether the aircraft is hangared, but indoors or out, the longer the jet is stored, the more complex the process becomes.

"An owner knowing their aircraft won't be flown for at least six months is wise to opt for long-term storage, where all the work is done upfront and there's less regular work subsequently. Place the aircraft in short-term storage in hopes that you'll be flying sooner, then find out after six weeks that's not going to be the case, and suddenly the work required increases almost exponentially." It is worth noting that if a dedicated technician is available and being paid anyway, then having them carry out short-term parking maintenance could mean it's more reasonable and less costly to keep the aircraft live, rather than putting it into long-term storage for six months and then depreserving it.

There are still major work packages, and expenses, for properly stored aircraft in the longer term. Recalling the team's involvement in the first Boeing 787 VIP conversion, Chatfield says: "Then, if you stored a 787 for more than two years, the engines had to be pulled and sent to the shop. Our aim was to get back into the air in 22 months. We didn't want to get into removing engines. As soon as you pull an engine there's always something... and it's always expensive!" It's interesting to note that an aircraft hangared for a lengthy completion project is normally placed into storage.

## **Push it in the garage**

Faced with a period of inactivity, the very worst decision an owner can make is to park an aircraft outside and leave it. The enthusiastic owner of a vintage British sports car, Chatfield likens abandoning a jet to the elements to parking a treasured car on the driveway all winter – he's in British Columbia, so winters are hard. "It wouldn't be a surprise to come back to it in spring and discover it didn't work properly and the repairs were going to be expensive. Instead, you push it in the garage, replenish the fluids, place a protective cover on it, do the minor things necessary to keep it healthy and maybe get a cat or mousetrap to stop anything getting inside."







Tom Chatfield, CEO,  
Camber Aviation  
Management

But the best decisions aren't always made in the wake of an unexpected crisis and Tom Chatfield has seen some of the worst, including the dismissal of pilots as soon as problems arise. The questions of where the jet is and can you move it to a suitable storage facility are then moot, because it's staying where it is, regardless of location. Chatfield mentions an aircraft abandoned on a tropical, coastal airfield without even engine covers; both engines were written-off 14 months later and the asset lost in the region of US\$20 million in value.

"Camber now offers to go and get those aircraft and it's surprising how many people are calling us for help. Every case is different. We speak to the OEMs and figure out how to make the jets safe and airworthy, then get them to an MRO, where remedial work can be expensive." Ironically, much of the expense may be avoided by taking a look at the aircraft owner's manual which, in every case, details the requirements for storage. It's also important to consider the potential for damage or invasion by insects or rodents and while a cat almost certainly isn't the answer, it's important to prepare appropriately.

"Ideally, you'll want to park the aircraft somewhere warm and dry, although storing outside in colder climates is possible provided it is taken into account as part of the storage programme. Then everything has to be closed up, using a special tape to seal gaps, blanking off the engine intakes and exhausts, and sealing air vents; depending on the aircraft type, a fly screen-like material is used for air vents, allowing for ventilation but keeping bugs out."

"Passenger windows are vulnerable to UV and become crazed by sand and other debris blowing against them. Cockpit windows are also affected, so all transparencies need to be covered." Replacing a damaged transparency is costly. Chatfield reckons anywhere between US\$80,000 and US\$120,000 per item is typical, while the work involved is extensive and often surprisingly complex.

Lubricants and hydraulic fluids are usually topped up prior to storage and if the arrangement is long term, then it may be necessary to flush and change those



fluids later. Keeping everything full prevents moisture penetration and helps keep seals and other components in good condition. “If you drain a hydraulic system,” Chatfield notes, “it’s only a matter of time before the seals perish and components require overhaul.”

Ideally, aircraft are stored indoors, in environmentally-controlled hangars. Some owners have facilities available, for others hangarage represents a not inconsiderable cost, and yet Chatfield says he’s had conversations where owners have let pilots go without having them bring the aircraft home to the hangar first.

Again, regardless of whether the jet is kept inside or out, but more importantly in the latter case, it’s a good idea to protect the exterior paint and treat polished leading edges. It is something that ought to be done again before returning to flight, since both areas deteriorate quickly.

#### System checks

Without airflow or air conditioning, the cabin will suffer if left sealed and unattended – leather will age and mould may form. “For that reason, it’s important to put desiccators inside and to keep some vents open, albeit closed off with the ‘fly screening’. Depending on the OEM, there’ll also be a requirement to power the aircraft up at certain intervals, which means the door will be opened and the cabin aired. Opening the front and baggage doors lets air move through the cabin. Short-term storage may require an engine run at two weeks or four weeks too, providing the opportunity to cycle systems,” Chatfield says. Even in a hangar and following the requirements for powering-up, engine runs and protection, there is a need to reseal a stored aircraft at intervals, taking off and replacing the tape.

Bringing an aircraft out of storage depends on the type, how it was stored and how long for. “Assuming it was long-term, the covers come off and calendar checks that would have become due are completed. Systems checks would include hydraulics, APU [auxiliary power unit] and flying controls. Fluids and filters would be changed, and any scheduled maintenance checks completed, at the same time attending to airworthiness



You wouldn't expect this to start first time... Actually stored in an underground garage since 1981, this 1963 Mercedes-Benz 300 Coupe was auctioned by H&H Classics ([www.handh.co.uk](http://www.handh.co.uk)) in November 2020. Business and VIP jets, like treasured cars, must be parked and stored with careful attention to avoid costly bills later. H&H Classics



A properly parked aircraft will always have protective covers and tags applied, even if it's only being left for a few hours. London Oxford Airport

directives and regulatory requirements to maximise efficiency. With all that done, it’s time for a proper engine run. Legally, there’s no requirement for a test flight, but we feel it’s always important because by now you’ll have done a lot of work.”

#### Record keeping

Keeping accurate records through an aircraft’s career, including during periods of storage, is essential not only to maintaining airworthiness and safety standards but also to its value. Poor records are not unusual, especially when an aircraft has been parked under duress, but Tom Chatfield reckons the problem can be eased if the return-to-service

programme is well managed. A thorough inspection, precautionary work where doubt exists over a system’s status and careful diligence all reduce risk; he cautions over the ‘clean it up and continue with regular maintenance’ approach.

“If the records are solid, they establish the aircraft’s pedigree. Combine that with knowing where the maintenance has been done and you can tell how well it’s been taken care of. My perspective is always, ‘Would I be happy for my family to get on it?’ In the case of missing records and improper storage, the answer to that question is ‘absolutely not’.”





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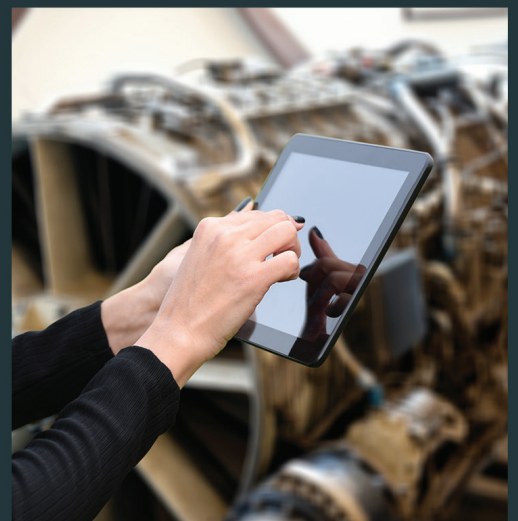
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