



# Meet the Learjet 85

by Jack Carroll

“You’re really going to get a kick in the pants from the Learjet 85 when it rockets you up to 12,500 metres (41,000 feet) in less than 18 minutes. You won’t find a business jet that can do that, except for another Learjet.” Brad Nolen, Product Planning Director, Bombardier Business Jets.

For a number of years Bombardier has been looking to develop a new aircraft for existing Learjet 45 and 60 operators – over 700 now – who want more cabin space and overall capability. The company’s designers spent a few years exploring alternatives including using the Learjet 45 wing with a larger fuselage, or maybe lengthening the Learjet 60 and adding modified Learjet 45 wings. But the solution was to forget about existing components, what Brad Nolen calls “building blocks”, and go with a clean-sheet design and all-composite construction. Welcome the Learjet 85.

This is a first for Bombardier Business Aircraft and it will also be the first all-composite business jet designed for FAA type certification under the stringent provisions of FAR Part 25. “The Learjet 85 is designed to compete at the upper end of the mid-size class,” says Nolen. “And no exaggeration, it will come out ahead in all areas, such as speed, time-to-climb, range and cabin volume. In fact, our cabin is 18% larger, and the Learjet 85 is significantly faster, than our nearest competitor, saving about 45 minutes on a typical New York to Los Angeles flight.”

We shall see what happens when the reality of flight testing begins, but Bombardier’s design and engineering teams haven’t missed yet.

## Composite Onboard

Bombardier will design and manufacture all primary and secondary structures for the all-composite Learjet 85 business jet, which will feature proven low-pressure, low-temperature composite technology. “The use of composites opens lots of design possibilities,” says Nolen. “A designer has an infinite number of options, such as complex curves, without adding exponentially to the number of parts required. And while there are many ways to apply composites, ours are built up in a precision mould.”

All primary structures of the Learjet 85 are composite, including the wing, fuselage and empennage. As Nolen points out: “The vertical fin is an integral part of the fuselage mould. This maximises strength and minimises the number of parts. There are two moulds, a left and a right, combining fuselage and tail fin. After the carbon fibre has cured, the moulds are mated together using a proven process to maximise strength in the joint area.”

## The Proven Ingredient

The many benefits of carbon fibre construction over traditional aluminium includes faultlessly smooth surfaces which mean less drag and improved performance, an impressive strength-to-weight ratio, reduced maintenance, maximum usable cabin space (no design-intrusive metal ribs), reduced maintenance and far fewer structural parts. All with little chance of corrosion or fatigue damage, as occurs with aluminium.

Production of the composite structures will take place at Bombardier's facility in Querétaro, Mexico. The electrical harness will be produced at Querétaro, which will also handle installation of sub-assembly systems. Final assembly, interior completions, flight-testing and customer deliveries will all happen at Bombardier's Wichita, Kansas facility.

## Top Suppliers Selected

Bombardier worked with Pratt & Whitney Canada (P&WC) for many years to develop the most fuel-efficient engine for the Learjet 60 platform. So it was no surprise that the company chose P&WC and its PW307B engines, each rated at 27.1 kN (6,100 pounds) of takeoff thrust. The PW307B features a full complement of advanced technologies including a TALON low-emissions combustor, an advanced shock management fan for increased flow capacity and high-pressure turbine disks for improved efficiency.

All that technology contributes to lower fuel consumption, CFO-pleasing operating economics, greatly reduced emission levels and low noise. In fact, Pratt & Whitney Canada claims its PW307B turbofan engine has the least impact

on the environment of any engine in its class. The engine produces over 30% less nitrous oxide (NOx) emissions than is recommended in the current International Civil Aviation Organisation (ICAO) standards. Learjet 85 operators will also avoid landing fee surcharges as the PW307B also meets the tough Zurich 5 emission requirements. By any standard of measurement, P&WC's new engine is indeed a "green" machine, with all systems go to push the high performance Learjet 85 to its projected high-speed cruise of Mach .82 and transcontinental range of 3,000 nautical miles (5,556 km).

Up in the cockpit, pilots will be treated to the Rockwell Collins Pro Line Fusion avionics suite, to lighten their workloads and maximise safety. Brad Nolen makes the point that Pro Line Fusion has been thoroughly proven as a key component of Bombardier's Global Vision flight deck. Launched in September 2007, Pro Line Fusion is Rockwell Collins' most advanced avionics suite, featuring three hi-resolution 38 cm (15.1 inch) LCD displays, synthetic enhanced vision for increased peace of mind in poor weather, advanced human-machine interface including graphical flight display planning, Integrated Flight Information System (IFIS) with electronic charts, and dual advanced flight management systems. Pro Line Fusion also includes electronic checklists linked to the Engine Indicating and Crew Alerting System (EICAS) and integrated circuit breaker control. Now all the crew has to do is fly the plane. For pilots these features mean smooth flying, situational awareness, fuel management and, most important, safety.



Learjet 85 interior

## Flexjet to Receive First 85s in 2012

As of 31 July 2008, Bombardier had announced 45 firm orders and 90 letters of intent for the Learjet 85. Among the firm orders are six from ExecuJet Aviation Group and 11 from VistaJet, both based in Switzerland, and five from London Air Services of Canada. As for scheduled certification and first deliveries, Brad Nolen tells us: "Certification should take place in 2012 when first deliveries begin to Flexjet. As a fractional programme, aircraft in the Flexjet fleet are subject to extremely high utilisation, so you might say that it is an excellent proving ground for the Learjet 85. It will allow us to make any adjustments necessary.

"As the first batch goes to Flexjet, we'll slow down the production line so we can make small changes as needed, so they are incorporated when first deliveries begin to external customers in 2013. We followed that plan for the Challenger 300 and Learjet 60XR and it worked out very well for us. In any event, we don't expect any problems. We tend to operate with a low-risk philosophy here and design aircraft around proven systems. For example, the PW307B was proven on the Falcon 7X, while the Pro Line Fusion avionics suite is very similar to the one we're using on the next generation Global Express."

When asked if Bombardier foresees a larger Learjet at some point in the future, Nolen responded carefully: "There is nothing planned at present. If a Learjet 85 operator decided at some point that they needed a larger aircraft with more range, I'd say that the Challenger 300 is the closest Bombardier family member. With a wider fuselage and about a 300 nautical mile (345 km) range advantage it would be a smooth and logical transition for a Learjet 85 customer."

So what will the newest Learjet set you back? "Right now the Learjet 85 is priced at approximately \$20 M (€13.28 M) but, of course, that can change at any time," says Nolen. A word to the wise: Bombardier Business Aircraft is now accepting deposits. ■