BELL 505 POISED TO ANSWER HOVERING QUESTIONS

News / Manufacturer



Bell Helicopter arrived at Heli-Expo in 1966 with the prototype 206 JetRanger and a business formula that would launch an entire industry: the packaging of a single turbine engine into a light airframe with a price point accessible to an individual entrepreneur.

Fifty years later, Bell returns to Heli-Expo with another prototype of a short light single (SLS) helicopter – the 505 JetRanger X – that follows an even more ambitious formula.

In addition to the turbine-airframe combination, Bell packages the 505 with a host of new features never seen before in the SLS class, including a maintenance-saving dual-channel full authority digital electronic control (FADEC) and a Garmin G1000 integrated avionics system. The 505 will also feature 50% more installed power than any of its predecessors.

And yet, Bell is promising to deliver the aircraft at a price point – $1.077 million – that defies the logic of an industry that seldom delivers more capability at a lower cost. As presently valued, the 505 will enter the market costing over 50% less than the last 206L4 model that rolled off the assembly line, in 2010.

Bell made all of those promises – along with others, including a useful load over 1,500lb and a

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maximum range greater than 350nm – at the programme's launch two years ago and, so far, continues to stand by all of them.

The market has responded probably as well as Bell had hoped at the 2014 launch ceremony: more than 350 purchase agreements with deposits – a marketing triumph as overall commercial helicopter sales are contracting.

But a number of assumptions underpinning Bell's assertions remain to be validated. Can Bell meet the improved performance targets for the 505 compared to the 206B it replaces, despite using a metal fuselage and a heavier, albeit modernised, engine? Can Bell deliver the 505 more cheaply than the last of the 206 series, despite featuring a more powerful engine and more advanced electronics? And, can the SLS market support the volume Bell needs to meet production cost targets? Bad timing saw sector demand plunge almost immediately after the 505 was unveiled.

Under Bell's original development schedule, announced two years ago, the answers to those questions would have already been known. But the programme is running up to six months behind schedule to receive airworthiness certification from Transport Canada.

The delay is caused at least partly by a design change. The original 505 test aircraft was unveiled in late 2014 with a single horizontal stabiliser surface attached to the right side of the aft tail boom, opposite the tail rotor. It offered a different look than all previous Bell designs, which had relied on a full-length stabiliser attached near the midpoint of the tail boom.

But flight tests revealed the new design in the aft position did not provide enough stability, so Bell reverted to the conventional stabiliser surface at the midpoint of the tail boom.

Bell has acknowledged the highly-visible design adjustment, but no other specific issues or changes with the 505 in flight test.

"The horizontal stabiliser looks a lot different than what we had at the start of the programme," Bell 505 programme manager LaShan Bonaparte says. "You make adjustments as needed. We weren't happy with the stability of the aircraft with the configuration that we had. Our teams did a great job of reacting to that very quickly and making the proper adjustments."

The certification programme, however, was lengthened several months. By the end of December, company officials were predicting certification in the first half of 2016. In January, newly-appointed chief executive Mitch Snyder appeared to extend the timeline, speaking of entry into service sometime this year.

The three flight test vehicles continue to make progress in the certification programme, accumulating more than 500 test hours up to early February. The first test aircraft is close to beginning a 100h, ground-based endurance test, required for certification. In December, Turbomeca certificated the Arrius 2R engine, a major break from Bell's traditional reliance on Rolls-Royce engines in the light turbine class.

By adding such items as the more powerful engine, along with new electronics like a FADEC and Garmin G1000, the 505 must have a challenging empty weight target. To save costs and simplify, Bell rejected lighter-weight composite structures for the airframe and reused the rotor system and driveshaft of the larger Bell 206L4, leaving little margin for error in the manufacturer's original weight estimates. Any extra weight could mean reducing onboard fuel, cutting into the promise of 1,500lb-plus of useful load and more than 3h endurance.

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So far, however, Bell has not updated the empty weight and maximum take-off weight estimates released when the programme was launched two years ago.

“We’re still looking at all those numbers. We just recently here, over the last month, finished the engine certification with EASA,” Bonaparte says. “We’re taking that data and analysing it along with the data we’re getting every day along with the flight tests on FTV-2 and FTV-3. We look forward to being able to brief those figures at the appropriate time.”

Meanwhile, Bell has started receiving the parts for the first production aircraft in a new final assembly site in Lafayette, Louisiana, anticipating a ramp-up planned to start later this year, upon certification. The production system and supply chain is critical to achieving Bell’s affordability target of just over $1 million, or about $100,000 more expensive than the smaller and less powerful Robinson R66.

Bell knows the risk of over-promising on price; Textron sister company Cessna’s launch nearly a decade ago of a light sport aircraft offers a chilling warning. Initially offered at a competitive, $100,000 price point, the Cessna 162 Skycatcher piled up more than 1,000 firm orders before the test aircraft even flew. But Cessna was unable to control costs and the price tag of the Skycatcher rose by 50%, leading to cancellations that eventually led to cancellation of the programme.

To avoid a similar fate, Bell focused on selecting suppliers for the 505 who could support a production system designed to deliver value and affordability in tandem.

“This is a clean-sheet design,” says Bonaparte. “Our customer asked for a high-performance, high-value aircraft and we’re going to deliver on all those things. The [206] JetRanger – it was a great aircraft for its time. It became too expensive for this particular market. We will be able to compete in this space as well.

“Technology has changed a lot over the past 30 years and a lot of things that maybe were out of reach from a price standpoint 10, 15, 20 years ago, the technology has come a long way since then from a design perspective as well as a manufacturing perspective.”

“It was really important when we selected suppliers to make sure that it wasn’t just about the product. It was about the customer. What does the customer need? What value can we bring to them? And it has to be at a price point that makes sense for this particular weight class.

“I think we have a really good set of suppliers.”

23 FEBRUARY 2016

SOURCE: FLIGHTGLOBAL
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