New competitors for Airbus and Boeing?

If the world's airlines were asked to sum up their most important requirement in any new aircraft, they would have an immediate reply: Affordability.

For Boeing and Airbus, this is suddenly a problem. Not an immense problem—their backlog of the most affordable popular short-haul airliners stood at a collective 1,797 at the end of February. But a new generation of 100-seat-plus airliners is poised to enter the market, offering major savings over 120-seat Airbus A318s, Boeing 737-600s, and even 100-seat Boeing 717s. For the first time since the demise of McDonnell Douglas, the world's two major airline manufacturers may have some competition on their hands.

Enter Canada and Brazil

The most immediate threat comes from Bombardier. At the start of February, the company let it be known it had started on a market study for a 130-seat airliner—which would pitch it against the A318 and 737-600. Bombardier will spend a year building a business case for the new aircraft, but will proceed only if it can guarantee 15-20% savings in direct operating costs over the nearest competitor.

At first sight this should not be hard to do. The current incumbents dominating this market are scaled-down versions of much larger—and more expensive—airliners. Scaling up cheaper regional aircraft designs should yield substantial savings.

The study will look into the possibility of developing a family of three aircraft, a development of the Canadair Regional Jet line, seating 75, 100, and 125 passengers. Development costs would be about $1.5 billion, but as well as canvasing the Canadian government for launch aid, the company is looking at setting up an assembly line outside Canada if such funding is made available. The company's Shorts facility in Belfast has been suggested as one possible new site.

Potential competitor number two comes from Embraer, which rolled out its 100-seat EMB-190 at the start of February and announced that its 108-seat EMB-195 would be certified in the second quarter of 2006. These types are already cutting deep into Boeing 717 territory, which with 100 seats is Boeing's smallest—and slowest selling—type. At the start of January, orders for the Boeing 717 stood at 161, of which 125 had been delivered.

However, this is a highly competitive market. It would be logical to expect the Boeing 717 to be a relatively expensive aircraft, claiming its heritage from the venerable DC-9. But the January 2001 list price—a notoriously unreliable indicator—was $35 million per aircraft, whereas the Embraer EMB-190 is apparently retailing for a similar amount. The 2003 JetBlue launch order for 100 EMB-190s is valued at $3 billion. This suggests that translating regional aircraft economics to trunk-liner aircraft markets may not be as easy as it first appears.

The slow sales of the Boeing 717 and the demise of the BAe 146/Regional Jet range and the Fokker F100 all imply that the crossover market between regional and trunk-liner aircraft may be highly complex. The reason why there are very few aircraft serving this market could be that airlines may not want to buy them.

But in the short term there is a race on to dominate this largely untapped 70-110-seat market. After all, it is just a short hop from 110 seats to 125, and if manufacturers could build a 125-seat aircraft using regional aircraft designs and economics—low maintenance costs, fuel-efficient and quiet engines—the rewards would be huge. The 2001 list price for the A318 was $41 million—again, an unreliable figure in the current economic circumstances but indicative of the gulf between regional air-

Embraer's EMB-190 will offer stiff competition to the two leading aircraft manufacturers.

Single-aisle order backlog February 2004

Manufacturer	Aircraft type	Backlog
Airbus	A318, A319, A320, A321	973
Boeing	737-600, 737-700, 737-800, 737-900	824

Source: Boeing, Airbus.

The possibility of a new family of small jets based on the Canadair Regional Jet line is being seriously entertained.

liner and trunk-liner aircraft prices.

Boeing is predicting sales of over 3,000 aircraft in the 100-125-seat class over the next 20 years; Airbus says the figure will be 3,112. In its most recent regional aircraft market survey in October 2003, Forecast International is predicting "dynamic" growth in the 70-120-seat aircraft market.

"As passenger traffic grows, airlines operating 50-passenger aircraft on many routes may find that they do not have sufficient capacity to meet demand and will need larger capacity aircraft to compete," says the company. So it is not surprising that new competition for this seat sector does not stop there.

Looking East

"China is single-handedly developing its very own regional jet and is expected to continue to protect its incredibly fast-growing domestic market," according to Bombardier president Paul Tellier, speaking to the Montreal Board of Trade in February. "Russia is well experienced in aerospace and has already launched both a regional jet and a medium-range jet program. Japan has invested in the feasibility study of a Japanese-designed and -manufactured twin-engine aircraft."

These developments will not trouble Boeing or Airbus, for whom the volatile nature of the regional jet industry is of merely academic interest. But they would do well to follow the Chinese ARJ21 program closely. The baseline model for this aircraft is a 70-90-seater that will be powered by General Electric CF34-10A engines. The commercial aircraft division of China Aviation Industry Corp (AVIC) is manufacturing the plane at four different plants throughout China. The first flight is planned for 2005 or 2006.

The aircraft is being built to service a huge domestic demand for regional aircraft, which will give it a major early boost. The Chinese say they will need 600 regional jets over the next 20 years—but they are also aiming at a global market estimated to total 4,000 aircraft over that period. AVIC's subsidiary Hafei Aviation Industry also has an agreement with Brazilian manufacturer Embraer to assemble EMB-145 regional jets under license. AVIC has some experience at breaking into new markets. As well as producing aircraft, the company is the largest manufacturer of small cars in China.

For these new players the huge scale of the short-haul airliner market—both regional jets and beyond—is enticing. Boeing sees a market for 13,270 single-aisle aircraft and regional jets between 2003 and 2022, while Airbus is predicting sales of 8,259 aircraft with seat ranges from 100 to 175 between 2000 and 2020. There does appear to be an important market gap between the 108-seat EMB-195 and the 124-seat Airbus A318 that the new Bombardier aircraft could plug. But it would be very strange if designers looking to meet this hole in the market did not consider just a small stretch.

Philip Butterworth-Hayes
phayes@mistral.co.uk

Correspondence

I am extremely disappointed in the coverage you provided in the December 2003 Year in Review. Nowhere in your issue could I find mention of the tragic losses of members of the aerospace community involved in the accidents at the Alcantara Launch Center or United Technologies, Calif. (There were probably other less publicized losses as well.) These souls were no less brave or stout of heart than the crew of Columbia, who were appropriately recognized by your issue.

If there are any new beginnings that should be recognized, it is the efforts of these developing programs that are pushing more boundaries than our own established systems. This oversight does a disservice to those directly affected by the

All letters addressed to the editor are considered to be submitted for possible publication, unless it is expressly stated otherwise. All letters are subject to editing for length and to author response. Letters should be sent to: Correspondence, Aerospace America, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191-4344, or by e-mail to: elainec@aiaa.org.

accidents and to the community at large.

As your editorial, Celebration, loss, and new beginnings, states, "[as we] pause to remember all of the brave men and women who came after them, we can look back at the year, and the century, with admiration and pride, coupled with no small measure of sadness and, maybe, a bit of hope." The 21 dedicated souls from Brazil will be remembered in my heart; their efforts should be celebrated in your journal.

Eric R. Payne
Lt Col., USAF

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I am a student at California Polytechnic State University and coordinator for the CubeSat Project. Thank you for mentioning the project in the Design engineering report (December, page 71).

There were a few errors in the article. First, the CubeSat Project encompasses 30-40 universities worldwide. Northrop Grumman and other corporations have provided not only sponsorship but technical expertise with their industry experience. Also, the dimensions of a CubeSat satellite are 10×10×10 cm, not 100 cm. Finally, there was a total of six CubeSats launched, not seven; with three satellites "performing" their desired mission. The other three did not function properly.

Thank you for mentioning the amateur radio community. They have been a big help to us, providing guidance as well as teaching new amateur operators within the CubeSat Project.

Beyond that initial Eurockot launch, we will have a launch on a DNEPR launch vehicle in the fall of 2004, which will include 5 P-PODs (Poly-Picosatellite Orbital Deployers), totaling 14 CubeSat satellites. We will have our first annual CubeSat conference at Cal Poly in April.

Simon Lee
STLee@calpoly.edu

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The Lighter than air report (December, page 34) was not up to date concerning Cycloidal propellers. The propellers used on the Airspeed 500 blimp flight last March were the ones used first on a 7-ft balloon in the U.S. and were carried to the U.K. and installed on the blimp to make demonstration flights. After the March flight, the blimp was shipped to Meridian, MS, for further modifications.

The controls for the cycloidal propellers were modified so that each unit could be individually controlled. The upper fins were removed from the blimp and the lower fins and rudders locked in place; all controlling would be through the use of the propellers. The first flight of the airship using only the cycloidal propellers for control was made in July. Flights were made in all directions including turns.

Roy P. Gibbens
cyproplta@aol.com

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Corrections: Due to an editing error, a word was ommitted from the February Commentary, The key to success in space (page 3). In discussing the use of the space shuttle, the sentence should have read: "In effect, it flew for 17 years *without* serving its primary purpose."

In the February Out of the Past (page 44), the photograph labeled Soyuz 32 is actually the Apollo command/service module and docking module from the 1975 Apollo/Soyuz mission.

Events Calendar

APRIL 19-21
International Air and Space Symposium, Washington, D.C.
Contact: 703/264-7500.

APRIL 19-22
Forty-fifth AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference; 12th AIAA/ASME/AHS Adaptive Structures Conference; Sixth AIAA Nondeterministic Approaches Forum; Fifth AIAA Gossamer Spacecraft Forum. Palm Springs, Calif.
Contact: 703/264-7500.

APRIL 21
Congressional Visits Day, Washington, D.C.
Contact: 703/264-7500.

MAY 9-12
Twenty-second AIAA International Communications Satellite Systems Conference and Exhibit, Monterey, Calif.
Contact: 703/264-7500.

MAY 10-12
Tenth AIAA/CEAS Aeronautics Conference, Manchester, U.K.
Contact: 703/264-7500.

MAY 17-21
SpaceOps 2004, Montréal, Québec, Canada.
Contact: Michelle Robitaille, spaceops2004@nrc-cnrc.gc.ca; www.spaceops2004.org

MAY 24-26
Eleventh St. Petersburg International Conference on Integrated Navigation Systems, St. Petersburg, Russia.
Contact: www.elektropribor.spb.ru

JUNE 2-4
International Federation of Nonlinear Analysts' ICNPAA 2004, Mathematical Problems in Engineering and Aerospace Sciences, Timisoara, Romania.
Contact: Seenith Sivasundaram, 386-226-6298; www.icnpaa.com

JUNE 22-25
India-U.S. Conference on Space Science, Applications, and Commerce—Strengthening and Expanding Cooperation, Bangalore, India.
Contact: www.aiaa.org/indiaus2004