

Europeans consider small business jets

With over 2,100 orders before the first production aircraft has entered service, the Eclipse 500 will probably soon hold the record for the most successful jet aircraft program in history. The 500, along with the Cessna Mustang and Adam 700—all undergoing flight testing—is spearheading a new generation of extremely light business jets in the U.S.

Despite the growing backlog of orders, however, forecasters are divided about the impact of this new type of aircraft: Will they create a genuinely new market, with business travelers eschewing the low-cost regional airline services that are dominating many short-haul routes for more flexible and convenient low-cost business jet services? Or will owners find that pilot, insurance, maintenance, and fuel charges make even a \$1.5-million aircraft too expensive to own and operate?

And just as the three new competitors race to enter the market, a new, even lighter and cheaper business jet is under development. In Europe, Austria's Diamond D-Jet, a single-engine, single-pilot craft, is due to fly for the first time later this year. The D-Jet is on sale for just under \$1 million, compared with \$1.2 million for the 500, \$2.4 million for the Mustang, and \$2.1 million for the Adam 700, begging the question: Just how small and how cheap can business jets get?

The market in Europe

In its July 2004 market survey, Forecast International predicted that Eclipse Aviation would capture 12.2% of the business jet market between 2004 and 2013, third only to Cessna (30.2%) and Bombardier

(15.7%). Others are taking a more cautious view—only recently the Teal Group suggested just 200 very light business jets a year will be produced annually (see “Business jet free-fall ends,” May, page 16). By contrast, Rolls-Royce is predicting around 8,000 very light jets will be delivered by 2023.

In Europe, this new generation of light business aircraft is being viewed by many with some degree of suspicion. Europe may be only a relatively small business aircraft market in global terms, but the unique operating conditions of the continent—extremely congested airspace, high fuel and operating cost—could define the base limits in terms of size and cost for this new range of aircraft.

“My personal view is that they will make an impact in Europe, but not a big one,” says David Humphries, CEO of the European Business Aviation Association. “If the idea is that they develop into the air taxi market, there are many limitations on their use. In Europe you need two pilots; with fuel and luggage on board that will leave room for just two passengers and cut back the range to just 300 mi.

“There could be a market for sales to private individuals, but fewer prospects as an air taxi aircraft.”

The D-Jet challenge

History would suggest that attempting to develop a \$1-million business jet aircraft is a process doomed from the start. Although the concept has been around for some years, even with a new generation of small but more efficient jet engines now available, developers have tended to run out of money just as the prototype is wheeled out of the hangar. The Eclipse 500 has taken around \$500 million in development costs.

Will the Diamond D-Jet confound this trend? It is a lighter



and cheaper competitor to the Eclipse 500 and is powered by a single Williams FJ33-4 fanjet. It is capable of carrying four passengers, with a cruise speed of 315 kt and maximum operating altitude of 25,000 ft. The aircraft is being designed to operate from 2,000-ft runways.

But in Europe, believes Humphries, at least two pilots should be required if the aircraft is to fly into busy European hub airports—the workload is simply too much for one. “These are high-performance aircraft, and flying into a busy airport things happen very quickly; there is a great potential for good with these aircraft but a great potential for harm as well,” he says.

The new Cologne-based European Aviation Safety Agency (EASA) now oversees all aviation certification issues in the EU, and it has tasked Austria's national air safety agency, Austrocontrol, with the certification of the aircraft.

European business aviation suffers from a plethora of complex regulations that differ from country to country—for example, only aircraft equipped with TCAS (Traffic Alert/Collision Avoidance System) are allowed to fly from Germany to Italy, whereas transition periods have been granted to business aircraft operators in all other parts of the continent. The move to a single regulatory authority in EASA should help produce a common set of rules in the long term, but in the short



term manufacturers and operators face a minefield of differing legislation.

Infrastructure issues

Humphries is not the only European aviation executive to express reservations about Europe's aviation infrastructure suddenly having to cope with a new and unexpected type of light business aircraft operation. For the continent's air traffic management agencies, the new light aircraft are a particular concern.

"It is extremely worrying," says Alexander ter Kuile, secretary general of the Civil Air Navigation Services Organisation. "Impending proliferation of these aircraft is even more advanced in the U.S. than it is in Europe, but even here we have not given it the appropriate attitude on our operational agenda for both the spare airport capacity and charging mechanisms."

"There is a large, still unexpected demand about to unveil itself," notes Alex Hendriks, head of airspace/flow management and navigation at Eurocontrol. "The Eclipse 500 jet is expected to be certified by FAA by March 2006. Production will hit four aircraft a day in early 2007—some 1,200 per year. To date, some 2,100 aircraft have been sold, and more companies are successfully offering similar aircraft. We therefore must take a radical new and fresh look to the ATM [air traffic management] infrastructure and ATM provision."

Big business for small jets

There is no doubt there is a huge potential demand for the flexibility of business aircraft services within Europe. Europe may lag behind the U.S. in the business

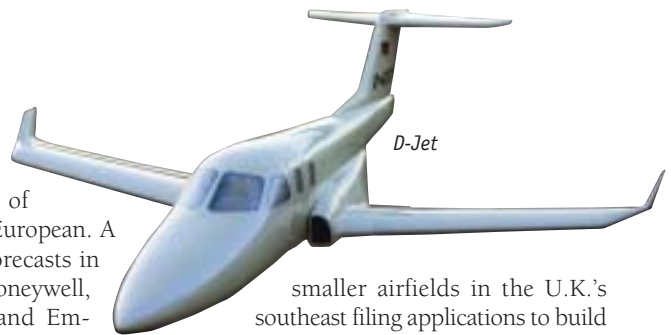


aircraft market, but it is still the second largest sector in the industry—around 10% of Eclipse 500 customers are European. A series of business market forecasts in the latter part of 2004 by Honeywell, Bombardier, Rolls-Royce, and Embraer all seem to agree that the market bottomed out in 2001 and that 2005 will be a particularly good year for business aircraft manufacturers.

According to Rolls-Royce, there will be a need for 23,000 business aircraft, with a delivery value of \$284 billion for very light jets through reconfigured Boeing 737s and A319s. According to the Honeywell survey, demand is greatest in Europe for longer range jets and the new very light jets.

To echo this finding, one fast-growing market is the demand for business aircraft service for transatlantic business passengers. Both Lufthansa and Swiss now operate all-business class operations to North America using aircraft from the Geneva-based business jet charter company Privatair.

But it is the very light business jet aviation sector, in effect an entirely new market, that has sparked most interest among Europe's aviation industry. Tim Johnson, director of the Aviation Environment Federation in the U.K., notes that there has been a recent increase in the number of



smaller airfields in the U.K.'s southeast filing applications to build hard runways. A sudden increase in interest in general aviation usually goes hand in hand with an economic recovery, but the replacement of twin-engine propeller aircraft with cheaper and faster jets could change the nature of the corporate and private sector forever.

It is certain that if this sector does take off, the three most advanced programs, all based in the U.S.—Eclipse 500, Cessna Mustang, and Adam 700—will soon be joined by other competitors, some of whom will be European. Austria's Diamond D-Jet is just such a potential newcomer. But it faces stiff competition from such other North American programs as the Monument Excel-Jet Sport-Jet, Air Investor Resources Tam-Air Epic Jet, the SafireJet, and the Avocet ProJet (a joint development between Israel Aircraft Industries and Avocet Aircraft).

The key will be to find and sustain funding over the long development period; in this race, U.S. companies are light-years ahead of any European competition.

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Correspondence

Wanted: A vision for aeronautics (February, page 3): Be careful what you wish for, you may get it. I too think that space exploration is a noble and worthy goal. However, it cannot be done without a very large budget increase or taking the money from other things. Based on the current NASA budget, our government is pursuing a combination of both. The most obvious sacrifices are the Hubble Space Telescope and aeronautics.

Regardless of what NASA management tells you (reference the "restructured

and improved vehicle systems program" statement in April's **NASA budget reflects major reorganization**, page 10), the aeronautics program and the vehicle systems program in particular have been decimated (ask the 700 people or about one-third of the civil service staff at Langley, as well as others at Glenn and Ames, who are being threatened with dismissal).

I expect better reporting than that from the professional society that represents me and my profession. Bob Whitehead in his letter (**Correspondence**, April,

page 5) hit the nail on the head—the best plan in the world is worthless without the will and the resources to execute it. NASA has come up with plans to satisfy program offices, to satisfy stakeholders, to satisfy external customers, to satisfy OMB—none have been worth the paper they were written on because of lack of commitment and resources.

Now Congress has earmarked \$10 million (over two years) for the National Institute of Aerospace to come up with another aeronautics plan. For what? Who is going to pay any attention to it? Who is going to fund it? The \$10 million would have been better spent infusing some life into one or two now dead aeronautics projects and saving some jobs.

Until program decisions are again turned over to the technical experts (individuals who either actually use or produce the technology rather than pay for it), I fear that aeronautics in the U.S. will continue its downhill slide. As my representative for the profession in Washington (and indeed the world), I expect the AIAA not to forget that the third letter in its name stands for aeronautics. Based on what is happening within NASA, it is obvious that they have forgotten that the second letter in their name stands for the same. Rather than having a vision, aeronautics in the U.S. is being abandoned.

Bobby Berrier
NASA Langley



With reference to **Relighting the fire** (April, page 3), in order to “relight the fire” for the American public and to get them behind future exploration efforts, we have to connect with them. You mentioned in the editorial about how unengaged and uninformed our nation is about the importance of our scientific and technical conquests. That is exactly why our nation is unengaged.

Our point-and-click, instantly gratified society wants a NASA with heroic astronauts blazing the star-studded trails of our solar system and beyond. They do not want to listen to some older engineer or scientist with more doctoral degrees than children expound upon dark matter or some other equally boring platitude.

Air travel used to be exciting—now it is business as usual. The same has hap-

pened to NASA’s efforts. NASA flew a great number of shuttle missions with great and exciting experiments for those of us who are interested, but to the average person it was another launch that orbited the Earth a certain number of times by a nameless, faceless crew. It certainly did not rank as a monumental accomplishment, like going to the Moon. In fact, it solidified NASA as an organization patting itself on the back for the past accomplishments of making it to the Moon and melting back into missions of perceived mediocrity.

That was the perception until we blew up a shuttle after launch or burned one up trying to return it home. At that point, our reality-show public paid close attention.

I mention a nameless, faceless crew. We definitely do have a need for those senior engineers and scientists with their degrees, but NASA also needs to identify someone like one of the original seven astronauts who may only have a bachelor’s degree in science or engineering, but who could connect to the American public on a different level, with a charisma that markets the adventure and the danger of the journeys we are about to pursue.

NASA may need more than one of these public astronauts. As the time draws close to go to the Moon again, and sequentially to go to Mars, this young astronaut or astronauts will make a huge difference in getting the public energized to support these dangerous and expensive undertakings.

Once that happens, the elected officials will appropriate the funds to the NASA budget and the full power of the U.S. will be behind those missions; and, once again, we will awe the rest of the world with our accomplishments. The scientific and technical conquests will fall out as a result, but the average American will also feel and display an ownership and pride that NASA hasn’t seen since the Mercury, Gemini, and Apollo days.

I hope I haven’t oversimplified the problem. I’ve always personally felt pride in our space program; however, I do not think the wholesale pride of the Mercury, Gemini, and Apollo days is out there anymore. I think it will come back when we start acting upon these upcoming exploratory goals set by President Bush, as

long as NASA and those of us in the aerospace community make a connection to our average Americans. We need to come up with a plan on how to make that connection during this seemingly long period of time building up to the accomplishments of these milestones.

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In **NASA budget reflects major reorganization** (April, page 10) you report that the HR&T program, which supports a large majority of our research and engineering community, was one of the hardest hit, receiving a 20% funding decrease. In fact, this decrease currently represents a phasing out of basic life science research and nonhuman flight research.

While we support the broad goals of the president’s space vision, we are deeply concerned that changes to NASA’s internal decisions, reflected in the FY05 and FY06 budgets, sacrifices programs that will provide the information to support human exploration that cannot be obtained from research in humans only. It demonstrates a lack of understanding of the essential role basic research plays in finding answers to support exploration problems such as microgravity effects on the autoimmune system, developing and testing artificial gravity requirements to sustain an adequate health level, trauma care (like wound and fracture healing), effective pharmacotherapeutics, and radiation and shielding testing that cannot be done solely with humans.

It is ludicrous to rationalize that the abrupt termination of the program is the best approach without having any exploration science roadmaps in place to determine research priorities based on knowledge gaps. Too often recently, NASA has defined exploration science in the context of space science, whereas exploration science is defined by many research disciplines, basic and applied.

Contrary to some opinions, exploration in itself is not science; science enables exploration, and exploration enables science.

For decades, NASA has emphasized to Congress the International Space Station’s value for life and medical sciences and benefits to space and Earth. Many of

these totally disregard the historical rationale given to Congress by NASA to support these investments. A drastic redirection of life sciences will put us beyond recovery in capability, talent, experience, infrastructure, and development of next-generation scientists.

And even if the life science budgets are reinstated, there is another problem involving continued access to space: NASA desires to accelerate the retirement of the shuttle with many fewer than the originally planned 28 flights and before a replacement capability is in place, significantly underutilizing the capability of the ISS, and shifting reliance on our nation's ability to access space to dependence on other countries.

We have achieved historic space successes based on our direct access to space. The acceleration of the shuttle's retirement may provide the exploration budget some early augmentation; however, major science research capabilities aboard the ISS would be lost, unique test capabilities for exploration will not be available, and the U.S. would set an historic precedent by failing to fulfill its current international agreements, not to mention having no direct access to space until another vehicle comes on line.

An Exploration Life and Medical Sciences (ELMS) Coalition was recently formed to promote and foster space life and medical sciences research and work with the community to selectively align current and future research with the Vision for Space Exploration. The coalition consists of professional societies, including the AIAA Life Science Technical Committee, and business partners. We wish to support the new NASA administrator in maintaining life and medical sciences capabilities for the long-term needs of the vision and our nation. We need the strong support of AIAA members to do this effectively, so please contact us with your suggestions.

**AIAA Life Sciences and Systems
Technical Committee members**



It appears that, when it comes to arguments about nuclear weapons, the more things change the more they stay the same. The arguments against the robust nuclear earth penetrator (RNEP) quoted in the **Budget request holds some surprises** (April, page 8) echo the arguments against nuclear defense made in the 1980s. They fall into two categories:

The first category is, "It's cheap and easy to counter them." We heard that argument made against missile defense 20 years ago. We were told that antimissile defenses could be countered cheaply and easily by fast-burn boosters, by armoring the offensive missiles with a layer of lead, and by spinning them so a laser couldn't continually focus on the same spot.

As it turned out, these countermeasures were neither easy nor cheap, and none have been deployed by any potential adversary. Countering RNEPs by digging in deeper will likewise be neither easy nor cheap, and the additional costs may well deter some potential adversaries from even trying it.

The second argument is the rather paradoxical one that "If we build usable weapons, we might be tempted to actually use them in a war." We heard this argument raised against building small, accurate nuclear weapons in the 1980s. Apparently we were supposed to build only big, city-busting warheads whose effects were so horrible that they frightened us as much as they frightened a potential adversary (remember "nuclear winter"?).

The response to this argument is the same as it was in the 1980s—We should build usable weapons because their usability itself will convince a potential adversary that we have the will to use them in a discriminating manner if attacked.

I covered these arguments and more in my 1988 book *A Fighting Chance: The Moral Use of Nuclear Weapons*. Unfortunately it's out of print, but apparently not out of date.

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Col., USAF (ret.)

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.

Events Calendar

JUNE 6-9

AIAA Conferences on Applied Aerodynamics; Computational Fluid Dynamics; Plasmadynamics and Lasers; Theoretical Fluid Mechanics; Thermophysics; AIAA Conference and Exhibit on Fluid Dynamics. Toronto, Ontario, Canada.
Contact: 703/264-7500.

JUNE 8-10

American Control Conference, Portland, Ore.
Contact: S. Jayasuriya, 979/845-3081.

JUNE 9-11

International Conference on Recent Advances in Space Technologies 2005, Istanbul, Turkey.
Contact: Col. Kurnaz, kurnazsefer@yahoo.com

JUNE 28-JULY 1

International Forum on Aeroelasticity and Structural Dynamics, Munich, Germany.
Contact: J. Schweiger, johannes.schweiger@eads.com

JULY 10-13

Forty-first AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Tucson, Ariz.
Contact: 703/264-7500.

JULY 11-15

International Conference for Environmental Sciences, Rome, Italy.
Contact: G. Anderson, 520/903-1000, ext. 12.

AUG. 4-5

Queen's University Belfast First International Conference on Innovation and Integration in Aerospace Sciences, Belfast, Northern Ireland.
Contact: S. Raghunathan, S.Raghunathan@Queens-Belfast.AC.UK or www.ceiat.qub.ac.uk

AUG. 7-11

AAS/AIAA Astrodynamics Specialist Conference, Lake Tahoe, Calif.
Contact: 703/264-7500.