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Going Hypersonic

EADS' proposed hypersonic jet could take you from London to Tokyo in 2.5 hours, on biofuels

By [MICHELLE PRICE](#)

When European aerospace manufacturer European Aeronautic Defence & Space Co. unveiled a futuristic design for a high-supersonic aircraft in June, it captured the imagination of economy-class travellers around the world. But while the type of futuristic 'hypersonic' travel represented by the EADS Zehst design sounds exciting, it is unlikely to revolutionize everyday commercial aviation.

Journal Report

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The Zehst, which stands for zero-emissions high-supersonic transport, provides a glimpse of what the future of commercial aviation might look like in decades to come.

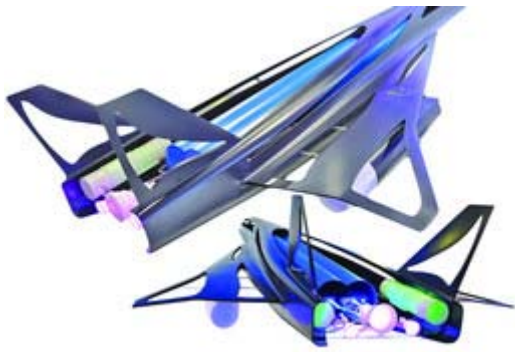
And it's really fast. The concept of a hypersonic commercial aircraft takes the aviation industry far beyond the supersonic Concorde, which boasted a cruising speed of 2,100 kilometers per hour, or Mach 2, into an aeronautical realm where passengers travel at five times the speed of sound at around 6,000kph, or Mach 5, just outside the earth's atmosphere. The Zehst has the potential to transform long-haul air travel by allowing up to 100 passengers to fly from London to Tokyo in 2.5 hours instead of the standard 12 to 13 hour direct flight.

Space Age Technology

The Zehst design employs existing military and space-age technology. A combination of jet engines commonly used in missiles and spacecraft would propel the aircraft into a normal take-off followed by a steep ascent into the stratosphere. Once the plane is cruising at an altitude of 32 kilometers, ramjet engines common to military aircraft would kick in to take the Zehst hypersonic.

The plane, which would run on bio-fuel, lands like a normal aircraft and although customers would experience some mild gravitational pressure as the plane enters the stratosphere, comfort levels would equal those of an everyday shorthaul flight.

The Zehst concept is a giant leap for an industry that has yet even to embrace



EADS

Is it a plane? Jet engines commonly used in missiles and spacecraft propel

supersonic travel. Since Concorde's last flight in 2003, commercial air travel has remained entirely sub-sonic, with the average cruising speed of a jumbo-jet reaching up to 900kph. Supersonic travel remains the preserve of the military and space agencies, but even these high-tech industries have yet to get a firm grip on hypersonic technology.

Alan Bond, managing director of Reaction Engines, a U.K. engineering company that is also working on a hypersonic commercial jet

concept, says: "Hypersonic travel technology is not yet very advanced. There have been some smaller breakthroughs: A small number of small hypersonic vehicles have been flown, but progress has been slow."

EADS has said the Zehst is a long-term project which would not enter commercial use for another 30 years, although unmanned test flights could be expected as early as 2020. The manufacturer has also said that the technological challenges are surmountable since the majority of the components, in particular the jet engines outlined in the design, are already in use today.

However, Tom Ellis, director of litigation support at aviation specialist Nolan Law Group, says the challenges of securing the necessary regulatory stamp of approval for such a radical new craft, known as a 'type certificate,' are not to be underestimated.

How the Zehst Compares	
Aircraft	Maximum Speed
A380 Double-Decker Jumbo-Jet	900kph (560mph)
Concorde	2,100kph
The Zehst	4,900kph
Falcon Hypersonic Technology Vehicle 2 ¹	21,000kph
Ballistic missile	24,000kph
Space shuttle re-entry	27,358kph

¹ Speed of an object moving through air, divided by the speed of sound
² U.S. military, in testing
 Source: The Wall Street Journal Research

He says: "There are an unbelievable number of design parameters that need to be met, both actual and in a virtual environment, before an airliner can secure a type certificate for a new design. The design has to satisfy the requirement that there is a less than one in a billion chance of a catastrophic failure resulting from any combination of failures—that is a tall order." But it is cost, not technology, that will ultimately define the limits of hypersonic travel, say aviation

experts. Jan van Toor, vice president of global innovation network, innovative concepts and long term scenario at EADS, agrees that cost is critical: "The most challenging aspect of the project will be creating something that is economically viable," he says.

EADS has estimated it would cost well in excess of €15 billion (\$22 billion) to bring the design to market. This would be distributed across a fleet of 50 to 100 aircraft. Mr. van Toor says the company had not put a price on a ticket yet, but he adds: "We would imagine the cost of the ticket to be much more than the premium fare of today's aircraft. It will be for the lucky few."

If hypersonic travel is unlikely to change the lives of the lowly economy-class traveller, will it transform the long-haul business market? While global premium travel spending is expected to grow in coming years, aviation experts are skeptical.

Cost Versus Speed

Matthew Buckley, a former Top Gun and commercial airline pilot, and founder of consultancy Top Gun Options, says ticket price increasingly wins out against speed. "Cost is far more important than speed in the post 9/11 environment. Prior to 9/11, an airline could charge \$4000 for a last-minute business ticket, but the days of sticking it to the business traveller are over. Corporations are not prepared to spend that kind of money." This raises the question: How important is speed to the future of commercial aviation?

Previous failures to get other high speed aviation projects off the ground suggest that speed is simply not a critical factor for the future of the commercial market, says Chris Seymour, head of market analysis at aviation consultancy Ascend. He adds: "The reality is that the industry is, for the foreseeable future, focused on making conventional aircraft designs more efficient and environmentally friendly."

EADS agrees. The Zehst is one of many projects the manufacturer is currently working on, the majority of which are focused on reducing the environmental impact of flying. "The future of aviation is not in fact about speed," Mr. van Toor says. "The focus is more about environmentally friendly flying. The industry will have to strike a balance between speed and environmental impact."

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