Unlike today, traveling at supersonic speeds used to be possible not so long ago. Two supersonic passenger airliners used to be in commercial use, the Aérospatiale-BAC Concorde and the Tupolev Tu-144, with the Concorde being the much more successful one of the two. The Concorde has been in use for almost 27 years, predominantly by Air France and British Airways. Although no longer in service, the Concorde is still one of the most iconic and well-known aircraft that have flown on the Earth. Featuring a very sleek fuselage and its double delta shaped wings, it looks unlike any other passenger jet currently in use. The Concorde is almost always seen in a predominantly white livery. The highly reflective white paint was used to prevent the aircraft from overheating when flying at supersonic speeds.

Making its first commercial flight with British Airways on January 21, 1976 the Concorde was capable of transporting 100 passengers at twice the speed of sound. This allowed the aircraft to perform transatlantic flights in half the time it takes today, namely three and a half hours. Its fastest crossing only took 2 hrs 52 min 59 sec, from New York to London. The Concorde not only flew faster than any other current aircraft but also higher, having a cruising altitude of 17,000m. At these altitudes, the passengers could even experience looking at the curvature of the earth. Flying the Concorde was an experience like no other, something very few people experienced. It did, however, come at a price, since the average price for a round trip was upwards of $12,000 [van der Linden, 2004].

The beginning of the end of the Concorde was on July 25, 2000, when Air France Flight 4590 crashed. Crashing just minutes after take-off, killing everyone on board and four more on the ground, Flight 4590 was the first crash of a Concorde. However, due to the fact that the Concorde flew a lot less than any other aircraft, it immediately had more fatal incidents per million flights than any other aircraft. After safety updates, the Concorde did return for commercial usage in November 2001. Passenger numbers however dropped, following the crash and the 9/11 attacks. In 2003, both Air France and British Airways announced that they would withdraw the Concorde from service. On November 26, 2003, the Concorde made its last flight, marking the end of an era.

Today, the only supersonic aircraft are military aircraft. For commercial flight, there is no longer an option to travel at supersonic speeds. With the demise of the Concorde and as of yet, an unfilled gap has been left. Research however is being done and supersonic travel might return.

Fixing the boom
Today, the only supersonic aircraft are military aircraft. For commercial flight, there is no longer an option to travel at supersonic speeds. With the demise of the Concorde and as of yet, an unfilled gap has been left. Research however is being done and supersonic travel might return.

Even though it is still seen as a marvel of engineering, the Concorde had its share of problems. Its biggest problem was the noise it produced, both in flight and on the ground. When taking off, the Concorde was one of the loudest aircraft ever manufactured. A bigger problem however was the sonic boom it produced, which was so loud that the Concorde was not allowed to fly over land at supersonic speeds. This greatly restricted the amount of routes the aircraft could fly, thereby reducing its usability. The Concorde was also very expensive to fly. It consumed...
twice the amount of fuel as the Boeing 747, while transporting only a quarter of the passengers (Black, 2012). Even though British Airways has always claimed to have made a proft on the Concorde, it must be clear that any new design must overcome the noise and fuel consumption problems faced by the Concorde.

Currently a lot of research is being done on supersonic transport jets. Much of this research is focused on the reducing the noise produced by the sonic boom. As Peter Coen, supersonic projects manager at NASA’s Aeronautics Research Directorate’s Fundamental Aeronautics Program, says “If we can’t solve the boom problem there is no sense working the other issues because the airlines won’t buy an aircraft they can’t fy wherever they want to fy” [Wilson, 2013]. Research is being done at, amongst others, NASA and Japan Aerospace Exploration Agency (JAXA).

Both for NASA and JAXA the sonic boom is a very important issue. At JAXA, their current project is the NEXST, National Experimental Supercruise Transport. Launched in 1997, the program is now in its second phase. The goals of the f rst phase were to acquire design technologies to reduce drag when cruising at supersonic speeds. A scale model of the design was tested in 2005 in Australia. The model, which did not have an engine, was accelerated to Mach 2.0 by a solid rocket booster. Launched to an altitude of 19km, the aircraft separated and f ew at Mach 2.0. The f light test confirmed that the design reduced Aerodynamic drag. The second phase of the program focuses on noise reduction, while maintaining aerodynamic performance. Numerical simulations and wind tunnel tests are being done to gain a better understanding of how the sonic boom is related to the aircraft confguration. However, in reality the sonic boom is also inluenced by the atmosphere, as Ohnuki, leader of the Supersonic Transport Team at JAXA, also states. To address this JAXA is planning a f light test, which will hopefully be conducted in the mid 2010’s [Ohnuki, 2012].

Alt NASA too a lot of research is being done with the N-2 and N-3 programs. N-2 focuses upon an 80-passenger vehicle, traveling at supersonic speeds with transatlantic range, which should reach a technology readiness level in 2025. The envisioned aircraft has to be able to operate with an environmental impact on par with that of current subsonic aircraft.

N-3 is a step further, reaching a technology readiness level in 2035. The N-3 aircraft is envisioned to be in the 100-to-200-passenger class and to have transpacific range. For NASA the focus is also upon reducing the sonic booms, with experiments already showing a much lower sound level than that of the Concorde.

THE FUTURE
With a lot of research being done, it is time to look at what the future might bring for travellers wanting to travel at supersonic speeds. One of the frontrunners of bringing supersonic travel back is Aeron. Aeron is working on the Aerion SBJ, a supersonic business jet capable of carrying 8-12 passengers at Mach numbers up to 1.6. Although this seems f uturistic, Aeron expects the SBJ to be tested and in service by the end of the decade. Another proposed future supersonic business jet is the HyperMach SonicStar. With a cruising Mach number of 3.6, it can transport 24 to 32 passengers at supersonic speeds. Announced in 2011 the SonicStar is expected to fly in June 2024. Both the SJB and the SonicStar promise to produce less noise and be more fuel ef cient than the Concorde. This would enable them to fy over land and to be economically viable. Richard Lug, CEO of HyperMach even boasts ‘The aircraft is six times faster than the Gulfstream G650 and you are still paying less for fuel’ [Andrews 2013].

Boeing and Lockheed Martin together with NASA are also working upon larger supersonic aircraft. Both companies are working on aircrafts for NASA’s N+3 program. Although these aircraft would truly be a ‘Son of Concorde’, it will still be years before these aircraft reach the market, if ever.

Although all concepts sound promising, they still have to get off the shelf and into the air, something the Concorde achieved 44 years ago. Only time will tell what is going to happen, but for supersonic travel, the future seems promising.

References

Aviation Department
The Aviation Department of the Society of Aerospace Engineering Students ‘Leonardo da Vinci’ ful lls the needs of aviation enthusiasts by organising activities like lectures and excursion in the Netherlands and abroad.

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