SILENT AIRCRAFT INITIATIVE

Noise is always unpleasant and sustained levels of noise for long hours is a health hazard. Aircraft noise is one that falls in this category which is about 120-140 db. Hence it is a major barrier which denies expansion of airport operations to urban areas. Since the aircraft noise reduction has flattened out, further reductions become harder to achieve without a concerted effort. Silent Aircraft Initiative (SAI) was started with a partnership between the University of Cambridge and MIT and a host of aerospace partners, which include industry, airline and airport operators, policy makers and academics in 2003 to reduce the aircraft noise by making the reduced noise as a primary design criterion. The conceptual key project is "Silent Aircraft eXperimental" design SAX - 40. The aircraft's estimated noise level is to be less than background noise of a well populated area with a predicted 23% fuel burn reduction compared to current civil aircraft . For details on the initiative, various sources of noise and the SAX 40 refer [1-6]. Various sources of noise and the SAX40 are shown in Figs (1) and (2) respectively. SAI design is for an aircraft mission of 215 passengers with a range of 5000 nm at a cruise Mach number of 0.8.

Some of the key features of the design are:

- An overall shape integrates body and wings into a single flying wing.
- Flaps or hinged rear sections are a major source of airframe noise during plane take off and landing. Elimination of these will result in both the body and wings providing lift, allowing a slower approach and takeoff, which would reduce noise. This shape also improves fuel efficiency.
- Engines embedded in the aircraft with air intakes on top of the plane rather than underneath each wing. This screens much of the noise from the ground.
- The engines are placed well inside the ducts, which are equipped with extensive noise dampening layers. By the time the engine noise escapes the ducts, it has already been significantly absorbed
- A variable-size jet nozzle that allows slower jet propulsion during takeoff and landing but efficient cruising at higher speeds.

Noise Level

The aircraft maximum noise is estimated as 63 dB, comparable to background noise in urban daytime environments

Fuel Efficiency

There is major fuel saving predicted relative to current civil aircraft. The conceptual design specifically targeted to minimize fuel consumption and emission could result major saving. The engine exit nozzle is adjusted for optimum efficiency throughout cruise.

The goal of SAI is producing a commercial fleet of new airplanes by 2030.

References

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3. The Silent Aircraft Aero-Astro Annual 2006-2007, MIT, USA.

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5. Ann Dowling and Tom Hynes., "Towards a Silent Aircraft" Lecture for RAeS, DGLR, VDI and HAW, 2008, The Royal Aeronautical Society, Hamburg.

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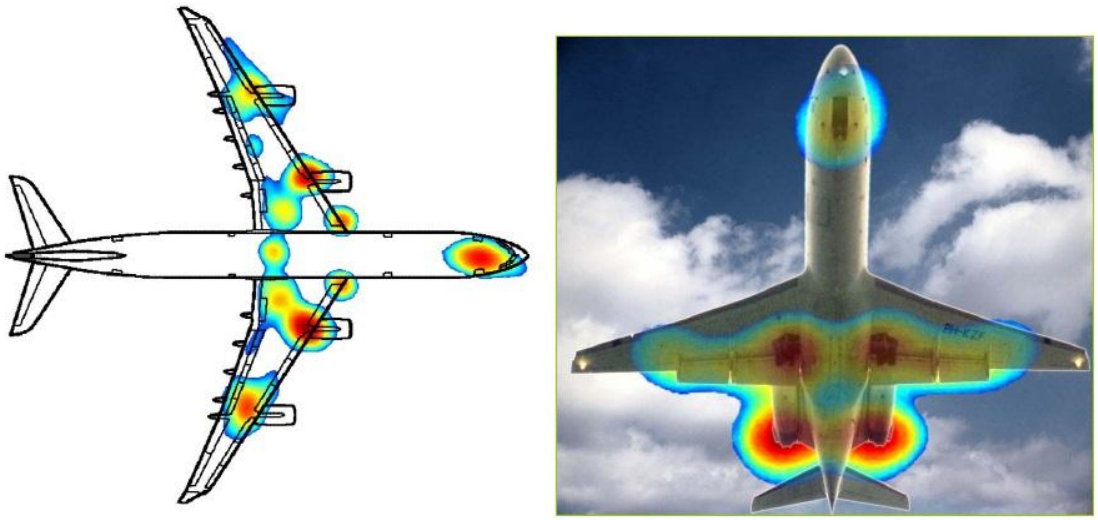

Fig 1. Aircraft Noise Source Detection

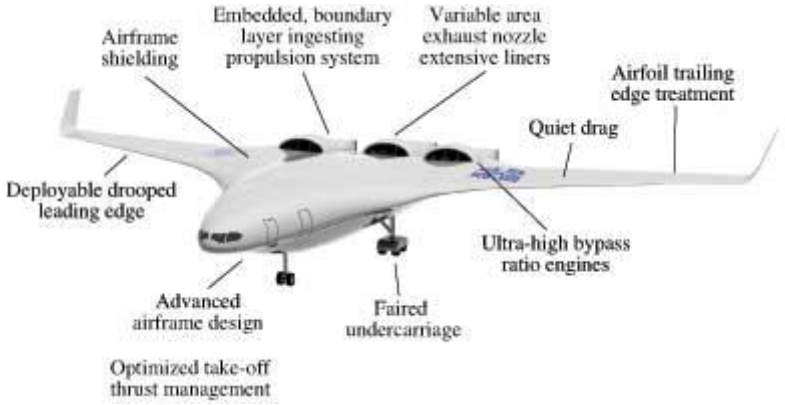

Fig 2. SAX 40