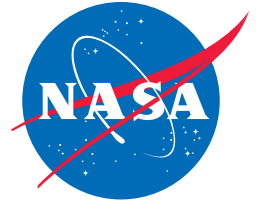


Fact Sheet

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-2199



FS-2002-09-73-LaRC

Reducing Aircraft Noise to Improve Our Quality of Life

NASA's Quiet Aircraft Technology Program

As airports, terminals and the skies become more crowded, the noise generated by jet-powered aircraft is a major issue. Even though some progress has been made in reducing commercial air transport noise, the public outcry against aircraft noise continues to grow. Additionally, noise issues are critically constraining the growth of the air transportation system by delaying, restricting and sometimes prohibiting the expansion of needed airport capabilities including runway additions, expansions and new airports. The demand for dramatically reduced aircraft-related noise will continue until public expectations are met.

Airport noise abatement projects, including sound insulating homes and schools in highly-impacted communities, have been relatively limited in their ability to satisfy the public's concerns. These programs provide limited relief while people are indoors, but do not mitigate noise for outdoor activities. The key is to reduce the noise impact at its source...the aircraft.

NASA's Vision for Quiet Skies and Airports

NASA's vision for quieting our air transportation system is to develop technologies that will keep the objectionable aircraft noise contained within the airport boundaries. Once this vision is achieved, airports will become valuable community assets, improving national commerce and accessibility. On the way to achieving this vision, NASA's goal is to reduce the perceived aircraft noise levels by half in 10 years, and by three-quarters in 25 years, using a 1997 baseline. That ambitious noise reduction goal can only be attained by developing new technologies that will di-

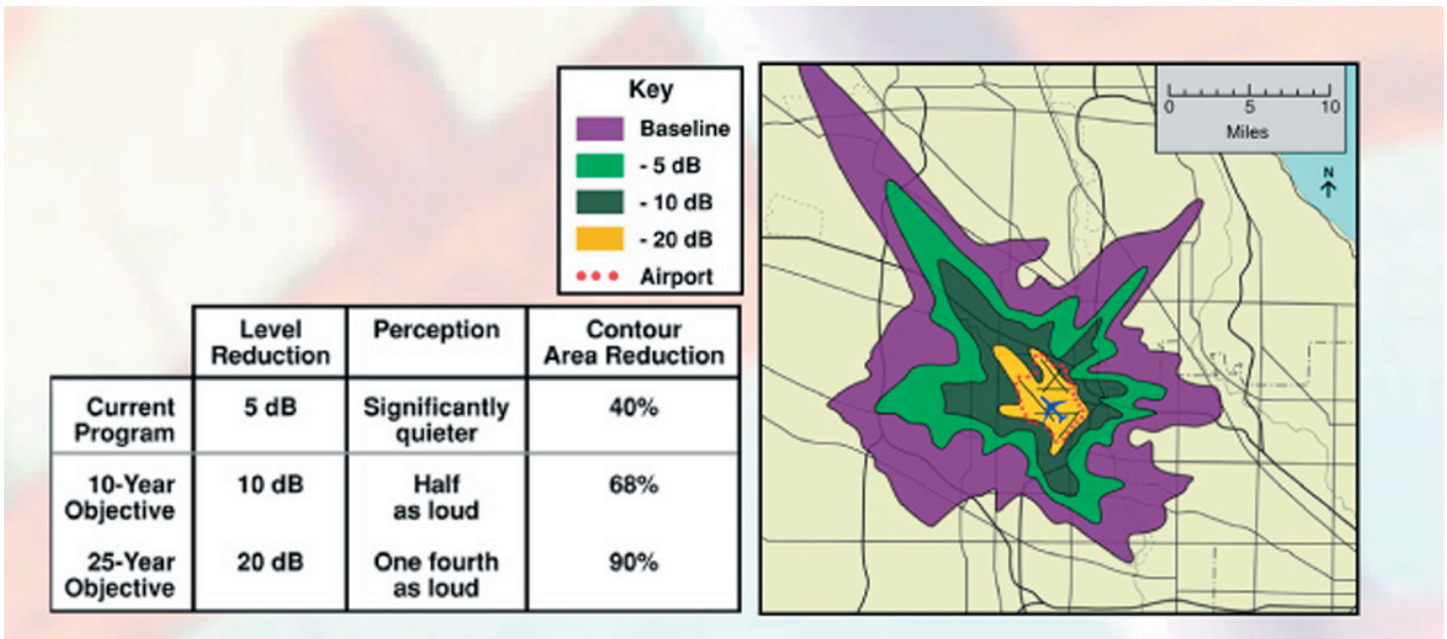
minish aircraft source noise (the engine and airframe) as well as how aircraft are flown around airports.

NASA Quiet Aircraft Technology (QAT) program focuses on three critical noise areas:

Airframe Systems: On takeoff, engine noise dominates what people hear. However, modern aircraft, such as the Boeing 777, have already incorporated noise reduction technologies so that on landing, the airframe and engine are nearly equal contributors to the perceived noise. An airplane's landing gear is the primary source of airframe noise. Noise is generated as the gear doors are opened and the gear extends into the airstream. The slats on the leading edge, or front of the wing, and flaps that extend from the trailing edge, or back of the wing, also greatly contribute to aircraft takeoff and landing noise. Research is underway to examine and redesign the protruding parts of an aircraft to make the airflow around them less turbulent and quieter.



Scalloped edges around engine nozzle mix the jet exhaust and reduce noise.



NASA's noise reduction goals are illustrated in this graphic representation of the noise footprint around an airport.

Engine Systems: Engineers have studied changing the angle of fan blades and of the stator blades behind the fan in jet engines to reduce noise. Engine inlets have also been redesigned and noise-absorbing treatments in the inlet have been improved to help keep more of the engine noise confined inside the engine. Engine nozzles, at the back of the engine have been redesigned to have a scalloped, or “chevron” configuration, which has been shown to dramatically reduce jet noise.

Aircraft Operations: Research is underway to explore ways to fly aircraft around airports so that the noise will have a minimal impact on the surrounding communities. Not only do the “low noise” flight paths need to be defined, taking wind, temperature and other atmospheric conditions into account, but tools also must be developed so that pilots are able to safely fly those paths, and controllers can integrate those paths with a minimal impact to the capacity of the airport.



Landing gear, slats and flaps are the primary source of airframe noise

Change Does Not Come Quickly

It takes almost 20 years for half the worldwide commercial aircraft fleet to incorporate a new technology, and almost 40 years for 100% implementation. In order to reap the full benefit of a specific noise reduction technology, a majority of the fleet must incorporate the new technology. By 2010, the economic life cycle of the majority of the existing US commercial fleet will be approaching its end and nearing replacement. That creates an opportunity at the end of this decade to have a major influence on the future noise impact of our air transportation system. New airplanes being produced to replace aging airplanes, as well as to accommodate the projected growth, will control the noise impact of our air transportation system for decades to follow. Noise reduction technology development is critical early in this decade to ensure that these airplanes are as quiet as possible. NASA's Quiet Aircraft Technology Program is working toward that end.