

**RESEARCH.** The SILENCE(R) aircraft noise reduction research program has now been completed, with some very concrete results.

# FLYING IN SILENCE

**L**aunched in 2001, the SILENCE(R) research program came to an end in July 2007 with the large-scale validation of various noise reduction technologies for commercial jetliners. It was designed to investigate not only engine noise, but also the aerodynamic noise produced by the airframe and aerostructures.

"SILENCE(R) aimed to prove the maturity of these technologies, paving the way for development and then practical applications," explains Eugène Kors, coordinator of the SILENCE(R) program at Snecma, part of the Safran Group. The Advisory Council

on Aeronautics Research in Europe, or ACARE, has issued a very ambitious noise reduction objective of 10 decibels from 2000 to 2020. SILENCE(R) should help us achieve 5 decibels of this reduction."

Noise is a highly complex phenomenon, as shown by the number and diversity of participants in SILENCE(R): a total of 51 companies and organizations, coordinated by Snecma. Research focused on four main areas: engines, nacelles, active noise control and aerodynamic noise.

## Beyond engines

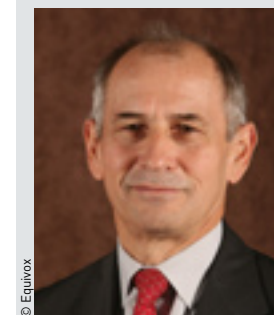
Snecma worked on engine and nacelle noise research, ranging from fan noise to air inlets, as well as new nozzle shapes. Two other Safran Group companies, Messier-Dowty and Messier-Bugatti, focused on reducing landing gear noise (from the structure, wheels, brakes and equipment) during the landing approach phase. "SILENCE(R) is the first major noise reduction program in which we took an active role," says Patrick Monclar, head of Research & Technology for the two companies.

R&D efforts over the last few decades on reducing engine noise have been so successful that noise from today's engines no longer cloaks the aerodynamic noise from landing gear and other parts of the plane. "We worked on short-term solutions," adds Monclar, "such as adding fairings to our current landing gear, and these were flight-tested on an Airbus A340. Looking further ahead we studied landing gear designs that integrate noise reduction. Wind-tunnel tests of a scale model demonstrated the potential benefits of this work."

Fellow Group company Aircelle was equally successful, with the development of a prototype for a low-frequency plug (the central part of the nozzle), a primary nozzle specifically designed to reduce combustion and hot jet noise. According to Christophe Thorel, head of R&T at Aircelle, "Ground tests of the plug and flight tests of the nozzle validated these concepts, developed in collaboration with Snecma."

Aircraft manufacturers are now taking a very close look at these areas of research, and the most promising

## VIEWPOINT



## "Both Snecma and the Safran Group rose to the occasion"

MICHEL LAROCHE  
SENIOR VICE PRESIDENT, AEROSPACE TECHNOLOGIES, SAFRAN GROUP.

### Europe helped fund the SILENCE(R) program. What are the European Commission's objectives for the aviation industry?

In addition to considerable government support in each country, such as provided by the DPAC (civil aviation program directorate) in France, the European Commission is fully committed to helping the aviation industry in member countries bolster their competitiveness. It's now clear that this industry creates wealth and brings a host of benefits to Europe. At the same time, these countries are very concerned about the environmental impact of air transport, and want to make sure that this impact is significantly reduced as the industry grows. The European Commission has therefore supported a "Strategic Agenda" setting out these goals, and industry has responded with very concrete research proposals.

### SILENCE(R) had some very concrete goals, but wasn't it also an opportunity to enhance the recognition of Snecma and the Safran Group?

Absolutely! Snecma is bolstering its image as a major European engine-maker, comparable to Rolls-Royce. Safran, the leading supplier of aircraft equipment in Europe, has the same objective. SILENCE(R) had to meet some major challenges, and

both Snecma and the Safran Group rose to the occasion. The European Commission took note of our excellent results, and our partners have expressed their satisfaction as well. In short, this major research program has helped us further burnish our image.

### Will there be a follow-on to the SILENCE(R) program?

Certainly, since European programs are generally geared to the long haul. SILENCE(R) was launched as part of the 5th PCRD framework research & development program. Then came the 6th, and today we are starting on the 7th PCRD - it's an ongoing research effort! The aim is not only to meet increasingly stringent environmental regulations, but also to anticipate them, if possible. Through a new program called Open Air, we will be working on technologies even further upstream.

And don't forget the national research programs. In France, after Maia and Inca, we are now participating in the Iroqua network for basic research in acoustics. Another major program has been launched by the French Ministry of Industry, concerning composites. Both Snecma Propulsion Solide and Aircelle are taking part, with a project for a high-temp nozzle incorporating acoustic treatment.

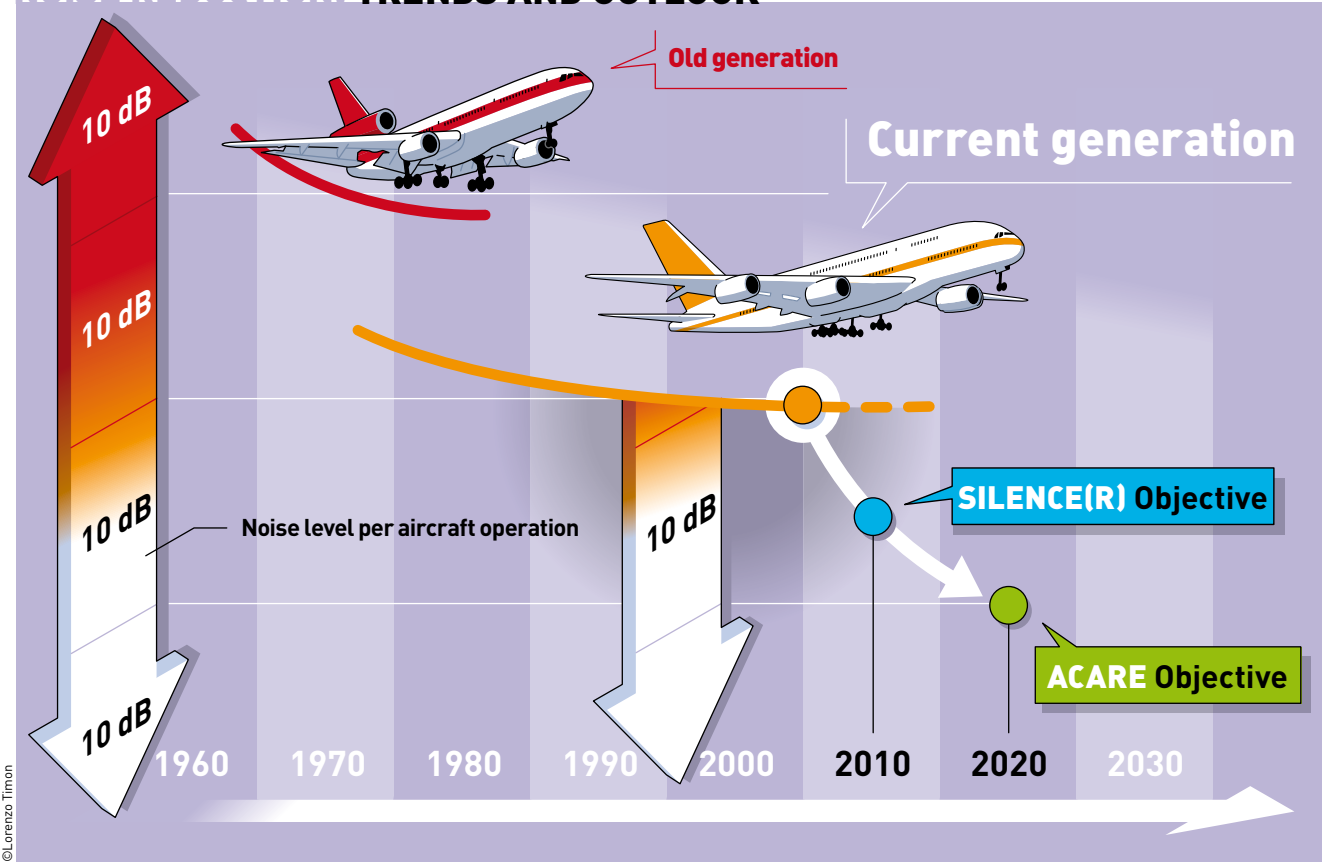
concepts could quickly lead to practical applications. With SILENCE(R) now completed, research is continuing through other programs\*, and the

magic number is still 10 decibels! ■

F. LERT

\* See the article "Clean Sky" on [www.le-webmag.com](http://www.le-webmag.com)

## NOISE REDUCTION: TRENDS AND OUTLOOK



### EUROPEAN OBJECTIVES FOR 2020

The European Commission has issued various recommendations which aim to make Europe a global leader in aviation, while also providing the best solutions for society as a whole. Certain objectives have been set for 2020:

- Decreasing fuel consumption per passenger-kilometer by 50% (20% through improvements to engines).
- Decreasing noise by 50% (ACARE objective), including all noise sources: aerodynamics, landing gear, engines, etc.
- Decreasing nitrogen oxide (NOx) releases by 80%.