



GE-SAFRAN, benchmark

More than 30 years ago, General Electric of the United States and Snecma (Safran Group) of France teamed up to create what would become the benchmark in commercial airplane engines, the CFM56.

A CFM56-powered airplane takes off somewhere in the world every three seconds – and every ten days, the CFM56 engine fleet logs an extra 1 million flight-hours! Building on their success, the two companies are already hard at work on the next generation. GE Aviation's President and CEO Scott Donnelly kindly agreed to tell us more about this partnership, which has become a textbook case of cross-border collaboration.

I think that one of the reasons for the CFM56's success is that it is based on a very simple worksplit. First of all, the work is physically split in two and each partner is responsible for its own parts and modules. This applies across the board, from design and development to engineering and production. Then there are two assembly lines – one in France in Villaroche and one in the United States in Cincinnati (Evendale plant) – serving the two customers Airbus and Boeing.

This relation has lasted for 33 years so far. Given its great success, it makes a lot of sense for us to continue teaming up.

Beyond the present 50/50 cooperation on the CFM56, do you have a project under way to address the needs of the next generation of single-aisle airliners?

In fact, the future in terms of an actual engine may seem many years away, but we are already working together on the post-CFM56 generation. We expect both Boeing and Airbus to develop replacements for their 737 and A320 families, and we realize that for our joint venture to continue to be successful, we need to develop the technologies and products to meet their requirements.

Given all the important performance characteristics that will distinguish

Safran magazine: You've already had a fruitful partnership with Snecma on the CFM56 for more than 30 years. What is this partnership all about?

Scott Donnelly: It reaches back to the early seventies when Snecma started as a subcontractor on the General Electric CF6-50. Snecma then became a risk and revenue sharing partner on the CF6-80C, and its subsequent variant, the CF6-80E. In the early 1970s, there emerged a need for an engine in the 10-ton thrust class. Snecma defended this idea, and in 1974 reached an agreement with GE to develop this type of engine.

“One of the reasons for the success of the CFM56 is the very simple worksplit.”

Scott Donnelly

Interview with Scott Donnelly, President and CEO, General Electric Aviation

BIO

1984
BACHELOR'S DEGREE, UNIVERSITY OF COLORADO (USA)

1989
MANAGER, GE'S OCEAN SYSTEMS DIVISION

1995
MANAGER, GE'S INDUSTRIAL CONTROL SYSTEMS BUSINESS

1997
VICE PRESIDENT, GENERAL ELECTRIC

2005
PRESIDENT AND CEO, GENERAL ELECTRIC AVIATION

the next generation of engines from the current CFM56, we have already jointly undertaken to conquer this market and invest in the technologies that will ensure continued leadership for CFM International. We are aiming for a lighter, quieter, environmentally-friendly engine that offers longer life and much lower fuel consumption. Meeting those goals demands a significant investment in research, technology, development and testing, now being conducted jointly by GE and Snecma through our Leap56 technology program. We are investigating two major possibilities, corresponding to two different engine architectures: the "traditional" turbofan design, which we believe can still be very significantly improved, with a targeted fuel burn improvement of at least 15%; and an open rotor type design, which could improve fuel consumption by a further 10% or 15%. We therefore hope to reduce fuel consumption by another 30% by the end of the next decade.

In view of current developments in geared-fan engines, what do you

think about this new technology?

A geared fan is not a new idea. This type of engine has been discussed for a long time and there are sound reasons for us not to favor it. If you look at a turbofan and ask yourself why this technology has been so successful, it is because of its fundamental simplicity and the elimination of metal-to-metal contact. In comparison, what bothers us about geared fans is that you're trading away all that turbofan simplicity and then taking all that energy, some 20,000 to 30,000 horsepower, just to push it back through metal-to-metal gears. This is highly illogical from the standpoint of both reliability and durability.

What the customer cares about is getting better economics in both fuel burn and maintenance costs. For the coming decade we can do a turbofan that offers superior performance in both these areas. When you talk about a geared fan, there is risk, but no reward. With the investments we are making, we will be able to deliver the fuel burn without introducing the risk.

What about GE and Safran's partnership on large engines?

GE and Safran have a long history of working together on larger engines. Snecma and Techspace Aero have a stake in the GE90 of almost 25%, and Safran also contributes to the GP7200. As for the GENx, Snecma decided early on to remain focused on its current programs and available resources, because we were already starting to talk about the next generation of smaller engines. However, Techspace Aero is participating in this engine program.

We are also still talking with Airbus to determine whether there is an engine that GE could design for the A350, and our engineering teams are trying to determine the feasibility of doing that. If and when we did that, of course Snecma would be – as they have always been – one of our partners that we would talk to about participating in such an engine. ■

JM. GUHL



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CFM56-7B.

LOOKING FORWARD

Marc Ventre, Executive Vice President of Safran, in charge of the Aerospace Propulsion branch.



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Marc Ventre and Scott Donnelly.

With more than 17,000 engines in service, the CFM56 is undoubtedly the most successful engine in the history of commercial aviation. It powers airplanes carrying nearly 3 million passengers a day. Our long-standing partnership with General Electric continues to bear fruit, as shown by the latest figures: in 2007 we booked orders for 2,700 engines, setting a new record.

But we can't afford to rest on our laurels, which is why CFM International is now focusing its energy on the future. For the last five years, teams from CFM partners Snecma and General Electric have been working on the research

& technology program Leap56 (Leading Edge Aviation Propulsion). The goal of this program is to identify and test the engine technologies needed for the next generation of single-aisle jetliners. It raises the bar very high indeed. In addition to reducing fuel consumption, noise and nitrogen oxide emissions, research teams are investigating ways of significantly cutting maintenance costs and increasing engine life.

Technology-environment tradeoffs

A decision must be made between the two main options: an architecture based on disruptive

technologies, or one similar to current engines. The application of a truly disruptive technology would enable a significant reduction in fuel consumption, and therefore in carbon dioxide (CO₂) emissions. Safran is contributing its considerable expertise to this research, and has already developed technologies that differ radically from current approaches. For example, it has developed fan blades using 3D woven preforms, and nozzles based on ceramic matrix composites.

Environmental concerns are a central part of all technological progress. As a manufacturer,

we have to find the best tradeoff between technological performance and environmental protection. Of course, this concern didn't just spring up overnight, and we have already made tremendous strides in this area. Our current airplanes are significantly less fuel hungry and noisy than the previous generation. Just to take one example, a modern plane consumes less than 3 liters of jet fuel per passenger per 100 kilometers. But this is only one stage in the process. Safran fully agrees with the objectives defined by ACARE, and is one of the leaders in the Clean Sky program.