Between 2020 and 2050, helicopter engines will undergo significant technological advances. These innovations are already in development at Safran Helicopter Engines. Its R&T Program Manager, Pascal Dauriac, outlines some of the major technologies that the company's design department teams are currently working on.

A twofold increase in power for a 40% reduction in consumption: helicopter engines have improved considerably over the past fifty years. And the progress continues: "The principles of additive manufacturing have revolutionized the design of parts that we would not otherwise have been able to produce, such as the fuel injectors of the rotating combustion chamber of the Arrano" explains Pascal Dauriac, R&T Program Manager for Safran Helicopter Engines. This technology has also earned Safran Helicopter Engines grand prize at the 2016 Safran Innovation Awards.

Discover the Safran Innovation Awards Grand Prize 2016

New concepts will further help to improve the performance of this new generation of engines.

Electric assistance for the engines

If manufacturing techniques are evolving, then design isn't far behind, especially with the introduction of electric assistance for engines. "We're working on several hybridization concepts that are currently at different stages of maturity and will hit the market in the next fifteen years", says Pascal Dauriac (see box).

For example, "eco mode" makes it possible to pause one of the two engines in cruising phase, generating fuel savings of around 15%. It is also possible to envisage an auxiliary electric motor that would provide additional power during acceleration and in emergency conditions. With this system, we can improve the margins of safety, but also reduce the weight (engine size and power are optimized to a bare minimum) and consumption. The first turbines equipped with this technology could be on the market by 2025.

Disruptive technologies

Safran Helicopter Engines is also working on more futuristic concepts, such as distributed propulsion. The total power produced can be distributed across multiple rotors, each providing a portion of the helicopter's lift. "We can see concepts in which the combustion engine, currently used, drives a generator that would produce the electrical power required to operate several rotors" explains Pascal Dauriac.

The implementation of these breakthrough technologies, which will be applied to the engines of the new generation of helicopters, is accompanied by the development of new electrical equipment that is more compact and lighter, such as electric motors. An area in which Safran Electrical & Power is one of the major players. This
Hybridization: Strength in unity

With the role of electric power expected to increase within all propulsion systems, hybridization is the focal point of research efforts at Safran Helicopter Engines. The principle? “To couple a combustion engine with an electric motor to assist in different phases of flight”, explains Pascal Dauriac, R&T Program Manager. This concept, which we’ve been working on for six years, also opens the way for architectures of combustion engines with optimized mass and consumption. When will we see a 100% electric helicopter engine? “Probably not before 2050”, according to Pascal Dauriac.