In partnership with GE and Snecma, Hispano-Suiza (Safran) is developing a system to incorporate an electric generator in a power transmission unit. This new generation equipment is part of the shift to a more electric aircraft.

Hispano-Suiza, a specialist in power transmission systems *(see box)*, has revolutionized this equipment by integrating the function of electric generation. Christened IGGB® (Integrated Generator GearBox), this innovative system drives all engine and aircraft accessories, with the additional advantage of providing electrical power to the aircraft, such as the power required to start the engine. Currently, the electric generator is an independent piece of equipment, cantilevered on the power transmission unit, whose dimension and mass entail significant constraints for its installation. "By incorporating it in the power transmission box, we get a better integration of components for greater compactness, weight and reliability", explains Samuel Becquerelle R&T development manager at Hispano-Suiza. "This power transmission system is particularly suited to the more electric aircraft of the future, enabling Safran to consolidate its leadership in this field."

Sequential development to maturity
IGGB was launched in 2009 and its technological demonstration is currently being finalized with TRL (Technology Readiness Level) milestones 5 and 6 reached. This benchmark system is widely used in the aerospace industry to measure the degree of maturity of a technology on a scale of 1 to 9, from the initial research-related milestones to operational development and production of the system.*

Two major milestones
Tests to reach TRL5 were conducted in November 2013 on the Copper Bird test bench**, a modular bench designed for the development and optimization of electrical systems. Performed in the presence of the project partners, GE Aviation System and Snecma, the test campaign demonstrated the compliance of the system. TRL6 was subsequently reached last February, the tests being carried out on a CFM56 engine at a Snecma production site in Villaroche. However, the development of the system is not yet completed: "We are continuing to incorporate feedback from various manufacturers and to refine this new equipment", says Samuel Becquerelle. "Our participation in the GENOME (GEstioN OptiMisée de l'Energie) research platform should help us: driven by Airbus, the purpose of this program is to promote new energy management architectures in the context of the more electric aircraft."

The success of this demonstration process makes this technology eligible for future engine and aircraft developments.

* The TRL scale contains nine levels, each representing a given technology's degree of maturity. Each step flows into the following ones, depending on the needs of the program: (1) Concept (2) Feasibility (3) Functional Model (4) Prototype (5) Bench tests (6) Ground tests (7) Flight tests (8) Entry into service, (9) User feedback.

**) Copper Bird (Characterization & Optimization of Power Plant & Equipment Rig) The power transmission system
Hispano-Suiza (Safran) is an expert in all aspects of power transmission systems implementation. This equipment is used to divert part of the engine's power to various other equipment necessary for the operation of the engine and the aircraft, such as the fuel pump or the electric generators. It is a complex and critical system that incorporates more than 400 component references spread over several subsystems: internal gearbox, step-aside gearbox, accessory gearbox and oil tank.