First flight by Sagem's aileron electromechanical actuator (EMA): the next step in "more electric" aircraft

An electromechanical actuator (EMA) developed by Sagem made its first flight at the beginning of the year 2011 as the primary flight control for the aileron on an Airbus A320 commercial jetliner. Sagem's EMA marks a major step forward in the development of "more electric" aircraft, and won the Safran group's Innovation Competition Grand Prize in April.

Earlier this year Sagem's electromechanical actuator (EMA) made its first flight as the primary flight control for an aileron on a commercial airplane. "The Airbus A320 pilots were fully satisfied with the operation of Sagem's aileron EMA during this first flight, lasting two hours and forty-five minutes," said Olivier Ruas, Research & Technology director at Sagem's Avionics division. "It also marks a major step forward in the development of the 'more electric' aircraft, a very timely response with airlines now expecting less fuel-hungry aircraft. Innovation is a key to the aircraft manufacturers' development strategy, as they seek to meet this economic and environmental challenge."

Exactly what solutions are these manufacturers expecting? According to Franck Bonny, head of the actuator program at Sagem's Avionics division, "One of the solutions being considered by Airbus is to replace hydraulic systems with electric systems, because that would generate major weight savings."

A STRONG COMMITMENT TO INNOVATION AT SAGEM AND SAFRAN

As a Tier-1 aircraft equipment manufacturer, Sagem, via its Sagem Avionics and Safran Electronics divisions, is taking an active role in the development of "more electric" aircraft. "Safran is heavily involved in this development, especially through our Group-wide AMPERES project," says Olivier Ruas. "One aspect of this project is the e-wing initiative, led by Sagem, that seeks to develop electric technologies and actuators for tomorrow's 'e-wing'. We are also teaming up with Airbus on the Covadis research project, designed to evaluate the in-flight behavior of electromechanical actuators on an A320."

The ultimate aim of this research is of course the A30X, which will replace the A320 towards 2025. According to specialists in this field, the advent of "plug & play" electrical systems will considerably reduce both cost of ownership and servicing time for new-generation jetliners. "It will also facilitate data processing and optimize maintenance operations, including repairs and troubleshooting," adds Franck Bonny. But engineers still have to be able to replace each hydraulic system by its electric equivalent. "We are focusing first on primary flight controls, because they have to offer high-level integration and operating safety."

SYNERGIES ACROSS SAFRAN

For the aileron EMA developed by Sagem, three years of intensive research were needed to replace each hydraulic function by an electric equivalent offering the requisite reliability. "We had to come up with an ultra-integrated design, calling on several patented innovations that fully capitalized on the special characteristics of EMA technology to fit all the same functions as for a hydraulic flight control in the limited space of an A320 wing. All in all we hope to increase service life four-fold using this solution," notes Franck Bonny.

Sagem's long, hard work culminated in April 2011 when it won the Safran Innovation Competition Grand Prize, awarded by Group Chairman and CEO Jean-Paul Herteman and Airbus President Fabrice Bregier. This major award recognizes the outstanding work by more than 200 Sagem staff working at different R&D facilities and centers of excellence, supported by Safran's network of experts and about thirty French and European subcontractors. According to Olivier Ruas, this project leveraged the broad range of industrial and technological synergies that characterize the Safran group of companies: "Sagem's smart actuator incorporates leading-edge expertise in power transmissions, sensors, electric motors, electronics, software engineering and materials. We achieved this major first along with Airbus thanks to our people's skill and efficiency."
The next step for Sagem and Airbus is the test flight of an "all electric" wing, including the primary EMA flight control, by 2015.

The EMA in action: see the video, "Airbus & Sagem, a successful joint effort"