SPECIAL REPORT

TOWARDS GREENER SKIES

Eco-responsibility is at the heart of Safran’s corporate strategy
Reflecting our long-term strategy, Safran continues to bolster our security businesses in different markets. We recently acquired 81% of General Electric’s Homeland Protection division, making our Group the world leader in imaging systems used to detect dangerous or illicit substances in luggage.

We also recently celebrated the delivery of the 20,000th CFM56 engine, which mainly powers the Boeing 737 and Airbus A320 twinjets. This was a historic milestone, symbolizing the unprecedented success of this landmark turbofan engine. Created 35 years ago, the CFM partnership instigated a profound change in the course of civil aviation. Today, reflecting this adventurous mindset, our research efforts and investments are shaping industry over the next 30 years, not only in aerospace, but also in our other areas of expertise.

Just as we were going to press, Chinese aircraft-maker Comac selected Safran and General Electric, via their joint ventures CFM International and Nexcelle, to supply the complete propulsion system for the new C919 jetliner. This business win continues to validate our long-standing transatlantic collaboration. Its selection also gave the Leap-X a head start in the major engine competitions coming up in the next decade, particularly in the market for single-aisle commercial jets (over 100 seats) by leading Western manufacturers.
V-22 GETS IN GEAR

After the main gear, the nose gear! In August, Messier-Dowty (Safran group) delivered its first nose landing gear for the Bell-Boeing V-22 Osprey, for which it already provides the main landing gear. Messier-Dowty currently is under contract to deliver nose gear for 141 aircraft. Safran is extremely proud of its role in this unique aircraft: the V-22 “tiltrotor” can land, take off and hover like a helicopter, but then tilts its rotors forward to fly like an airplane. Through this latest contract, Messier-Dowty strengthens its position as a landing gear supplier to Boeing Integrated Defense Systems.

Jean-Paul Herteman, the new Chairman of Gifas

In 2008 Gifas celebrated the aviation industry’s 100th anniversary on the Champs-Élysées in Paris. Safran CEO Jean-Paul Herteman was elected chairman of Gifas (Groupement des Industries Françaises Aéronautiques et Spatiales), the French aerospace industry trade association, on July 9. In accepting the appointment he reiterated his commitment to meeting the associated challenges: “Given the fierce economic crisis and an unfavorable euro-dollar exchange rate, my efforts will be fully focused on helping all of our members overcome these difficulties and prepare for the eventual recovery.” Jean-Paul Herteman succeeds Charles Edelstenne, Chairman and CEO of Dassault Aviation, who held this position for four years. The Gifas chairman is elected from among the company heads who have been chairman of Gifas for four years. The Gifas chairman is elected from among the company heads belonging to the association. Three Safran company heads have been chairman of Gifas over the last 30 years.

Safran and General Electric Engine Chosen for China’s New Jetliner

At the end of December 2009, Comac (Commercial Aircraft Corporation of China, Ltd.) chose the Leap-X engine offered by Safran and General Electric, via their joint company CFM International, for its new C919 jetliner. Comac opted for a complete propulsion system, including the engine itself plus the nacelle (the housing that protects the engine and allows it to be attached under the wing) and the thrust reversers (which help brake the aircraft on landing). The 150-seat C919 is slated to enter service in 2016. Safran is also a candidate on other equipment contracts for this aircraft. Its selection for the propulsion system already represents total potential sales of $15 billion over the next 30 years. “The selection of the Safran-GE alliance on the C919 is the culmination of our strategy based on partnerships and operations in China reaching back over 30 years,” said Safran CEO Jean-Paul Herteman. “This latest success confirms Safran’s excellent position in the commercial aviation market, especially in the single-aisle jet segment.”

A Single Sight for Multiple Targets

During NATO’s “Belcoast 09” trials in October 2009, designed to assess new defense and homeland protection technologies, Sagem’s new multirole optronic sight, SAPS, made a very strong impression. Mounted on an all-terrain vehicle, it demonstrated its day/night, all-weather detection and identification capabilities with different threats: foot soldiers, snipers, light aircraft, drones, fast landing craft and vehicles. This data can then be shared between system operators and tactical command units, for situational analysis in near real time.
On Tuesday, December 15 at 10:27 am, two big jet engines spooled up on the runway at Paine Field in Everett, Washington, not far from Seattle. A few seconds later, a large blue bird climbed into the gray sky: the Boeing 787 Dreamliner had just taken off for the first time. With some 840 orders already under its belt, Boeing’s new long-range jet with the all-composite fuselage is already a striking success. Safran is playing a major role in this program, with contributions spanning the landing system, wiring, engine control units and engine. The 787 is slated to enter commercial service at the end of 2010.

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For engineers working on tomorrow’s engines it’s a real scientific and technological challenge to strike the right balance: the continued growth of air transport will depend on the development of airplanes that are lighter, stronger and environmentally-friendlier – but don’t cost any more to buy and maintain!” explains Claude Quillien, the head of materials and processes at Safran. To meet this challenge, the Group has a permanent workforce of over 50 researchers and technicians. They team up with well-known research labs, such as the Ecole des Mines de Paris engineering school, French aerospace research center ONERA and national scientific research agency CNRS, to develop new materials. Their task is to find solutions that will reduce structural weight, and replace certain parts made of titanium, nickel or steel-based alloys that are used on most engines today.

Since the early 1990s the focus has been on composite materials. Made of a “framework” of carbon fibers, strengthened by an organic matrix of resin, ceramic or metal, these materials considerably reduce engine weight. “On fan blades, composites can cut weight by up to 100 or 110 kilos, with an even greater induced impact on the aircraft itself,” says Bruno Dambrine, composites and materials mechanics expert.

**VIEWPOINT**

SHIGEHISA NAKA, DIRECTOR OF THE METALLIC STRUCTURES AND MATERIALS DEPARTMENT, ONERA (FRENCH AEROSPACE RESEARCH AGENCY)

“It’s a heck of a challenge!”

After joining ONERA in 1978, Shigehisa Naka quickly focused on research concerning new alloys. Along with his team, he worked on the development of single-crystal solidification. Since then, this revolutionary process has given rise to nickel-based superalloys that are now used to make the turbine blades on Safran engines. “In spite of all his experience, when faced with the current demands of aircraft manufacturers his immediate response is a cri du coeur, ‘It’s a heck of a challenge!’ But he’s not at all discouraged, in fact far from it. Firmly convinced that metallic alloys still harbor enormous potential, he is directing his teams to focus on three main areas for the future: an intermetallic alloy based on refractory metals such as niobium, which would increase the lifespan of parts subject to temperatures reaching 1,300°C; a higher performance version of his superalloy; and an intermetallic alloy such as titanium aluminide, far lighter than the nickel-based alloy used today.

Boosting propulsion efficiency

Organic matrix composites based on polymer resins cannot stand up to temperatures exceeding 200°C, so they will be used on the “cold” parts of the engine, namely the fan blades and inlet section. Tests of these components are planned for 2010 and complete engines should be flying by 2014. These composite materials are widely used in nacelles, the structure that surrounds and protects the engine, and attaches it to the airplane via a pylon. Ceramic matrix composites offer excellent temperature resistance – up to 1,100°C – and are therefore used on the hot parts of the engine, mainly in the nozzle and low-pressure turbine blades. They also offer excellent mechanical strength, based on a combination of silicon carbide fibers and a titanium matrix, making them the ideal material for the disks holding the blades, not to mention delivering significant weight savings.

Alloys still in pole position

Even though composites seem especially promising, Safran is also working on metallic alloys, which continue to progress by leaps and bounds. For example, a niobium/silicon-based alloy is used to make “refractory” composites that stand up to a temperature of 1,100°C. By increasing the heat-resistance of the high-pressure turbine blades, this new material will enable temperatures in the combustor to be increased, for greater engine operating efficiency.

“For the moment this alloy is still susceptible to oxidation, since we don’t have an appropriate coating, and nobody knows how to produce it at reasonable cost,” notes Jean-Yves Guiblot, an expert in metallic materials. The first engines equipped with turbine blades using this new alloy won’t fly until 2018 at the earliest. This may seem a rather distant date, but in fact for engineers it’s just around the corner. For engine-makers to deploy these new materials, they have to start revamping their design tools right now by integrating the specific characteristics of these materials, as well as identifying production methods that combine robustness and cost-effectiveness. Safran’s engineers will have their hands full indeed as they try to rise to these latest challenges.

Safran’s researchers are studying the new materials that will go into tomorrow’s aircraft engines. Stronger and lighter, these materials will help reduce fuel consumption and CO₂ emissions. **MATERIALS TO SHAPE THE FUTURE**
Eco-responsibility is an integral part of Safran’s corporate strategy, and is applied throughout the enterprise.

TOWARDS GREENER SKIES
What if going greener also meant increasing performance? “For us, environmental concerns are an integral part of any aeronautics research,” says Michel Laroche, Vice President for Research & Technology in the Snecma group. “In fact, our technology efforts have always focused on reducing engine weight and fuel consumption. Today, more than ever, these are the underlying principles behind our general research objectives, which strive to meet market expectations. We are working intensively to reduce the fuel consumption of turbine engines and make them friendlier to the environment, in line with the ACARE objectives for 2020.” (see “Viewpoint” opposite)

Tomorrow’s aircraft engines will be quieter and less polluting: not only the new LEAP-X, slated to replace the CFM56 in a few years, but also the SaM146 which powers the Superjet 100, Sukhoi’s new regional jet. The nozzle on this engine, designed and produced by Group company Snecma Propulsion Solide, reflects this two-pronged challenge. According to design engineer François-Laurent Buffenoir, “The nozzle’s main structure is an organic matrix composite, combining carbon fibers and a bismaleimide resin, which offers environmental benefits at two levels. First, the nozzle is 30% lighter than its metal equivalent, or 20 kilos less, which reduces fuel consumption. Secondly, it reduces noise, since the inner surface of the nozzle is in fact drilled with 160,000 tiny holes, ‘trapping’ the sound waves inside the composite honeycomb structure.”

A complex challenge
Scientists and engineers face a number of challenges in their quest to design engines that generate fewer greenhouse gases and other pollutants. They have to reduce fuel consumption, which means working on the engine combustion cycle and associated pressures and temperatures, reduce weight, and also cut polluting emissions such as oxides of nitrogen (NOx), which means revamping the combustor.

Turbomeca has achieved this goal on its Ardiden 1H1 turboshaft engine, designed for twin-turbine helicopters in the 5 to 7 ton class. A modified injection system, which redistributes air and fuel in the combustion...
Ecology and climate change are global issues, and solutions have to be found in synergy with all stakeholders,” emphasizes Marc Ventre, Safran Executive Vice President, Aerospace Propulsion branch. “Our full-fledged role in European research programs, especially Clean Sky, reflects our leadership position in the global aerospace industry.” As chairman of the Clean Sky steering committee, Ventre adds: “This research program was launched in 2008 as a public-private partnership, and enjoys equal funding from industry and the European Commission. Twelve European aerospace companies created this project, includ-

New materials
Another main research objective is the development of materials that resist higher temperatures, while increasing strength and reducing weight. “Composites are lighter, yet stronger, and they are another area of research excellence at Safran,” notes Michel Laroche. “Today composites are used in the fuselage and other structural components, as well as fan blades, nacelles and landing gear. They give us significant weight savings, and will therefore be increasingly used on both airframes and aircraft equipment.”

A number of tests are under way to validate the use of thermostructural composites, which maintain their mechanical properties even at very high temperatures. “We’ll use them in engine exhaust systems, and eventually in combustors and high and low-pressure turbines,” continues Laroche (see article on page 8).

Security businesses are also taking a long, hard look at various innovative materials. For example, the polycarbonate used by Sagem Sécurité (Safran group) as pages in ID documents is more environmentally-friendly than the previously used PVC. It also offers the considerable advantage of supporting laser engraving techniques, for even greater document security.

THE “MORE ELECTRIC” REVOLUTION
Offering lower total cost of ownership, greater propulsion efficiency and lower environmental impact, “more electric” aircraft are the future of the air transport industry. And Safran is taking an active role in this revolution. In short, the traditional hydraulic and pneumatically-driven systems are gradually being replaced by electrically-driven systems. This is already the case on the A380’s thrust reverser actuation and ventilation systems, and the brakes on the Boeing 787 Dreamliner.

For more information on polycarbonates, see the Media Section in Safran’s website: www.safran-group.com

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ParTnERSHIPs. Safran takes a lead role in many environmental projects. Whether in France or across Europe, the Group teams up with industry, academia and government to develop clean, sustainable air transport.

BRAINPOWER, NETWORKED!
ing Safran, Airbus, Thales and Rolls-Royce, and manage it along with the Commission.”

More than 70 companies, including about 20 small and medium-sized enterprises (SME), are associate partners in the Clean Sky JTI, along with 15 research organizations and 17 universities. Other partners will undoubtedly join this program by 2014.

Meeting the environmental challenge
“Clean Sky will help us meet the objectives set by the Advisory Council for Aeronautics Research in Europe, or ACARE,” explains Marc Ventre. “We are targeting a 50 percent reduction in C3 emissions and noise, plus an 80 percent reduction in NOx emissions for new aircraft in 2020, compared to the figures for 2000.” In addition to these objectives, Clean Sky seeks to foster the development of eco-design, while driving steady progress in “greener” production, maintenance and end-of-life disposal. Clean Sky has defined six major research subjects, in the form of Integrated Technology Demonstrators (ITD). Three of these concern the aircraft itself (smart fixed-wing aircraft, green regional aircraft and rotorcraft), and three cover general subjects (sustainable and green engines, systems for green operation, eco-design).

“The business is to generate value from aircraft that can no longer fly by deconstructing them,” says Philippe Fournadet, Chairman and CEO of Tarmac Aerosave. Safran is a partner in this new company, alongside Airbus SITA (Suez-Gaz de France group), Equip’aero Industrie and Aéroconseil. Based at the Tarbes airport in southwest France, the company boasts an unrivaled site: a 3,000 meter runway and a 9,000 square meter hangar stretching 40 meters high – big enough to house all aircraft types, including the Airbus A380 super-jumbo. Philippe Fournadet prefers the term “deconstruction” instead of the more traditional “dismantling.” Tarmac Aerosave carries out selective disassembly, starting with the pollution cleanup of the aircraft, then removal of all fluids: fuel, hydraulic liquids, oil and water. The aircraft’s systems and equipment are only removed at that point. “There are about a thousand assemblies on an aircraft that could be reused, once refurbished by an accredited repair shop,” points out Fournadet. “Once these assemblies are removed, we then start cutting up the airframe using a diamond-coated wire, lubricated simply with water. This is what I would call ‘green deconstruction, generating neither noise, dust, nor hot points. All in all, some 85 percent of the plane by weight can be recycled under economically acceptable conditions, in full compliance with environmental laws.”

A national program
Safran is also heavily involved in comparable efforts on the domestic front. The Civil Aviation Research Council, or Corac, was created in 2008 by Jean-Louis Borloo, French Minister of Ecology, Energy and Sustainable Development, as part of the Grenelle Environment Forum. It is the French equivalent of ACARE, and seeks to meet the same objectives. Corac’s mission is to define and implement innovative research and technology actions in France. Safran CEO Jean-Paul Herteman is a member of Corac.

“Safran has made a strong commitment to all areas where our expertise supports the development of environmentally-friendly air transports,” concludes Marc Ventre.
Solutions. The products and services offered by Safran are designed for optimum service life and energy consumption, which means reduced environmental impact and greater cost-effectiveness.

Combining Ecology and Cost-effectiveness

Ecology and profitability can in fact go hand in hand. This applies in particular to the aviation industry, and it’s a lesson that Messier-Bugatti has learned very well. The Group’s braking specialist has launched an initiative dubbed “eco-renovation”, which offers solutions that combine economy with ecological awareness. Take for instance the carbon brake designed for Boeing’s iconic Next-Generation 737 twinjets. These brakes cut weight by 320 kilos per aircraft versus conventional steel brakes, which reduces annual jet fuel consumption per aircraft by about 32 tons. On a fleet of ten Boeing 737-700s, for example, this generates savings of nearly $400,000 per year and reduces CO₂ emissions by 900 metric tons.

Moving to aircraft engines, the Tech Insertion standard now offered on CFM56 engines rejuvenates these best sellers through longer life on-wing, 5% lower maintenance costs, a decrease of 15% to 20% in nitrogen oxide (NOx) emissions, and a considerable decrease in fuel consumption. Likewise, the CPM9-3 Advanced Upgrade kit reduces fuel consumption on this engine and cuts repair costs in half. Daniel Chaubard, engine support manager at Snecma, explains: “Our recommendations on engine settings or compressor cleaning, for instance, help improve efficiency, and decrease consumption and emissions. But we go even further. During flight operations seminars, our consultants show best practices with pilots from our customer airlines to enhance operating efficiency.”

A winning approach

At Sagem Avionics (Safran group), the services offered to customers all reflect this same approach, “Our Analysis Ground Station, or AGS, which analyzes flight data, helps improve procedures and thus limits fuel consumption during the critical takeoff and approach phases,” notes LaurentBloch, sales & marketing director at SagemAvionics, Inc. “The data we collect also helps optimize the jet fuel reserve carried by the plane, and makes taxiing more economical as well, by using the engines more efficiently.” To take just one example, an airline was able to save some 343,000 liters of fuel over a period of ten months, meaning 1,895 fewer metric tons of CO₂ released into the air.

Raising eco-awareness

The Chihuahua plant also practices selective waste sorting, resuses paper that has been printed on a single side, and favors biodegradable garbage bags. This is a very promising sign in Mexico, where eco-awareness is only beginning to dawn. As Ana puts it, “Our employees realize the importance of meeting environmental challenges and have really embraced this initiative. They have become so involved, in fact, that they have even changed their everyday behavior. For instance, since selective sorting is not applied outside the company they bring their used batteries into the plant.”

Engagement: The Safran group continuously improves its environmental performance at all industrial sites. At Labinal’s plant in Chihuahua, Mexico, for instance, this approach has helped raise the ecological awareness of employees.

Eco-production in Mexico

V I P parking! Several staff members at Labinal’s Chihuahua plant have a special badge on their windshield that gives them access to a reserved parking space. But to wear this badge you don’t have to be part of top management at this Safran subsidiary specialized in aircraft wiring. All you have to do is “car pool” to work with at least two of your colleagues. Bearing the tongue-in-cheek name of “Autosardina”, this program encourages car pooling to limit CO₂ emissions during travel from home to work.

Ana Laura Duarte Diaz de Leon, the Health, Safety and Environment manager at the plant, explains that “Autosardina” is just one of the many sustainable development initiatives deployed on the site. “All of our restroom facilities have been revamped to reduce water consumption by 42 percent. And we have installed solar water heaters, thermostats, timers and air-conditioning control software.”

MEASURING SAFRAN’S CARBON FOOTPRINT

By 2050, developed countries will have to cut their emissions four-fold, which means an average annual decrease of 3% for all activities. Planning ahead to meet this challenge, the Safran group has set a goal of reducing its CO₂ emissions by 15% over three years. This ambitious initiative starts with each plant’s in-depth knowledge of its main sources of greenhouse gases. Last year the Group launched a program to measure its carbon footprint at some 40 sites. These measurements showed a total of 3 million metric tons of CO₂ equivalent generated by the Safran group in 2007 – the same amount as emitted by a city of 380,000 inhabitants.
High-temp, high-pressure production of Safran engine parts

IN THE HEAT OF THE FORGE
In 1895 Louis Seguin set up shop in the Paris suburb of Gennevilliers with about 40 workers. That was the birthplace of the Omega rotary engine, the first successful product offered by the company Gnome, the ancestor of Snecma, a Safran group company. Over a century later, some 1,400 employees now work on the sophisticated parts that go into the Group’s aircraft engines. From the CFM56 and SaM146 to the M88 and TP400, all of the Group’s aero-engines start their lives in the forges and presses of this historic site. But materials and processes have of course evolved over the last 100 years. Today, Gennevilliers offers resources and technologies that are unique in Europe, including powder metallurgy, single-crystal structures, isothermal forging, high-speed machining and micro-drilling. Safran Magazine takes a closer look at these forge and foundry facilities that turn out some 95,000 high-tech parts a year.

1. 80-TON DROP-HAMMER
   The part is shaped by the power of this 80-ton drop-hammer.

2. FROM FURNACE TO FORGE
   After being heated in the furnace, the rough disk is moved over to the 80-ton drop-hammer for forging.

3. CIRCULAR ROLLING PRESS
   Heated to over 1,100°C, the ring is then gradually enlarged on this 565-ton circular rolling press to provide its final shape.

4. 20-TON DROP-HAMMER
   The forge operator adjusts a heated ring that will be shaped by the 20-ton drop-hammer prior to machining.

5. GRINDING
   After the forging operations, the parts go to the finishing shop for grinding to remove surface defects and burrs.

6. FORGING
   A reactor blade that has just undergone precision forging is removed for cooling.
PARTNERSHIP: The success of China’s planned C919 commercial jetliner will depend on certain Western skills. Safran is leveraging its expertise to get in on the ground floor.

A FRANCO-AMERICAN HEART FOR A CHINESE BIRD

Safran has all the cards in hand to win contracts on China’s C919: 30 years of presence in the country, an excellent brand image and technical expertise spanning virtually all mechanical systems for the new single-aisle jet being developed by the Commercial Aircraft Corporation of China, or Comac. “We’re taking an integrated Group-wide approach to all requests for proposals (RFP) from Comac,” notes Jean-Luc Doublet, program manager at Safran. “The propulsion system contract that we just won is a specific case because it involved CFM (see box). For all other ‘work packages’, Group companies have proposed solutions under the auspices of Safran, which is acting as the single point of contact with our Chinese partners.”

In addition to the engines, Comac has defined four major packages for potential equipment suppliers, Sagem is bidding on the flight controls and avionics, Hispano-Suiza on electrical generation and distribution, and Labinal has also been in contact with Comac for the contract to supply the aircraft’s wiring. As for the landing and braking systems, “Messier-Dowty and Messier-Bugatti have submitted a joint proposal, via the future programs department representing the two companies,” notes Christophe Claise, director of future single-aisle aircraft programs at Messier-Bugatti and Messier-Dowty. “Messier is staking out a position as lead partner to the aircraft manufacturer, enabling us to reduce risks over the entire program, from the initial landing system design to its integration on the aircraft.”

Local partners
Messier-Bugatti and Messier-Dowty are teaming up with LOC (Landing Gear Company), a consortium that consolidates China’s landing gear capabilities, to propose a landing system for the new jet. LOC includes Huaxing (producer of wheels and brakes), the design office FAI (First Aircraft Institute) and LAMC, a machining specialist and long-standing partner to Messier-Dowty on other programs. The main equipment suppliers should be selected by the end of 2009. They will then have until September 2010 to refine their detailed designs during a collaborative working phase with Chinese engineers. Partnerships between Chinese and Western manufacturers will be a real advantage for the aircraft manufacturer. It is only logical that local industry benefits from the spectacular growth of Chinese air traffic. And it is to the advantage of Western system suppliers to draw on partnerships with Chinese counterpart, not only to be selected for this new program, but also to enhance their offerings. These alliances will be based on a judicious mix of workshares, allowing the end product to benefit from each partner’s expertise, while also protecting their technologies, and providing excellent opportunities for both parties.

VIEWPOINT
FABIENNE LACORRE, HEAD OF PRODUCT AND MARKET STRATEGY AT SNECMA (SAFRAN GROUP)

Engines, all wrapped up and ready to run...

“CFM had offered Comac a complete propulsion system, including engine and nacelle, a highly integrated layout that helps reduce weight and increase overall performance. Leap-X is a new-generation engine intended for tomorrow’s single-aisle commercial jets, and the C919 will be its first application. It is made of basic “building blocks” which already exist, including a new combustor and fan blades, for which demonstrators have already been validated in ground tests. A decisive advantage for CFM was its two parent companies’ strong industrial presence in China: both General Electric and Snecma have several production sites for aircraft engine parts, as well as services. More than 1,800 CFM56 turbofan engines are now in service with 20 Chinese airlines. The nacelle, a sort of engine “housing”, will be designed and produced by Nexcelle, the new joint venture created by Aircelle (Safran group) and Middle River Aircraft Systems (General Electric) [see page 32].”
C919: Safran’s equipment proposals

**EWIS (electrical wiring interconnection systems)**
- Safran is proposing an integrated engine/nacelle assembly via CFM International, the 50/50 joint venture between Snecma and General Electric. The engine would be a first application for the new-generation Leap-X, which increases efficiency without losing any of the reliability that has built the reputation of its predecessor, the CFM56. The nacelle will be supplied by Nexcelle, a 50/50 joint venture between Aircelle (Safran group) and Middle River Aircraft Systems.

**EPGS (electrical power generation system)**
- In addition to designing the landing gear, the Messier companies in the Safran group are staking out a position as a systems integrator, capable of supporting its Chinese customer all the way through certification.

**EPDS (electrical power distribution system)**
- Safran is proposing an integrated engine/nacelle assembly under the Safran Power label, to develop a comprehensive offering for the electrical distribution function. Although a new player in this area, Safran has no ambition to propose the avionics system.

**LGS (landing gear system)**
- The design of the braking system on the C919 is still open to discussion. An electrical system would undoubtedly be more innovative, but using conventional hydraulics would indicate maturity and proven reliability. No matter which option is chosen, Safran is ready to offer appropriate solutions.

**Subsystems and Equipment**

- **PFCS (primary flight control system)**
- **VTBS (wheels tires braking system)**
- **EPGS (electrical power generation system)**
- **EPDS (electrical power distribution system)**
- **LGS (landing gear system)**
- **OMS (onboard maintenance system)**
- **AIS (aircraft information system)**

**EWIS (electrical wiring interconnection systems)**
- Safran has focused its offering on the cockpit control system, a suite of control equipment for the flight deck, including flight, landing and engine (throttle) controls.

**Proposals**
- Proposal selected by Comac
- Pending proposal
- Offre en cours

**January 2010** _SAFRAN magazine_
C919 focus

C919 targets Chinese market

Will China always buy its commercial jets from Europe or the United States? Beijing’s answer is a resounding “no,” as it gears up for the entry of the C919 in a market dominated by the duopoly Airbus and Boeing. In fact, the Chinese domestic market alone will give this new plane a non-negligible market base. The projected global market for single-aisle commercial jets from 2017 to 2035 is about 15,000 aircraft, with China accounting for 17% of this total. Comac plans to use this domestic market as its springboard to become the world’s third leading aircraft manufacturer. The first flight of the C919 is slated for 2014, with service entry of the basic 168-seat version in 2016.

China is of course a highly strategic market in today’s global economy. Safran was ahead of the curve on this trend, since it has been developing local partnerships for nearly 30 years.

The “Middle Kingdom” is now the world’s second largest economy, trailing only the United States. Buoyed by its huge population, China continues to boost its fast-paced development with massive investments in a number of different sectors, especially aerospace. Several Western manufacturers are supporting this development, with Safran among the leaders.

The Safran group boasts more than three decades of industrial collaboration with China, a long track record that clearly reflects the high quality of the partnerships formed over the years. Turbomeca started things off in the 1970s by selling turbine engines to power Super Frelon helicopters. More recently, Sagem flight control equipment was selected for China’s future regional jet, the ARJ21.

In the aircraft engine market, CFM International has been just as successful here as in other areas of the world. Some 1,800 CFM56 engines are now in service in China, and this figure continues to grow. Over the next 20 years, China will account for about 20% of all single-aisle commercial jets sold worldwide.

In addition to its sales success, Safran has set up a number of joint research and production programs, solidly anchoring its presence in the Chinese market. The Group now has several joint ventures in China, with a total of nearly 700 employees.

Looking further ahead, Safran is also investing in training centers for mechanics and technicians, and has formed partnerships with the country’s leading universities. Safran has truly set down roots in China by planting numerous seeds, which should help it reap a bounteous harvest in the future.

INTERVIEW

JEAN-LUC DOUBLET, SAFRAN C919 PROGRAM MANAGER, SHANGHAI

Controlled development

From the industrial standpoint, how would you describe the collaboration between Safran and Comac?

Safran has to demonstrate its technical and economic credibility, but it also has to emphasize significant local content in its proposals, whether for the nacelles, landing gear, engines or wiring. For engine assembly, a dedicated assembly line will be set up with a Chinese partner. In addition to current arrangements, several partnerships will be established with Chinese companies, mainly for production, but also for part of the design work. This enhanced collaboration will ensure not only the success of the program, but also help us build foundations for the future by developing new supply sources in China.

How will you organize the joint work with Comac?

As our customer, Comac will have a very clear view of the different work packages under our responsibility. The dashboards will be totally “transparent”, and will enable daily tracking of development progress, the different milestones, any difficulties encountered, etc. This information will also be available to Safran management, which will share an overall vision of the C919 program with Comac, thus facilitating high-level exchanges.

What does this mean in practical terms?

We will have an array of highly visual dashboards, concerning timetables, costs, allocation of resources and customer satisfaction, all kept up-to-date through regular meetings with Comac teams at different levels of responsibility. A control room based in Shanghai will centralize and summarize all information we receive.

Safran FLYING HIGH IN CHINA

T he C919 targets Chinese market.

A delegation from Comac met the heads of Safran in July 2009 and visited various Group facilities, such as the Messier plant near Paris shown here. They got a first-hand look at Safran’s scope of expertise as a top-tier player in aircraft propulsion, equipment and electronics.

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PROPULSION. Safran continuously improves the M88 engine powering the Rafale fighter to keep pace with customer expectations.

MORE POWERFUL, MORE ECONOMICAL ENGINES FOR THE RAFALE FIGHTER

The Safran M88 engineering department knows this powerplant inside out. These engineers offer all the skills and expertise needed for a state-of-the-art fighter engine, and are used to working closely with the French armed forces that deploy the Rafale multirole fighter. Week after week, they analyze the rich lode of data generated by the aircraft’s missions. “Feedback from this M88 fleet – now totaling over 100,000 flight-hours – flows directly into the current and future developments of this engine, and also helps bolster its reliability,” notes Jacques Dufau, M88 engineering manager at Snecma.

Solid foundations
The next major upgrade to the engine is the M88 TCO Pack (total cost of ownership package), addressing operational requirements of French armed forces. “Our customer, the French government, wanted to retain the same thrust but improve the engine’s operating life and maintainability,” explains Dufau. Safran’s engineering teams responded by drawing up the specifications for this upgraded engine.

“The development of the new version was built on very solid foundations,” points out Marcel Charrier, M88 TCO Pack program manager. “We don’t start anything unless we’re sure that the technology is mature. In this case, about 20 percent of the engine will change, including the rear section of the high-pressure compressor and the high-pressure turbine. We largely revamped the propulsion.

Safran continuously improves the M88 engine powering the Rafale fighter to keep pace with customer expectations.

more PowerFuL, more economicAL engines For the rAFALe Fighter

In sync with the customer
Over the last six months engineering teams have made several trips to the United Arab Emirates, a potential Rafale customer. At the 2009 Paris Air Show in June the UAE indicated that they would like an engine in the “9-ton” thrust class (20,000 lb), rather than the current 7.5 tons (16,500 lb). “Before kicking off the development of a new engine we first try to understand the customer’s requirement and optimize the engine for the specified range of missions,” explains Jacques Dufau. It should take only about 36 months to develop a new “M88-X” incorporating the advances of the TCO Pack. “Studies are underway,” says Bruce Pontosteau, M88-X program manager. “And they are focusing on an enhanced low-pressure compressor. At the same time, we’re working with Dassault to integrate the engine in the airframe, including several changes around the air inlets.” But even this new initiative won’t signal the end of M88 developments, since this engine still harbors room for improvement over the many years of service that stretch out ahead.

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“Everything is proceeding perfectly. We started ground tests of the first of five engines needed to develop the TCO Pack variant, and right from the second day we achieved full thrust!” We will need about two weeks of testing to check the engine’s mechanical integrity and acceleration, so we can gradually adjust the fuel control laws. We’re already very satisfied with temperature readings, since they’re fully in line with our predictions. The engine will then undergo testing in a simulated altitude chamber to simulate actual conditions and its ability to restart under these conditions. At the same time, a second engine will be installed on a test rig for mechanical endurance tests, operating for the equivalent of more than 1,600 hours of service use (about eight years). The following engines will then be used for vibration tests and flight testing.”

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STRATEGY. Aircelle is multiplying alliances with industrial partners in an effort to quickly bolster its presence in international markets.

**NACELLES, OR THE ART OF PARTNERSHIPS**

Aircelle, the nacelle specialist in the Safran group, has taken to heart the old adage, “In union there is strength,” by forming alliances with two major players in the global aviation industry, General Electric and Air France Industries. “These new joint ventures reflect two different logic,” underscores Vincent Mascré, head of Aircelle. “The former enables us to pool our research resources, while the latter bolsters our service business.”

The aim behind the creation of Nexcelle. “We are gearing up for the next generation of single-aisle commercial jets by uniting our industrial and commercial strengths. Based on the collaboration agreement between Nexcelle and CFM International, we are ready to contribute to tomorrow's highly innovative integrated power plant systems, comprising engine, nacelle and pylon.”

There are a number of opportunities: China’s C919 single-aisle jet (see previous article), the Embraer KC-390 military transport, and of course successors to the Airbus A320 and Boeing 737 twinjets. “In addition to continuing our historic partnership with Airbus,” notes Vincent Mascré, “we are staking out a position with aircraft manufacturers in emerging countries and we hope to win at least one nacelle contract from Boeing. The partnership with MRAS gives us solid foundations in the United States, an advantage not only in terms of expanding our geographic footprint, but also allowing us to work with a partner in the dollar zone.”

A win-win partnership

Other reasons lie behind the creation of Aerostructure Middle East Services, or AMES, a joint venture of Aircelle and Air France Industries. As Aircelle head Vincent Mascré explains, “We want to double the share of our total revenues generated by services in the next five years.” Since it’s very hard, perhaps impossible, to achieve this target through organic growth alone, Aircelle wanted to team up with a recognized service provider. “Our in-depth knowledge of this type of equipment attracted Air France Industries, and they were able to give us access to the Middle East market through their broad sales & marketing network,” adds Mascré. “We're also attractive to them as an OEM, or original equipment manufacturer.”

The first step in this collaboration is opening a nacelle repair unit in Dubai. This is in fact a strategic location since it’s a global hub at the crossroads between East and West, and above all because it’s at the heart of the United Arab Emirates, which has a large fleet of long-haul aircraft. Whether or not they use Aircelle products, this fleet will benefit from the technical expertise and local presence of AMES.

“We've already in negotiations to create other joint ventures in international markets,” notes Mascré. “These will be partnerships with recognized companies, targeting very specific areas.” By forming joint ventures around the world, Aircelle will forge a powerful network enabling it to meet ambitious goals.

**INTERVIEW**

**BRUNO DELILE, SENIOR VICE PRESIDENT, INDUSTRIAL AND BUSINESS DEVELOPMENT, AIR FRANCE INDUSTRIES (AFI)**

**Innovative solutions**

Why did you create this joint venture with Aircelle in the Middle East?

Under current conditions, operators in the Gulf region are looking for innovative solutions that combine local presence and reduced costs. Our project to set up a Dubai-based repair shop perfectly addresses these requirements.

How will you carry out this link-up with Aircelle?

We’re used to working together, in fact, and the two partners will bring to the table complementary areas of expertise and similar cultures. AFI deploys a solid sales & marketing force, along with certification enabling us to develop new repair procedures. Aircelle enjoys a very strong presence in the market for new-generation nacelles.

What about AMES’ local facilities?

In fact the setup in Dubai will have about 40 people once we hit cruise speed, only two of whom are expats. But it will of course call on the repair entities of its two parent companies for support: AFI’s Le Bourget facility and the Pont-Audemer plant for Aircelle.

For more information, see the Media Section in Safran’s website: www.safran-group.com

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SERVICES. Airlines have to record their flight data. But this same data can also become a source of savings – as Safran shows with its eGDM service offering.

FLIGHT DATA UNDER CONTROL

KEVIN BOTTEMILLER, DIRECTOR OF SAFETY/SECURITY AND REGULATORY COMPLIANCE, SUN COUNTRY AIRLINES

eGDM according to Sun Country

“We contacted several FOQA [Flight Operational Quality Assurance] service providers, and Saagem’s eGDM services best matched the needs of a small airline. The data collected through this system will enable us to enhance flight safety within the scope of our safety management program, to be implemented very shortly. In practice, each quarter we target different airports to identify any difficulties during the approach phase. Crews are then informed of the results of the analysis via a newsletter. Other aspects we study include aborted takeoffs, go-arounds and activation of the GPWS [Ground Proximity Warning System]. Let me give you a concrete example: after analyzing the data for one airport, we saw that it was impossible to reduce landing risks – so we decided to stop flying there. Another advantage is that data storage is totally secure with eGDM, and this guaranteed confidentiality is crucial for our company.”

SUN COUNTRY AIRLINES AT A GLANCE

• Fleet of 9 aircraft: 7 Boeing 737-800 and 2 Boeing 737-200.
• 32 destinations in the United States, Mexico and the Caribbean.
• Hub: Minneapolis-Saint Paul International Airport, Minnesota.

Online analysis

The process kicks into gear as soon as the engines are switched off. Saagem’s ACM5 unit transmits all flight data to a data center via a 3G link. After processing, this data is immediately made available to customers via a secure Internet connection. Several levels of service are available, from the simplest, including the mandatory flight reports for civil aviation authorities, to the most sophisticated, enabling the creation of personalized reports, flight monitoring and even pilot training aids.

“For a fixed monthly fee, the airline gets all the information it needs for efficient fleet operation,” notes Philippe Arnaud. Among other advantages, this data supports a preventive maintenance approach: data from a plane that experienced an incident is compared with the data from other aircraft, giving rise to individual or grouped servicing, if needed. “Our system is the only one of its kind on the market, and it’s setting a new standard,” notes Arnaud with pride. One of the factors behind this success is Saagem’s synergies with the Safran group’s two engine-makers, Snecma and Turbomeca. Data collected from these engines supports high-value-added services, enabling, for example, the cost-effective application of a “power by the hour” maintenance contract.

“The service center at Saagem Avionics is the first building block in the Safran Global Data Services platform, which will be up and running towards the end of 2010,” says Laurent Bloch. In the meantime, about 40 aircraft were already fitted with eGDM at August 31, 2009 – and this number should increase to 1,500 by 2015.”
DEVELOPMENT. In early 2009, Safran resumed development of the Vinci cryogenic rocket engine, intended for the upper stage of an upgraded version of the Ariane 5 launcher, set for its first liftoff in 2016.

VINCI ON TRACK

Escaping the Earth’s gravity is no laughing matter, but Ariane 5 has largely proven its bona fides. The European launch vehicle needs three separate propulsion systems to carry out its missions, and Safran leads the development and production of all three.

First step: liftoff! This is mostly handled by the two huge solid rocket boosters, which provide some 90% of the total thrust needed for liftoff – as much as several nuclear powerplants! Two minutes and twenty seconds after T-0, they burn out and are jettisoned to lighten the launcher. The main stage Vulcain 2 engine continues to operate for another seven minutes, bringing Ariane 5 above the Earth’s atmosphere to an altitude of 150 kilometers. After using up all its propellants, the main stage also shuts down and separates, leaving the upper stage and its HM7B engine to take over for the next 20 minutes. It’s up to this stage to inject the satellite or satellites (Ariane 5 often launches two payloads at once) into their assigned orbits. Like the main stage Vulcain 2, the HM7B is a cryogenic engine fueled by liquid oxygen and hydrogen, which create thrust through combustion and then ejection of the hot gases at very high speed.

The future is spelled “Vinci”

Ariane 5 is the leader in today’s commercial launch services market, but it has to evolve to cope with the gradual increase in satellite weight and greater international competition. For that reason, Snecma, a Safran group company in charge of HM7B production, has also been working since 1999 on a successor, dubbed “Vinci.” Tests of the two demonstration engines from 2003 to 2008 validated the design choices. Based on these results, the European Space Agency’s ministerial-level council meeting in November 2008 voted to continue development of the Vinci engine for an upgraded Ariane 5 Mid-life Evolution (A5ME) model, that would be operational towards 2016.

“The primary objective for this upgrade is to improve payload capacity into geostationary transfer orbit (GTO) from 9.6 metric tons for the current version, to 11.2 metric tons on A5ME. Furthermore, the Vinci engine is restartable in space, enabling its satellite passengers to use less of their own fuel for the orbital positioning phase, and therefore extend their service life.”

More powerful, more flexible

The main improvements in the new Vinci engine address these trends. It will develop nearly 40,000 pounds of thrust, three times that of the HM7B, and offer a significant improvement in thrust-to-fuel consumption ratio. Vinci’s higher performance is due to a new combustion cycle that uses all the liquid oxygen and hydrogen in its tanks.

Also new on the Vinci is an extendible nozzle. As Emmanuel Edeline explains, “The hot gases from the combustion chamber expand in this cone-shaped nozzle. In a vacuum, the longer the nozzle the higher the speed of the exhaust gases, which gives us higher performance for the
same propellant consumption. The advantage of an extendible nozzle is that it takes up less space in the launcher, enabling us to save weight. After separation of the main stage the nozzle is deployed by an electro-mechanical system.” Last, but certainly not least, the new Vinci is capable of being reignited several times in flight.

“These are the main upgrades from the customer’s standpoint,” adds Edeline. “But behind them is a series of technological innovations based on twenty years of joint research with the French space agency CNES.” For example, the rotor on the hydrogen turbopump, operating at some 100,000 rpm, uses ceramic ball bearings produced at a rate of eight engines per year, with a typical life of about 3.2 million ID cards and 3,000 passports, we were ready for the elections. This major success will also facilitate Albania’s integration in Europe as well as the free circulation of our citizens in the EU.

Albania is now a democracy that wants to call on modern technologies on a par with those in Western Europe. In particular, its young, well educated population wants to see the world! However, the government first had to distribute identification documents meeting international standards to the citizens of this country.

That was the aim of the request for proposals (RFP) issued by the Albanian government in 2008. The requirement was for the production and delivery of about 1.2 million ID cards and two million passports. Sagem Sécurité (Safran group) won the contract in conjunction with a local partner. “We offered a comprehensive turnkey solution, covering finance, logistics, technical aspects and everything else. I don’t know of another solution offered anywhere in the world that’s as complete as ours,” says Philippe Cuisset, director of sales and marketing Europe at Sagem Sécurité. Absolutely! With a daily production capacity of 15,000 cards and 3,000 passports, we were ready for the elections. This major success will also facilitate Albania’s integration in Europe as well as the free circulation of our citizens in the EU.

“We pulled out all the stops to meet this deadline,” notes Jean-Alain Jouan, managing director of Aleat. “In just six months we hired and trained over 320 people to issue more than 1.5 million ID cards. It was quite an achievement.” As a result of this effort the election logged one of the highest voter participation rates in the country’s history, with no challenges. This type of comprehensive contract based on a concession could prove to be a model for other European countries.

**NEW ID FOR ALBANIA**

**INTERVIEW**

**FERDINAND PONI, ALBANIAN VICE MINISTER FOR THE INTERIOR**

What were the Albanian government’s requirements for ID documents?

We wanted to modernize and computerize our public records, by giving our citizens a new ID card. One of the challenges was to distribute as many as possible prior to our legislative elections in June 2009. The joint venture with Sagem Sécurité was undoubtedly the best way of meeting this objective.

Are you satisfied with the system deployed?

Absolutely! With a daily production capacity of 15,000 cards and 3,000 passports, we were ready for the elections. This major success will also facilitate Albania’s integration in Europe as well as the free circulation of our citizens in the EU.
ENGAGEMENT. Safran is a partner in “Women on the move”, an association that aims to encourage young women to pursue engineering and technical careers. Safran Magazine sketches a portrait of three of the Group’s “godmothers” who are supporting this initiative.

WOMEN ENGINEERS SPEAK OUT

The “glass ceiling” in the very masculine world of engineering is beginning to crack. Since September 2006, the French association Elles bougent (“Women on the move”) has offered young women students, from high schools, vocational schools, universities, or the first year of engineering school, a chance to meet women who are already working in the profession, one of whom may even become their “godmother”, or mentor. Safran’s corporate human resources department has supported this initiative since the outset, and Caroline Dubot, in charge of school partnerships and relations at Safran, is on the association’s board of directors.

For the Group, this is an excellent way of introducing young women students to its technical and scientific disciplines as early as possible, and encouraging them to pursue technical careers. It will also help meet Safran’s ambitious goal of making women 30% of new hires in the coming years.

At the same time, Safran encourages its women engineers to participate in these actions to raise awareness, in particular by becoming godmothers in the “Women on the move” association. Their role is to explain their jobs, support the younger women in making professional choices, and of course answer their questions and address their concerns. Below are short profiles of three of Safran’s “godmothers”.

YOLANDE BRAULT, 28, methods engineer in the engineering department at Snecma

Yolande Brault discovered the association during the Safran Discovery Days orientation event for new management staff in October 2008. She quickly decided to sign up. Although she has only participated in a single event, the initiative “100 girls, 100 godmothers, 100th anniversary”, at the 2009 Paris Air Show, she already has a number of projects. “I’d like to go directly into the high schools to meet with students. We have to change the ideas of young women and address their concerns about family life, because they consider this profession as one that will take up all their time.” Her present job was a natural outcome of her pronounced taste for all things mechanical. “I never really thought about the fact that there aren’t many women,” she admits. After taking technical courses at university, Yolande entered the SupAero engineering school (since merged with ENSICA to form ISAE), and then joined Snecma after graduation. “You shouldn’t be shy just because you’re a woman, nor deny your femininity. It all builds character!”

MARTINE MOYER, 51, head of the Biometric matching system program at Sagem Sécurité

Martine Moyer joined Sagem Sécurité’s border control department in July 2008. That same year she discovered the association during an open house at her alma mater, Polytechnique. Today, Martine Moyer is mentoring a student, as she explains: “It’s important for her to know how this business works. We should organize informal meetings to form real mentoring bonds, like ‘godmother looking for goddaughter’, or vice versa.”

Drawing on her own experience, Martine Moyer notes, “Today, there’s too much media pressure on parity, which raises doubts in young women. They’re afraid to get pregnant, afraid of not having enough time to spend with their family.” She also wants to emphasize that there are no more restrictions than in other sectors. “Professions like ours enable us to be involved in current history and to contribute to changing society.”

CHANTAL GRÉSILLON, 50, head of the center of industrial expertise in combustion, Turbomeca

A Turbomeca employee since 1986, Chantal Grésillion joined “Women on the move” at the 2007 Paris Air Show. “Like many other “godmothers”, she doesn’t mentor one young woman in particular, but gets involved through the association’s website. “Our relations are via the forum. I get requests for help in finding internships, questions on careers, or job openings at Turbomeca,” she explains.

Chantal Grésillion didn’t hesitate a minute in choosing an engineering career. Emphasizing that young women shouldn’t be scared of the sciences, she says: “Engineering schools offer a broad array of jobs as soon as you leave school, and also allow you to work in many different sectors throughout your career.” Based on her own career in engineering and production, she summarizes her experience: “You never get bored, and you’re always learning something new.”
**PATRONAGE.** It was a magical day at Villaroche on May 27, 2009 when the “Knights of the Sky” flew in to make dreams come true for a number of children, most of them disabled. Safran was not only a full-fledged partner in this operation, but its CEO even took the controls for the first flight.

**FIRST FLIGHT**

**LE CHEVALIERS DU CIEL ("Knights of the Sky")** is a French association of pilots who generously organize an aerial Tour de France every year, dubbed “Kids’ Dreams.” Each stage in their tour, they offer a first flight to disadvantaged children. One of the stages this year was at the Safran Aerospace Museum in Villaroche, near Paris, and the neighboring airfield. Eagerly awaiting their arrival were 146 youngsters, including 60 physically or mentally disabled children from three special education facilities in the region.

“One of the principles of this operation is to bring together ‘normal’ and ‘special’ kids,” explains Vanessa de Lauzainghein, head of patronage at the Foundation. “It’s the third project we’ve organized with Safran, and the smiles on everybody’s lips were eloquent testimony to our success.”

**HELPING HANDS.** To enter work-study programs. The Group supports these enthusiastic employees all the way through their degree and into the workforce.

**ELAN PROGRAM KEEPS DISABLED EMPLOYMENT ON TRACK**

**SAFRAN magazine _ January 2010**
Based in Brussels, the AeroSpace and Defence Industries Association of Europe brings together the national associations in four major sectors, namely space, defense, security and aircraft construction in the broad sense of the term. While ASD defends the interests of European manufacturers, it also acts at a more general level, with its Secretary General as chair of the International Coordination Council for Aerospace Industries Associations (ICCAIA), which represents industry associations from the United States, Canada, Europe, Japan and Brazil.

ASD plays a pivotal role in regulatory issues, for instance by making sure that proposed European Union regulations are consistent with the capabilities of European industry. It also helps conduct the Research & Development (R&D) and industrial teaming programs co-funded by the European Commission.

One of Patrick de Prévaux’s primary missions at ASD is to oversee the application of the European Commission’s 7th Framework Program for Research & Development (FP7), and prepare for the 8th Framework Program (FP8). He also coordinates ASD’s support for the Advisory Council for Aeronautics Research in Europe (ACARE).

Safran Magazine: How do you see the current crisis, its implications and possible escape roads?

Patrick de Prévaux: The cyclical nature of the industry is well known in our business sectors, but for the first time we are facing a much longer and deeper crisis than we have ever experienced. Over the last few months we have seen a collapse in the freight market, a strong downward trend in passenger traffic, postponed aircraft deliveries, etc. In other words, we’re a long way from seeing the light at the end of the tunnel. Furthermore, the low point is undoubtedly yet to come, mainly due to the high level of uncertainty concerning financing for aircraft to be delivered in 2010 and 2011. We have informed the European Commission of this, and they are once again negotiating actively with the European Investment Bank for financial aid to smaller enterprises and carriers. We are eagerly awaiting the results of these negotiations, which should be completed in early 2010.
Safran participates in major European research programs working on tomorrow’s “more-electric” aircraft. The Copper Bird test rig, for example, developed by an Hispano-Suiza-led team for the Power Optimized Aircraft program, is designed to demonstrate the maturity of electrical systems and technologies.

But a direct cash infusion for companies is not the only solution to emerge from this crisis. ASD, on behalf of industry, is also emphasizing to European institutions the absolute necessity of maintaining R&D efforts. From this standpoint, the implementation of FP7 and preparations for FP8 represent a crucial challenge. We are taking a very active role to ensure that research co-funded by Europe are maintained, or even amplified, then consolidated this trend. ASD supports ACARE to ensure that research co-funded by the Commission satisfies the needs of citizens and addresses the requirements of industry. For research to translate into technological advances incorporated in products that reach the market, industry stays involved throughout the technological development process: from basic fundamental research (and the EC considers this extremely important), to large-scale projects such as Clean Sky and Sesar.

What is ASD’s position on environmental issues?

First, remember that over the last 50 years aircraft have steadily improved their fuel efficiency, thanks to powerful research & technology efforts, and the resulting marked advances in aerodynamics, weight and propulsion systems. Aviation only accounts for about 2% of total CO2 emissions. Today, we are taking a more direct “citizen-oriented” approach: we have to shift into higher gear by developing another disruptive technology, similar to the introduction of high-bypass turbofan engines in the 1970s. Our aim is to develop the solutions – new materials, engine operation, flight management modes – that will drive this quantum leap in the environmental performance of aircraft, and of the air transport industry in general.

A landmark event took place at the end of the last year, namely the UN summit meeting on the climate in Copenhagen in December. Because of its position within the ICCAIA, ASD will play a unifying role, and will coordinate industry players on both sides of the Atlantic. Airlines, airports and air navigation services have a common vision based on ambitious objectives: to improve the energy efficiency of air transport by an average of 1.5% per year from now to 2020, thus cutting greenhouse gas emissions in half by 2050 (versus 2005). To achieve this goal, we will have to press a number of levers, in particular increase partnerships between industry, national governments and regional authorities. The impetus has been given, and one of the best examples in the Clean Sky research program, targeting the design of tomorrow’s green aircraft.

Another key project is Sesar, which aims to create a future Europe-wide air traffic control system. With this system, we could reduce the greenhouse gases generated by flights in Europe by about 10%. Both of these projects are public-private partnerships, jointly funded by the industry and the European Commission.

What’s the relationship between European and national research programs?

The European Commission supports an approach based on joint research programs, whereas industry and individual countries are more reserved, for two main reasons. First, coordination between the EC’s programs and those of each member state is already largely assured. Secondly, each member state wants to retain a certain research independence in order to protect its domestic industry.

Furthermore, the Commission already largely encourages collaborative research projects by co-financing them along with partners in each sector, including of course manufacturers. This has driven the creation of networks and broader collaboration between the different stakeholders. The creation of ACARE (a joint body combining politicians, agencies and industry) and the definition of a Strategic Research Agenda (SRA) first amplified, then consolidated this trend. ASD supports ACARE to ensure that research co-funded by the Commission satisfies the needs of citizens and addresses the requirements of industry. For research to translate into technological advances incorporated in products that reach the market, industry stays involved throughout the technological development process: from basic fundamental research (and the EC considers this extremely important), to large-scale projects such as Clean Sky and Sesar. This policy is necessarily guided by the viewpoints of manufacturers, who have to offer innovative, cost-effective solutions in fiercely competitive markets. And that’s ASD’s mission.

“Another key project is Sesar, which aims to create a future Europe-wide air traffic control system. With this system, we could reduce the greenhouse gases generated by flights in Europe by about 10%.”

But industry has to move in the same direction! Safran is clearly at the heart of European initiatives in this area: Michel Larochelle, head of R&T at Safran, was named chairman of ASD’s Research & Technology committee, taking over for Jean-Paul Herteman, Safran CEO. Marc Ventre, a member of Safran’s executive board, has been named head of the Clean Sky board, while Eric Dautriat, previously Safran Vice President, Quality, was named director of this Joint Technology Initiative (JTI). Not only is this “triple play” clear recognition of our Group’s expertise and leadership, it also amply illustrates our ability to unite all stakeholders.”
The CFM56 turbofan powers mainline commercial jets with more than 100 seats. Launched 35 years ago, it is equally produced by Safran and General Electric. The CFM56 is the world's best-selling commercial jet engine, with over 20,000 delivered to date and 500 airline customers. A CFM56-powered aircraft takes off every 2.5 seconds. Snecma and General Electric are gearing up for the next generation with a new engine, Leap-X, that will incorporate breakthrough technologies.

For more information see the websites for the joint venture (www.CFM56.com) and Safran (www.safran-group.com)