SOLUTION. To meet aircraft manufacturers' evolving requirements, Safran Group companies Messier-Dowty and Messier-Bugatti are teaming up on joint work packages that combine landing and braking systems.

TOWARDS INTEGRATED LANDING SYSTEMS

A basic new underlying trend is taking shape in the aircraft industry, but it will only come into its own when Airbus and Boeing replace their current single-aisle jets towards 2015 or 2020. Olivier Andries, senior vice president for strategy and development at Safran, explains: "Aircraft manufacturers today want to use a smaller number of suppliers, giving them responsibility for the design and production of larger equipment packages, so they can focus more fully on their core business of aircraft design and integration."

This trend has already gotten under way at Airbus. While the recently introduced A380 jumbo-jet was divided into about 150 work packages, the upcoming A350XWB aims to reduce this to 70, and the post-A320 generation will reduce this figure even further.

Giving suppliers a greater role

The aircraft industry was still relatively fragmented until recently, but the trend towards consolidation has made suppliers more mature. They are now capable of developing more complete, more complex systems and proposing real improvements. Aircraft manufacturers have therefore sought to reduce the number of work packages that go into their aircraft, not only at Airbus and Boeing, but also at Bombardier, Dassault, Embraer and COMAC (Commercial Aircraft Corporation of China).

There are a host of advantages for manufacturers in this approach. By assigning larger, more unified packages to a smaller group of suppliers, they have to deal with fewer interfaces. "This arrangement also gives suppliers greater leeway in proposing improvements at system level, instead of for single components," notes Paul Kremer, head of future programs at Messier-Bugatti and Messier-Dowty. "And it means that the two parties are in contact much earlier in the process, at a point when system architectures have yet to be frozen, so that it's easier to incorporate upgrades."

The Air Transport Association (ATA – trade association of the largest North American airlines) has identified about forty unified work packages on a typical aircraft. They are all identified by the abbreviation ATA plus a chapter number: for example, ATA27 for flight controls, or ATA24 for the electrical system.

Work package by Safran

The landing system (ATA32) is a prime focus in the trend towards fewer work packages. Safran is a world leader in this area through two companies: Messier-Bugatti for wheels, brakes and control systems, and Messier-Dowty, for landing gear and structures. Historically, the landing system was divided into five or six separate packages, but these have been consolidated in recent years. On the Airbus A350XWB for instance, Airbus chose the team of Messier-Bugatti and Messier-Dowty to handle a large part of the ATA32 work. And on the new Airbus A400M military

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The Airbus A320 is fitted with Messier-Bugatti wheels and carbon brakes, as well as the braking, steering and landing gear extension/retraction systems, plus the brake temperature/tire pressure monitoring systems. Messier-Dowty supplies all landing gear for this plane. On tomorrow's aircraft, the landing and braking systems will be integrated in a single work package – to be supplied by Safran!

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INTEGRATED LANDING SYSTEM

1. Landing gear extension/retraction system
2. Main and nose landing gear
3. Carbon and electric brakes
4. Wheel and landing gear monitoring
5. Work package advantages: efficiency, economy and integration

transport, this work is even more integrated.

"Aircraft manufacturers want even more highly integrated ATA32 systems because this is a very dynamic market, harboring a constant stream of innovative ideas, and they would find it hard to combine all these solutions if they came from different suppliers" notes Yves Leclère, Safran senior vice president, Aircraft Equipment branch.

However, while this enhanced system integration seems logical on paper, in reality it is very technically challenging. Landing gear and brakes are still very different disciplines, calling on distinct skill sets. Furthermore, manufacturers do not only want to assign larger work packages, as Yves Leclère explains: "They also want to give suppliers greater responsibility, and this depends on the acquisition of new skills, particularly concerning flight safety and certification tests."

Today, for example, Messier-Bugatti and Messier-Dowty are teaming up to meet this emerging requirement. A joint future programs department has been set up to support Safran's offering of integrated landing system packages for the next generation of single-aisle commercial jets.

Messier-Bugatti and Messier-Dowty have already submitted joint contract proposals, especially for business aircraft and single-aisle jets. For the Safran Group in general, this is a crucial challenge. "As for any significant change, the trend towards greater integration will drive changes in our sector," points out Olivier Andries. "Companies not selected as tier 1 suppliers on the next generation of single-aisle jets may well find themselves demoted to the minor leagues!" ■

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Safran makes the nose landing gear for the Airbus A380.

AN INNOVATIVE PACKAGE

Landing gear and braking systems offer a fertile field for innovation, spanning six different areas.

• Structure
Landing gear structural parts may be made of composites, or new metallic materials. Safran companies are also working on new coatings, to replace current materials with more environmentally-friendly products. Structural design will also increasingly call on powerful computer modeling systems.

• Electronics
The landing gear controls and actuators are still hydraulic, but they will become increasingly electric in the future, reflecting the trend towards "more electric" aircraft. Work is already under way on components and electronic control units capable of supporting harsher operating environments, with higher temperatures and vibrations.

• Brakes
As the world's leading supplier of carbon brakes for aircraft, Messier-Bugatti continuously improves performance through its work on friction materials and technologies. The company's Sepcarb®III OR is already the fourth generation of carbon composite for these brakes. Messier-Bugatti is also developing electric brake technology.

• Predictive maintenance and auto-diagnosis
Another major trend that concerns landing gear. While current systems monitor parameters such as tire pressure and brake temperature, the number of parameters will increase significantly, leading to full authority control systems. All data will be recorded, analyzed and sent directly to the flight deck or maintenance staff.

• Environment
Work is underway to reduce the acoustic signature of landing gear, as well as developing new taxiing solutions for energy savings.

• Extended integration
Studies are also under way to couple the landing gear with other functions, resulting in unprecedented performance gains.

SYNERGY. Consultants from Safran Conseil are currently on assignment at most Group companies. We take a closer look at this unique in-house consulting company.

SAFRAN'S IN-HOUSE CONSULTING TEAM

Safran Conseil is a consulting company created in 2004 to pool certain skills within the Safran Group. According to its chairman and CEO Françoise Descheemaeker, "We're a subsidiary that primarily provides services to all companies in the Group. We transfer and leverage expertise, while offering costs thirty to forty percent less than an outside service provider." Primarily employing engineers, Safran Conseil also aims to be an incubator of consultants with dual skills, covering both specific disciplines and the consulting services per se.

"Our offer is organized in five main areas: production/purchasing/services, development, organization, training, and methods," explains Véronique Bardelmann, consultant and head of management control. Safran Conseil continues to expand its scope of activity, while diversifying the type and size of its assigned missions.

"We are increasingly called on for cross-functional projects, to support organizational transformations," notes Françoise Descheemaeker. The company's consultants go into the field to support the deep changes under way, which may take up to two years. Today, the company is gradually opening its horizons outside the Group, as reflected in a recent contract with one of Safran's key partners. The aim is to meet three main objectives: develop business, diversify missions, and enhance expertise. "No matter what the job, Safran Conseil is an excellent support platform for structural changes in the enterprise," concludes Descheemaeker, underscoring the strategic role of this cross-functional organization.

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One example of how Safran Conseil supports the implementation of a Lean manufacturing approach: the reorganization of the thrust reverser assembly shop at Aircelle. The shop is shifting from separate workstations to a line approach built around the Takt time principle, which can be defined as the maximum time allowed to produce a product in order to meet demand (so that the pace of production is synchronized with the pace of delivery to customers).

Tailored training

For example, one Group company wanted to develop a "managerial continuous improvement culture" while also deploying competencies. Safran Conseil drew on its knowledge of corporate, economic and industrial environments to successfully carry out this project, demonstrating its strategic role. It applied the Lean Sigma approach to increasing industrial efficiency, with tailored training programs used in conjunction with a deployment scheme, spanning workers, management and the executive committee. ■

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