



# SAFRAN ROTORCRAFT SOLUTIONS

2019



## PROPULSION SYSTEMS

Safran Helicopter Engines

Safran Transmission Systems

Safran Electronics & Defense

## ELECTRICAL POWER SYSTEMS

Safran Electrical & Power

Safran Power Units

Safran Landing Systems

Safran Aerosystems

## LANDING AND BRAKING SYSTEMS

Safran Landing Systems

## AVIONICS SYSTEMS AND FLIGHT CONTROLS

Safran Electronics & Defense

## AEROSYSTEMS

Safran Aerosystems

## SEATS

Safran Seats

# SAFRAN OVERVIEW

SAFRAN IS AN INTERNATIONAL HIGH-TECHNOLOGY GROUP, OPERATING IN THE AIRCRAFT PROPULSION AND EQUIPMENT, SPACE AND DEFENSE MARKETS. SAFRAN HAS A GLOBAL PRESENCE, WITH MORE THAN 91,000 EMPLOYEES AND HOLDS, ALONE OR IN PARTNERSHIP, WORLD OR EUROPEAN LEADERSHIP POSITIONS IN ITS MARKETS. SAFRAN PURSUES A CONTINUOUS STRATEGY OF DIFFERENTIATION THROUGH INNOVATION AND UNDERTAKES EXTENSIVE ONGOING RESEARCH AND DEVELOPMENT PROGRAMS.

 **91,000**  
EMPLOYEES  
WORLDWIDE

 in nearly  
**30**  
COUNTRIES

 **\$18.5**  
BILLION IN SALES  
generated in 2017

## #1 WORLDWIDE

- ENGINES FOR SINGLE-AISLE COMMERCIAL JETS (in partnership with GE)
- HELICOPTER TURBINE ENGINES
- LANDING GEAR
- SEATS FOR COMMERCIAL AIRPLANES\*
- WHEELS AND CARBON BRAKES\*\*
- AIRCRAFT WIRING SYSTEMS
- HELICOPTER FLIGHT CONTROLS
- MECHANICAL POWER TRANSMISSIONS\*\*
- NACELLES FOR BUSINESS JETS

\* economy class seats for twin-aisle jets.

\*\* mainline commercial jets with more than 100 seats.

**8%** OF SALES  
INVESTED IN R&D

Safran applies a strategy based on innovation and continuous improvement in competitiveness, working closely with our suppliers and partners to address today's economic, societal and environmental challenges.

# SAFRAN'S COMMITMENT TO THE ROTORCRAFT MARKET

WITH DECADES OF EXPERIENCE IN AVIATION, SAFRAN MASTERS THE TECHNOLOGIES THAT MAKE ROTORCRAFT OF ALL SIZES FLY, FROM HELICOPTERS TO TILT ROTORS, IN BOTH CIVIL AND MILITARY MARKETS.



## AN UNMATCHED OFFERING FOR ROTORCRAFT

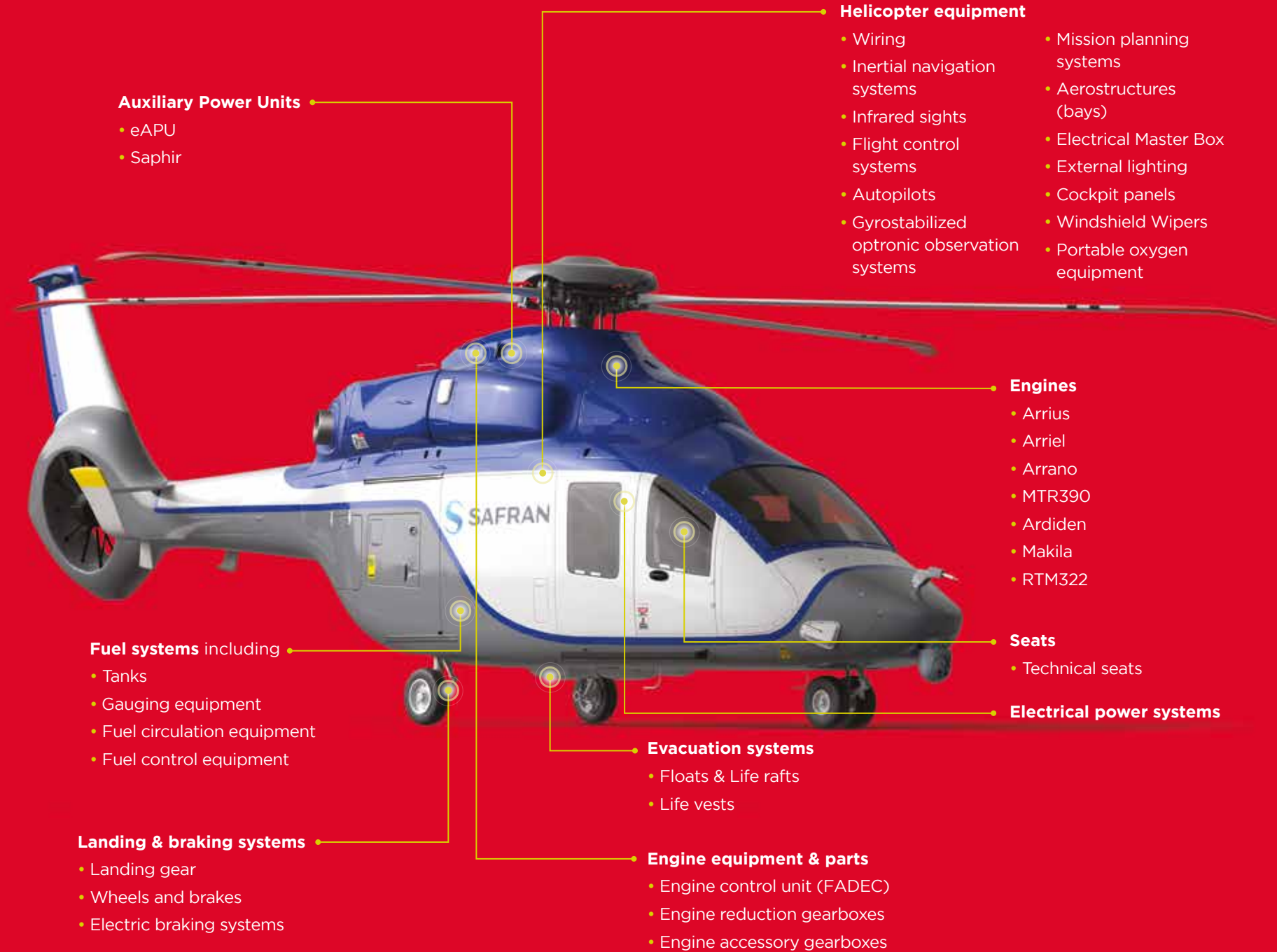
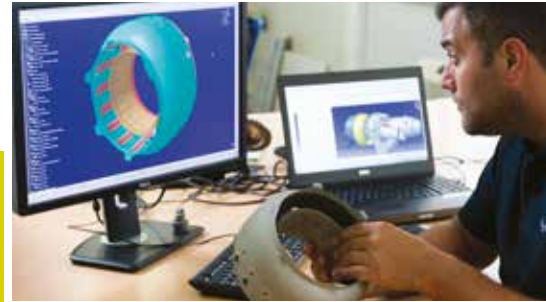
Our products meet the needs of helicopter manufacturers across the spectrum, ranging from engines, auxiliary power units (APUs), power transmissions, electrical power management systems, to landing gear, wheels, brakes, navigation systems, flight monitoring solutions and flight controls.

## CUSTOMER SUPPORT GUARANTEED

Safran has a global service network that provides after-sales, customer and operators support, as well as maintenance, repair and overhaul services for its rotorcraft customers. We provide cost-effective maintenance packages that can be customized to meet the unique needs of our customers.

## INVENTING TOMORROW'S HELICOPTER

We know that the key to performance of modern helicopters is energy generation and efficiency. This is why Safran is playing an active role in the development of next-generation helicopters by investing in hybrid propulsion systems and electrical power systems. Through additive manufacturing and the use of materials such as carbon and composites, we are providing the market with lighter and greener equipment including, engines, engine cowls and brakes. Our strategy is to improve flight safety, reduce operating costs and decrease the environmental impact of helicopters.



# MORE THAN 80 YEARS OF HELICOPTER ENGINE INNOVATION

SAFRAN, THE WORLD LEADER IN ROTORCRAFT TURBINES, IS THE ONLY MANUFACTURER DEDICATED EXCLUSIVELY TO THIS MARKET. PARTNERING WITH MAJOR HELICOPTER MANUFACTURERS ACROSS THE GLOBE, ITS PRODUCTS EQUIP THE VERY LATEST DESIGNS, INCLUDING THE BRAND-NEW BELL 505 AND AIRBUS HELICOPTERS H160.

## TURBOSHAFT ENGINES

Our engine families, which include the Arriel, Arrius, Ardiden, Makila and RTM322 have all been recognized for their safety, reliability and operational excellence. With solutions for single and twin engine helicopters, Safran can meet very specific needs of different helicopter missions.

**#1 WORLDWIDE**  
in helicopter turbine engines

**A SAFRAN-POWERED  
HELICOPTER TAKES OFF  
EVERY**

**9 SECONDS**  
somewhere in the world

**MORE THAN  
12,000  
HELICOPTERS**  
are powered by Safran worldwide

## 100% FOCUSED ON SAFETY AND CUSTOMER SATISFACTION

Safran's priorities are to provide customers with safe, reliable and high-performance engines, to stay focused on their missions and to keep their helicopters flying every day, everywhere. With safety as our watchword, we are committed to meeting and surpassing the industry's highest safety standards. Today, our best-selling Arriel is as reliable as the CFM56, the benchmark gold standard in commercial aviation.

Committed to providing customers with the most comprehensive and reliable support, Safran Helicopter Engines operates 16 sites globally, including five dedicated to helicopter engine repair.

**NEARLY  
100  
FIELD REPRESENTATIVES  
AND FIELD TECHNICIANS**  
dedicated to our customers

**MORE THAN  
100 MILLION  
HOURS FLOWN**  
by Safran Helicopter Engines

### TURBOSHAFT ENGINE CUSTOMERS:

- Airbus Helicopters
- Avicopter
- Bell
- Hindustan Aeronautics Ltd
- Korea Aerospace Industries
- Leonardo
- NH Industries
- Russian Helicopters
- Sikorsky



## ADDRESSING THE HEAVY ROTORCRAFT MARKET

Safran unveiled its new Aneto high power engine family in October 2017. Designed for new super-medium and heavy helicopters, it features several models ranging from 2,500 to over 3,000 shp output. Leonardo has selected the Aneto-1K to power its AW189K twin-engine. Airbus Helicopters has chosen the Aneto-1X to power its Racer (Rapid and Cost-Efficient Rotorcraft) high-speed demonstrator. Aneto offers a new level of performance coupled with reduced operating costs.

## POWER TRANSMISSION

Leveraging more than 40 years of experience in power transmission technologies, we provide helicopter manufacturers with new applications including engine reduction gearboxes, accessory gearboxes and transfer gearboxes to help boost performance and reliability.

## PISTON ENGINES: MINI SIZE, MAXI EFFICIENCY

For light helicopters or for long range unmanned aerial vehicle (UAV) operations, Safran is developing several aero-diesel engines operating on jet fuels. These offerings range from the certified SR305 series engine (230 to 265 shp) to the next-generation High Power Density Engine (400 to 800 shp). Their low fuel consumption increases the endurance by 30% to 100% compared with small turbine engines.



## ARRANO: The most innovative turboshaft in its class

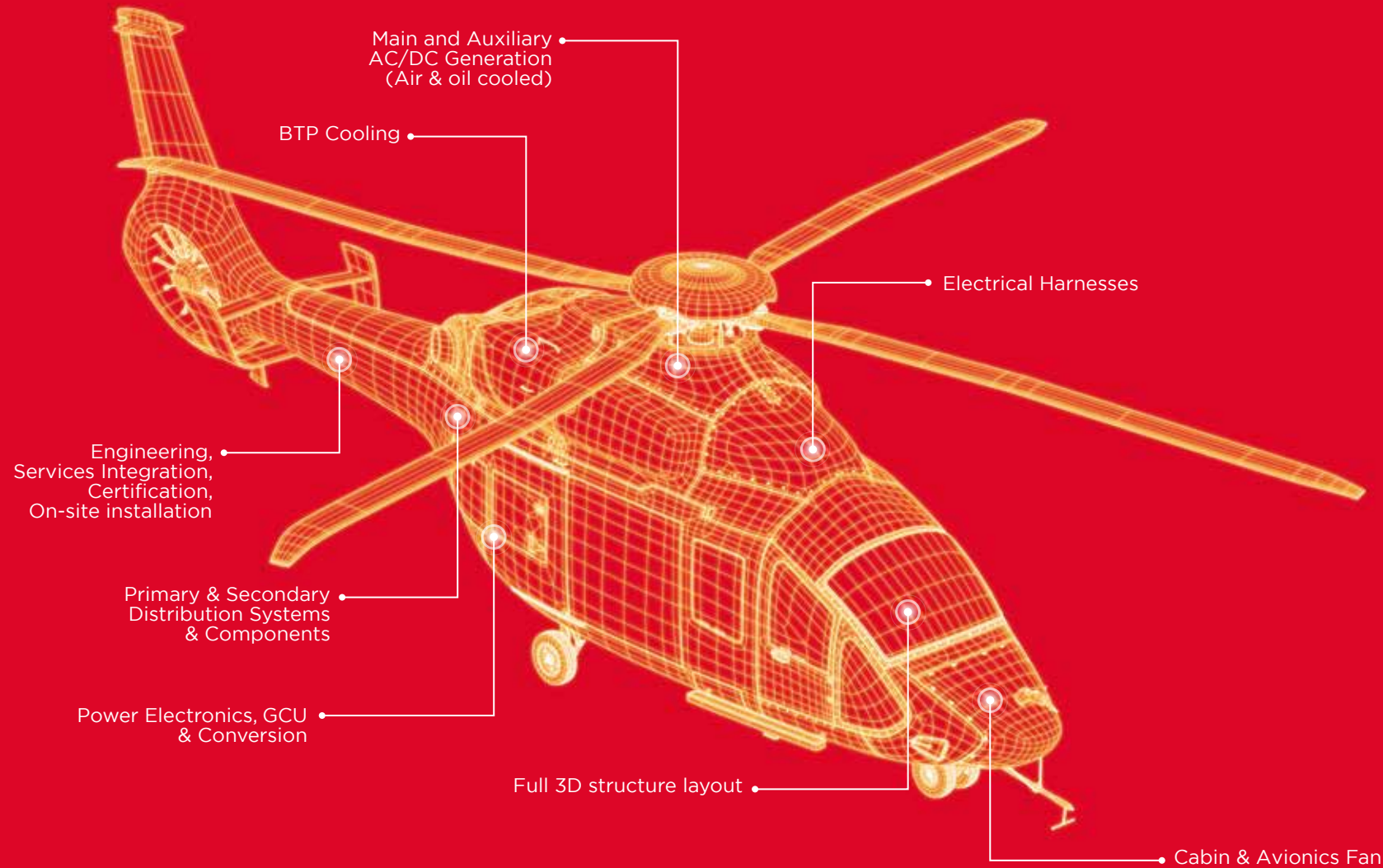
Safran's latest helicopter engine, the 1,200 shp Arrano, incorporates cutting-edge technology and numerous innovations. It offers a 15% improvement in fuel consumption over competing engines – one reason why Airbus Helicopters chose it to power the H160. Its first flight took place in January 2016.

## ARRIUS 2R: The only 500 shp helicopter engine to feature dual channel FADEC

The Arrius 2R (500 shp) was selected to power the new Bell 505, successor to the hugely popular Bell 206 Jet Ranger – of which 7,000 examples were sold. The partnership is on track to deliver unprecedented levels of reliability and low maintenance costs. The engine was certified in December 2015.

# ELECTRICAL POWER SYSTEMS

## INNOVATING FOR TOMORROW'S "MORE ELECTRIC" ROTORCRAFT



### ALL ONBOARD ELECTRICAL FUNCTIONS

As the world leader in electrical wiring interconnection systems, Safran is a recognized supplier to helicopter manufacturers around the world. From design and development to production and support, we cover other onboard electrical functions including generation, distribution, conversion, load management, systems integration, filtration and ventilation.

### ENHANCED RELIABILITY POWER SYSTEMS

Safran has engineered a range of auxiliary power units including the eAPU and Saphir Power System families, providing a wide range of solutions for new-generation rotorcraft. Capable of supporting either pneumatic or electric main engine start and delivering electrical power on ground or in flight, their proven reliability allows operations in the most severe conditions.

**#1**  
WORLDWIDE  
IN AIRCRAFT ELECTRICAL  
WIRING INTERCONNECTION  
SYSTEMS

**#2**  
WORLDWIDE  
IN ELECTRICAL POWER  
& DATA GENERATION

**#1**  
WORLDWIDE  
IN POWER TRANSMISSIONS  
(mainline commercial jets  
with more than 100 seats)

**A WORLD  
LEADER  
IN APUS FOR BUSINESS  
JETS, HELICOPTERS AND  
MILITARY AIRCRAFT**

### HYBRID ROTORCRAFT PROPULSION

Safran is committed to meeting the needs of tomorrow's more electric helicopters. By combining expertise in engines, electrical and power management systems and eAPUs, we are developing hybrid propulsion systems to remain at the cutting edge of helicopter innovation.

### ELECTRIC BRAKES

Combining new-generation composite carbon friction material and electric actuators, our electric brakes represent a major improvement in helicopter braking. We were the first company to equip a helicopter with this new-generation braking system.

**SIKORSKY  
GOLD SUPPLIER  
FOR ELECTRICAL WIRING  
INTERCONNECTION SYSTEMS**



### ENGINEUS™ ELECTRICAL MOTORS

Safran has designed a full range of engineus™ electrical motors. They are smart, efficient, optimized and adapted to a wide range of applications from actuation to propulsion.

#### CUSTOMERS:

- Airbus Helicopters
- Avicopter
- Bell
- Boeing
- Hindustan Aeronautics Limited
- Leonardo
- NH Industries
- Sikorsky



# LANDING AND BRAKING SYSTEMS

## HELPING HELICOPTERS TAKE OFF AND LAND

SAFRAN HAS LEVERAGED ITS LEADERSHIP IN THE DESIGN, DEVELOPMENT, MANUFACTURE AND SUPPORT OF AIRCRAFT LANDING AND BRAKING SYSTEMS TO SERVE THE ROTORCRAFT MARKET.

Combining advanced engineering, integrated systems technology and in-depth service experience, we offer cost-efficient solutions to helicopter and tiltrotor manufacturers around the world.

Our capabilities include landing gear, landing gear extension and retraction systems, steering systems, braking systems, as well as wheels and brakes integration.

- CUSTOMERS:**
- Airbus Helicopters
  - Sikorsky

### BREAKTHROUGH IN HELICOPTER BRAKING

We have applied decades of experience in carbon technology to develop innovative braking systems for the helicopter market. Our brakes are designed to be lighter, more reliable and highly efficient.

Our program of continuous development is geared at providing helicopter platforms with next generation landing and braking systems that are not only reliable and easy to maintain, but lighter, quieter, more cost-efficient and robust.

PROVIDING SUPPORT TO MORE THAN 2,800 HELICOPTERS in service

WORLD LEADER IN AIRCRAFT LANDING SYSTEMS

PIONEER AND WORLD LEADER IN CARBON BRAKES\*

PIONEER IN ELECTRIC BRAKES

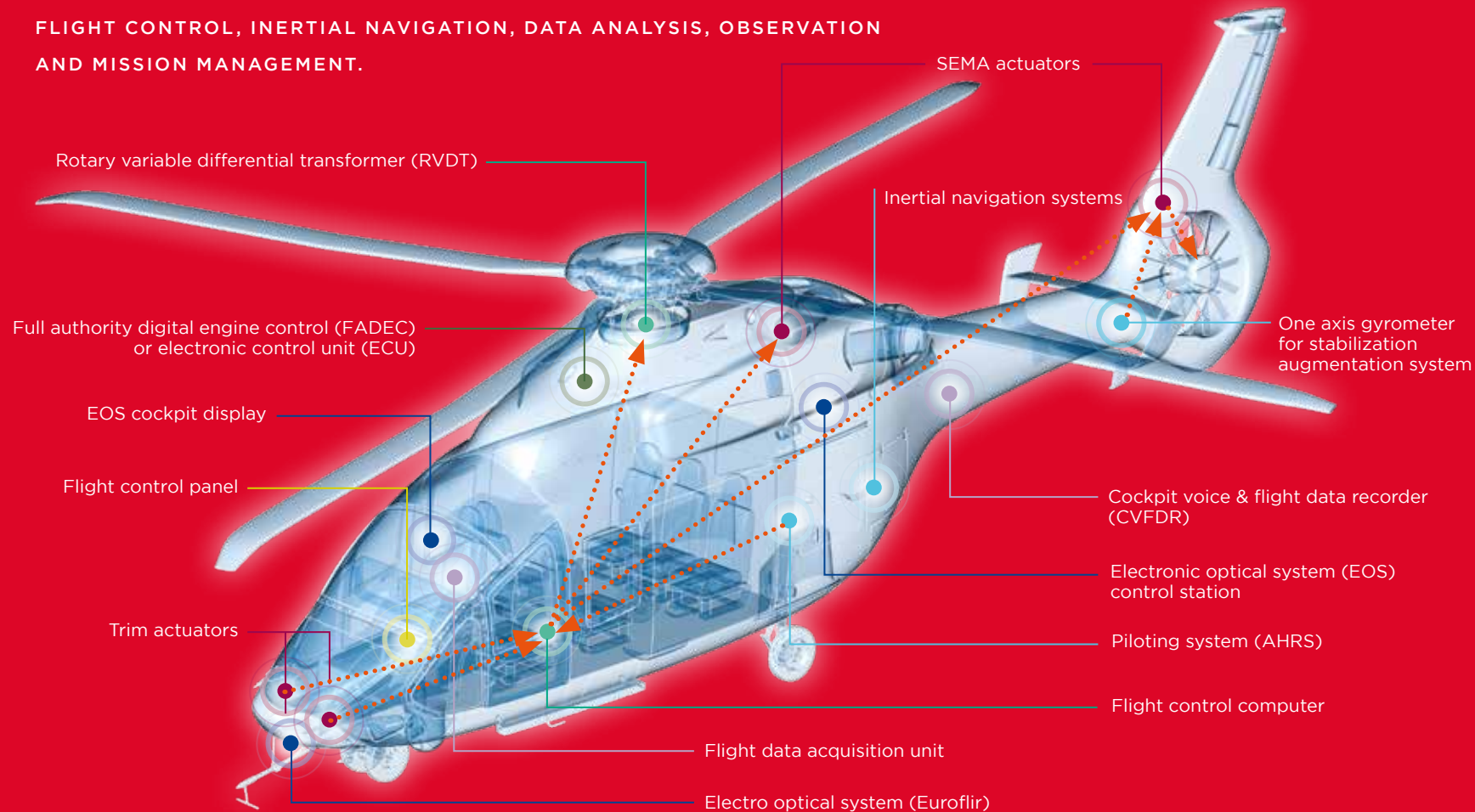
SUPPLIER OF THE WORLD'S FIRST CARBON BRAKES FOR HELICOPTERS

\* Mainline commercial jets with more than 100 seats.

# AVIONICS & MISSION SYSTEMS

## FROM INNOVATION TO CUSTOM-TAILORED SOLUTIONS

SAFRAN'S FULL RANGE OF HELICOPTER AVIONICS SYSTEMS COVERS FLIGHT CONTROL, INERTIAL NAVIGATION, DATA ANALYSIS, OBSERVATION AND MISSION MANAGEMENT.



### PILOTING AND NAVIGATION INERTIAL SENSORS

Using the most modern technologies (FOG, MEMS, HRG), Safran designs, produces and supports sensors, attitude heading reference systems (APIRS) and GPS/GLONASS/ Inertial navigation systems (SKYNAUTE).

### FLIGHT CONTROL COMPUTERS

Safran has 50 years of experience in manufacturing and supporting analog, digital and Fly-By-Wire control computers that meet the specific needs of each customer.



### COCKPIT MANAGEMENT

From throttle control assemblies, active side sticks to illuminated switches and displays panels, Safran offers an advanced range of flight control systems designed to improve flight safety.

### COCKPIT AND AUTOPILOT ACTUATION

Safran's smart electro-mechanical actuators are installed in series with trim actuators and managed by the flight control computer.

### ENGINE CONTROL

Based on Safran's long experience on Full Authority Digital Engine Control (FADEC), Safran's Engine Control Units are designed to withstand adverse conditions offering the highest level of safety and reliability.

### FLIGHT DATA MANAGEMENT

Safran's Helicopter Flight Data Monitoring solution Cassiopée Helisafe is designed to make the best use of your flight data. Entirely automatic, lightweight and easy to use, Cassiopée Helisafe enhances flight safety and operations and sharpens the maintenance activity.

### AIRBORNE IR ELECTRO-OPTICAL SYSTEMS

The Euroflir family delivers the highest level of performance for demanding missions worldwide: maritime patrol, homeland security, border and coastal surveillance, SAR, CSAR and special operations.

**WORLD LEADER**  
IN HELICOPTER FLIGHT CONTROLS

**#3**  
WORLDWIDE  
IN INERTIAL NAVIGATION SYSTEMS

**PIONEER**  
IN FLIGHT DATA MANAGEMENT SYSTEMS & AERONAUTICAL MAINTENANCE SUPPORT

**12 MILLION**  
FLIGHT HOURS  
LOGGED BY HELICOPTERS EQUIPPED WITH SAFRAN AVIONICS SYSTEMS

**CUSTOMERS:**  
• Helicopter manufacturers  
• Operators



# SAFETY SYSTEMS & ONBOARD SYSTEMS

## INCREASING HELICOPTERS PERFORMANCE & OPTIMIZING FLIGHT SAFETY

A KEY INTERNATIONAL PLAYER IN AERONAUTIC EQUIPMENT AND SYSTEMS FOR HELICOPTERS, SAFRAN DESIGNS AND MANUFACTURES HIGH TECH SOLUTIONS FOR TODAY'S HELICOPTERS.

### EMERGENCY FLOTATION SYSTEMS

Designed to enable a helicopter in difficulty to land on water, our emergency flotation systems are light and innovative. Capable of providing stability to sea state 6 and more, they reduce the risks of capsize and submersion during a sea landing.

### LIFE RAFT SYSTEMS

Safran has developed automatic and reversible inflatable life raft systems to facilitate passenger boarding. Offering high survivability, our rafts have the advantage of light weight and low packaging volume.

### FUEL SYSTEMS

Safran produces internal and external auxiliary fuel systems, as well as all associated equipment (gauges, fuel monitoring panels, etc.), that increase the operational range of helicopters. Backed by many years of experience in the domain of lightweight and flexible aircraft fuel tanks, Safran has reinforced its position in the helicopter market with the development of its own specific mixes and doped fabrics. This strategy of innovation has enabled Safran to develop lighter fuel tank envelopes.

### COCKPIT AND LIGHTING SOLUTIONS

A major player in the lighting solutions market, Safran can deliver a complete external lighting system that is entirely LED based. Safran also produces, for helicopter cockpits, large-scale illuminated panels, keyboards and other control panels.

#1  
WORLDWIDE  
IN EMERGENCY FLOTATION  
SYSTEMS FOR HELICOPTERS

60 YEARS  
OF EXPERTISE  
IN EMERGENCY  
FLOTATION SYSTEMS

OUR FLOTATION  
SYSTEMS CAN EQUIP  
80%  
OF THE WORLD  
HELICOPTER MARKET



- CUSTOMERS:**
- Airbus Helicopters
  - Avic Helicopter
  - Bell
  - Hélicoptères Guimbal
  - Korea Aerospace Industries
  - Leonardo Helicopters
  - MD Helicopters
  - Robinson
  - Sikorsky





# SEATING SYSTEMS

## OPTIMIZING SAFETY AND COMFORT

SAFRAN PROVIDES LIGHT, MEDIUM AND HEAVY HELICOPTERS WITH PASSENGER AND PILOT SEATING SYSTEMS THAT MEET THE SPECIFIC NEEDS OF THIS DEMANDING MARKET.

### INNOVATIVE SEATING SYSTEMS

Based on Safran's long experience on helicopters seating systems, our products include a shock absorption system designed to optimize pilot and passenger safety. We also offer smart, innovative seat actuation functions for a comfortable in-flight experience.

- CUSTOMERS:**
- Helicopter manufacturers
  - Operators



### CUSTOMIZED SOLUTIONS

Safran is aware of the challenge and is designing, manufacturing and maintaining customized technical seats that meet the specific needs. Adapting ourselves to the different requirements of customers, our pilot seats are unique to each helicopter model.



# CUSTOMER SUPPORT

## PROVIDING COMPREHENSIVE WORLDWIDE CUSTOMER SUPPORT

### FLEXIBLE, TAILORED SUPPORT

Rotorcraft manufacturers and operators require reliability, flexibility, cost-efficiency and optimized planning. Safran is well-positioned to offer extensive, custom-tailored support across the full lifecycle of rotorcraft programs.

Our global aftermarket offering includes spares provisioning and supply, maintenance, repair and overhaul (MRO), Aircraft-On-Ground (AOG) support, engineering services, real-time data monitoring, logistics management, as well as on-site and technical support and training.

### IMPROVING SERVICES THROUGH INNOVATION

As an innovator, our strategy is to constantly anticipate and introduce new technologies, new production techniques and new materials in order to better maintain and repair our products.

We believe in **preventive maintenance**, which is why we leverage our expertise in data analytics to diagnose and forecast maintenance needs.

### GLOBAL REACH, LOCAL SUPPORT

With facilities strategically located in major aviation hubs, we meet the demands of fleet operators, while strengthening ties with our customers. This strategy enables us to provide immediate, efficient and reliable support, ultimately improving dispatch reliability.

- CERTIFIED SERVICE CENTERS WORLDWIDE
- SUPPORT BY THE HOUR
- TRAINING AND CONSULTING SERVICES
- 24/7 CUSTOMER SUPPORT AND SERVICES
- DISTRIBUTION CENTERS
- INTERNATIONAL REPAIR NETWORK ON-SITE SUPPORT
- MORE THAN 200 TECHNICAL REPRESENTATIVES WORLDWIDE

**BOOST** (BANK OF ONLINE SERVICES & TECHNOLOGIES) is Safran's new online rotorcraft engine maintenance management service. Developed in partnership with IBM, this tool provides operators of Safran-powered helicopters with real-time, personalized engine data to enrich their own fleet maintenance management, with the direct support of Safran teams.

**POWERED  
BY TRUST**

[safran-group.com](http://safran-group.com)

