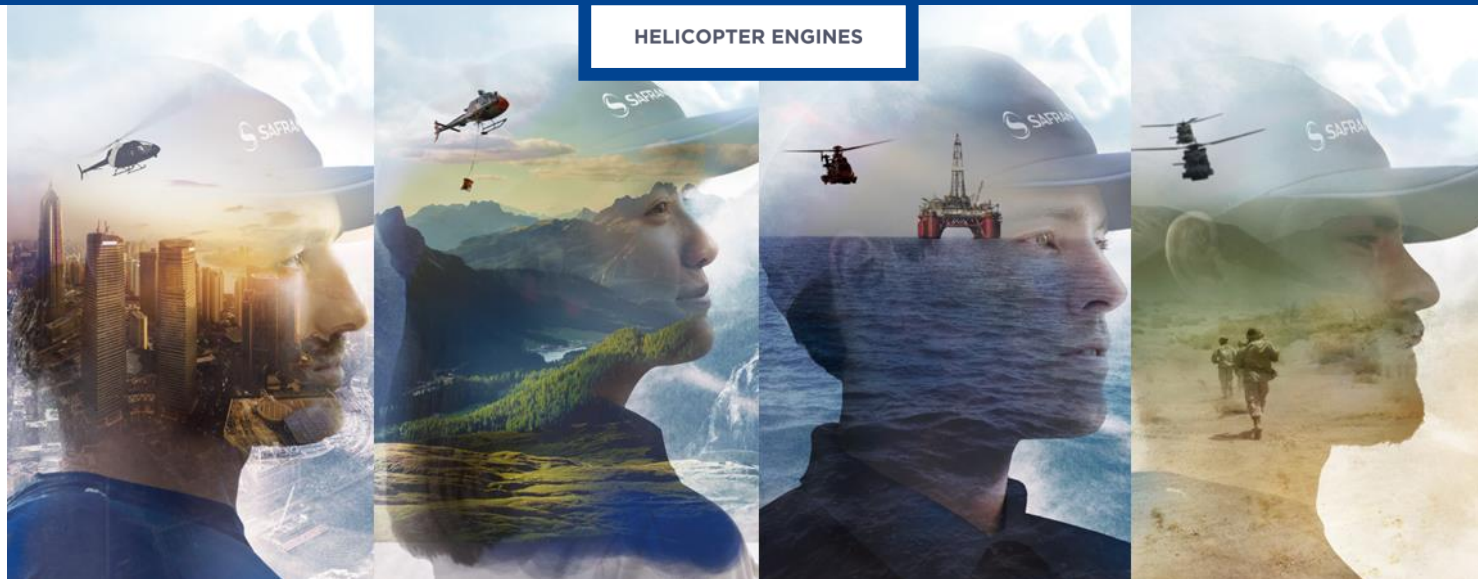


HELICOPTER ENGINES



## CORPORATE PRESENTATION

—  
May 2016



## SAFRAN, a leading international high-technology group



### **No. 1 worldwide**

- ◆ Engines for commercial jets (+100 seats)
- ◆ Helicopter engines
- ◆ Landing gears, wheels, carbon brakes

**70,000 employees**

**Global presence**

**Sales of 17.4 billion euros (2015)**

# SAFRAN, leader in aerospace propulsion



Storm Shadow

TRI 60-30



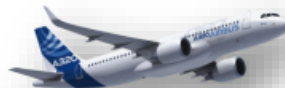
H145

Arriel 2E



Rafale

M88



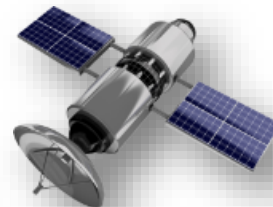
Airbus A320

CFM56 and Leap-1A



Ariane 5

Liquid and solid propulsion



Satellites

Plasma thrusters



## SAFRAN HELICOPTER ENGINES, key figures



**6,300 employees worldwide**

**1 out of 3 helicopter engines sold in the world is Safran**

- ◆ 2,500 customers in 155 countries
- ◆ 18,200 engines in service

**Revenue at Euro 1,28 billion <sup>(2015)</sup>**

- ◆ 718 engines produced <sup>(2015)</sup>

**A Safran-powered helicopter takes off every 9 seconds, somewhere in the world**

# 77 years of Helicopter engine excellence



**Founded in  
1938 by  
Joseph  
Szydlowski**

**1955: powered  
the first serial-  
produced  
turbine-powered  
helicopter in the  
world**



**72,000 engines  
produced since  
1938**

**In 2015,  
Turbomeca marks  
100 million hours  
flown by its engine  
range**

*Depuis plus de 50 ans, j'ai vu naître l'aviation,  
j'y ai vu, je voulais y participer,  
Turboméca est née de cette volonté.*

*Joseph Szydlowski, 1987*

# Our roadmap



To be the world's preferred helicopter engine manufacturer



Enlarge customer portfolio



Innovate and develop new engines and variants including high-power engines



Consolidate our leading position in growth markets



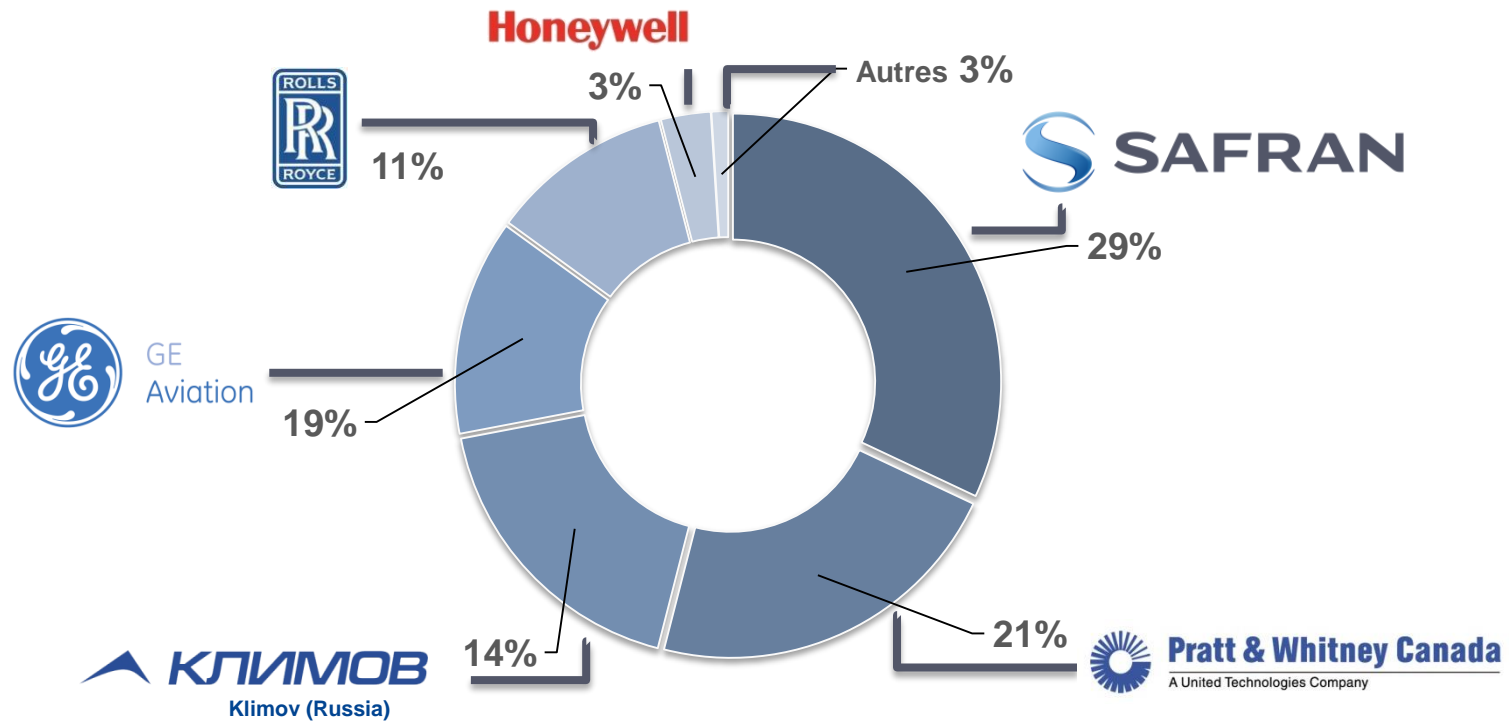
Develop customer satisfaction and loyalty



# The widest range of helicopter engines



# Our market share

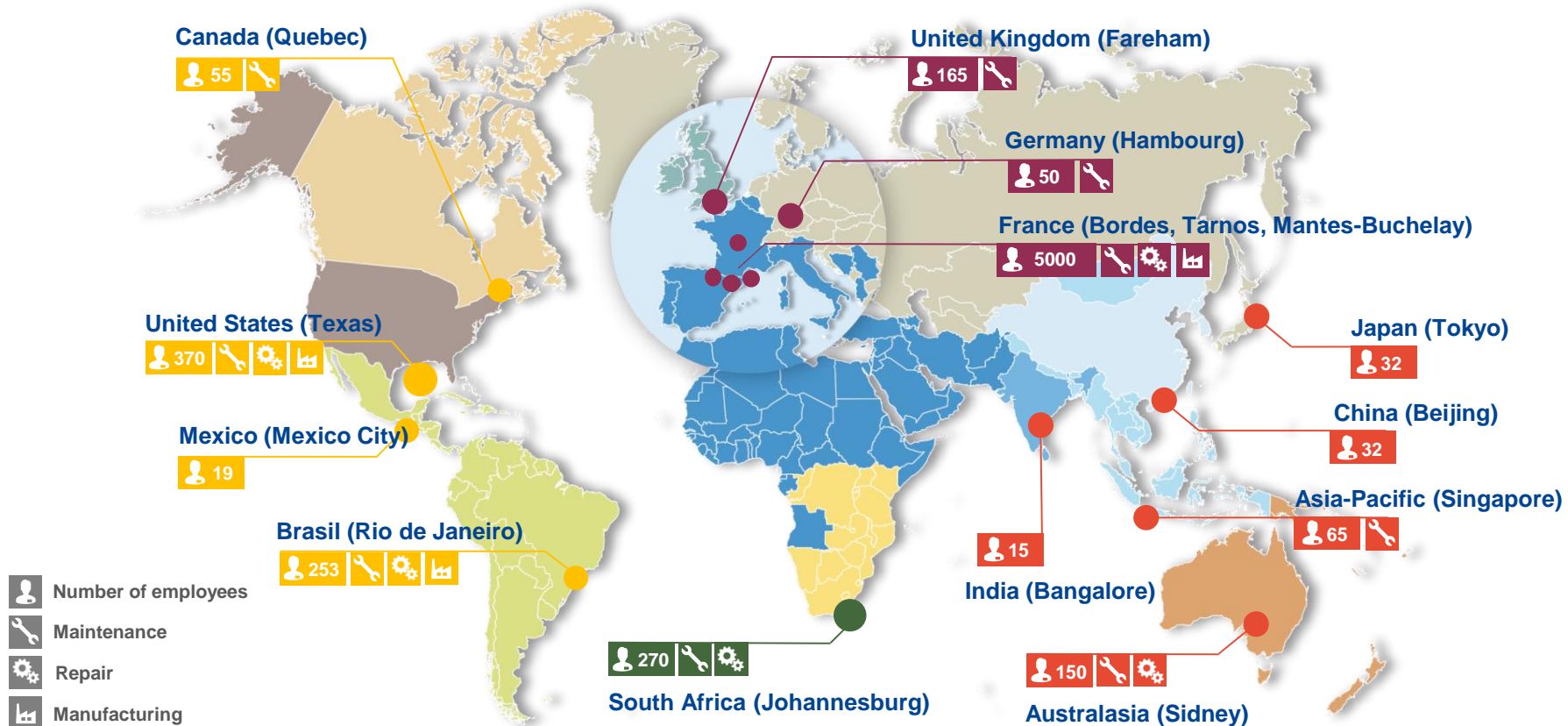


2009-2013 figures – Safran estimates, in number of helicopter engines delivered





# Operating on each continent



## 4 sites in France



M

### Bordes

2 600 employees

Site Manager : Marie-Chantal Brochet



**Head office:** production engines assembly, subassembly manufacturing, design office, development of new engines

T

### Tarnos

1 544 employees

Site Manager : Alain Peltier



**Global center** for support steering, maintenance, repair, subassembly manufacturing, training center

M

### Mantes-Buchelay

320 employees

Site Manager : Olivier Gourbesville



Design and manufacturing of **control units and accessories**

M\_T

### Toulouse (Safran Power Units)

498 employees

General Manager : François Tarel



**Safran Helicopter Engines subsidiary:** Jet engines (missiles, drones), Auxiliary Power Units (APU) and starters

## Joseph Szydowski plant in Bordes

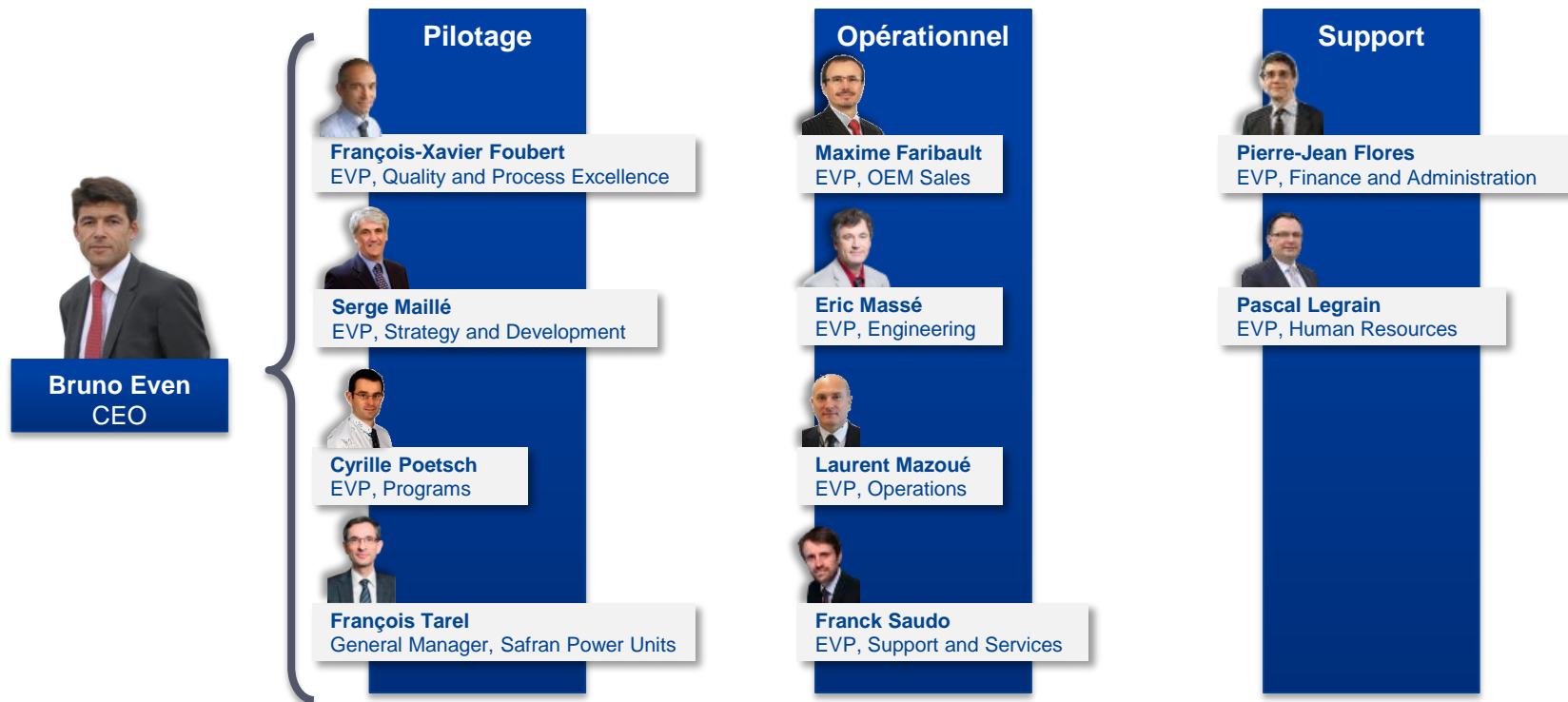


### A world-class industrial and technological base

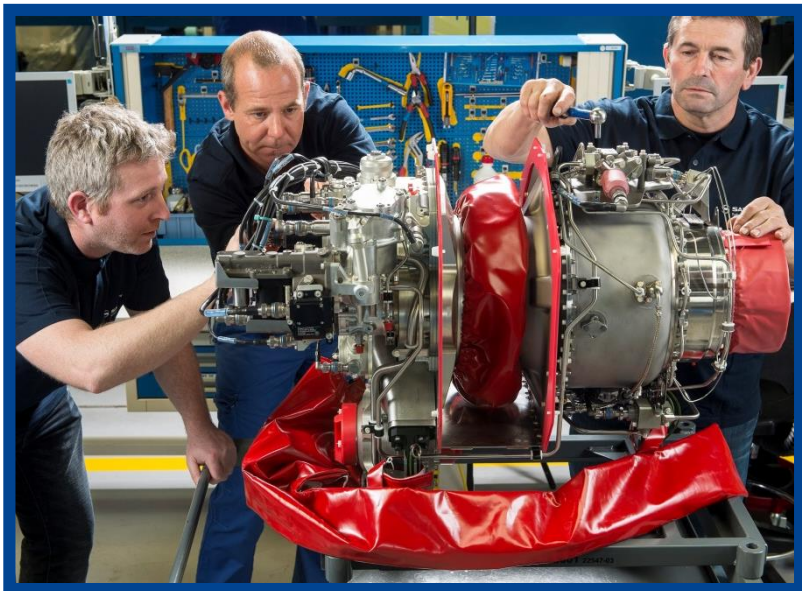
- ◆ Inaugurated in 2010
- ◆ 42,000 m<sup>2</sup>
- ◆ 2600 employees
- ◆ High-performance production capabilities



# SAFRAN HELICOPTER ENGINES : executive board



## 450 to 750 shp engines Arrius family



- ◆ 3,150 engines produced
- ◆ 8 million flight hours
- ◆ 650 customers in 75 countries

### Applications

- ◆ Airbus Helicopters H120/125/135
- ◆ Bell Helicopter Bell 505 Jet Ranger X
- ◆ Russian Helicopters Ka-226T





## 700 to 1000 shp engines Arriel family



- ◆ 12,000 engines produced
- ◆ 45 million flight hours
- ◆ 1,300 customers in 110 countries
- ◆ best-selling engine for two-to-five ton class helicopters

### Applications

- ◆ Airbus Helicopters H145, H155, AS365 N3+, AS565 Mbe
- ◆ Sikorsky S-76C++
- ◆ Korean Aerospace Industries LCH et LAH



**An Arriel-powered helicopter takes off every 15 seconds – all day, every day !**



## 1100 to 1300 shp engines Arrano family



- ◆ New-generation engine for four-to-six ton helicopters
- ◆ **10 to 15% reduction in specific fuel consumption**
- ◆ First rotation: 25 February 2014
- ◆ First flight: 27 January 2016
- ◆ Entry into service: 2018

### Application

- ◆ Airbus Helicopters H160 (exclusive engine)



## 1250 to 1450 shp engines MTR390



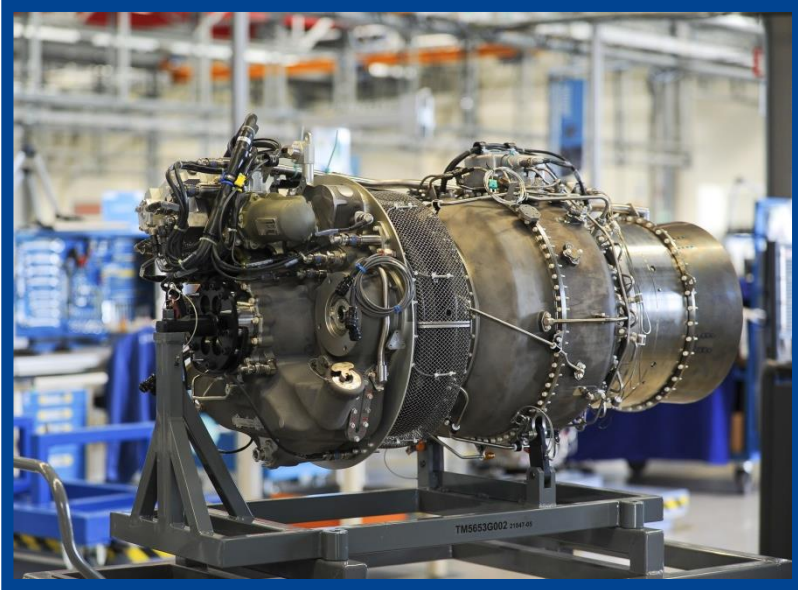
- ◆ Partnership between Safran, MTU Aero Engines Rolls-Royce and ITP
- ◆ +300 engines produced
- ◆ 79,000 flight hours
- ◆ Combat proven
- ◆ In service in four armed forces: France, Germany, Spain, Australia)

### Applications

- ◆ Tigre HAD/HAP, UHT and ARH



# 1400 to 2000 shp engines Ardiden family



◆ 10 to 15% reduction in specific fuel consumption

◆ Ardiden 1

- > 1400 shp
- > In serve



◆ Ardiden 3

- > 1700 to 2000 shp
- > First flight: April 2016



## Applications

◆ HAL Dhruv, LCH and LUH (Ardiden 1)

◆ Avicopter AC352 (Ardiden 3)

◆ Russian Helicopters Ka-62 (Ardiden 3)



## 1800 to 2100 shp engines Makila family



- ◆ +2,200 engines produced
- ◆ 10 million flight hours
- ◆ 90 customers in 50 countries
- ◆ Utilisé régulièrement en mer du Nord et en situation de combat
- ◆ Daily used over North Sea and in extreme military environments

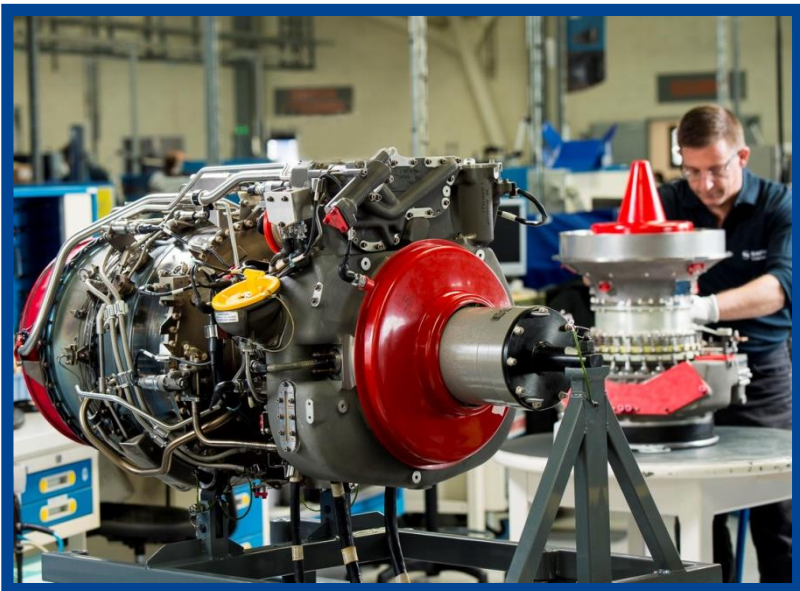


### Applications

- ◆ Airbus Helicopters H215/225/725, AS 332/532 Super Puma, SA330 Puma
- ◆ Denel AH-2 Rooivalk



## 2100 to 2600 shp engines RTM322 family



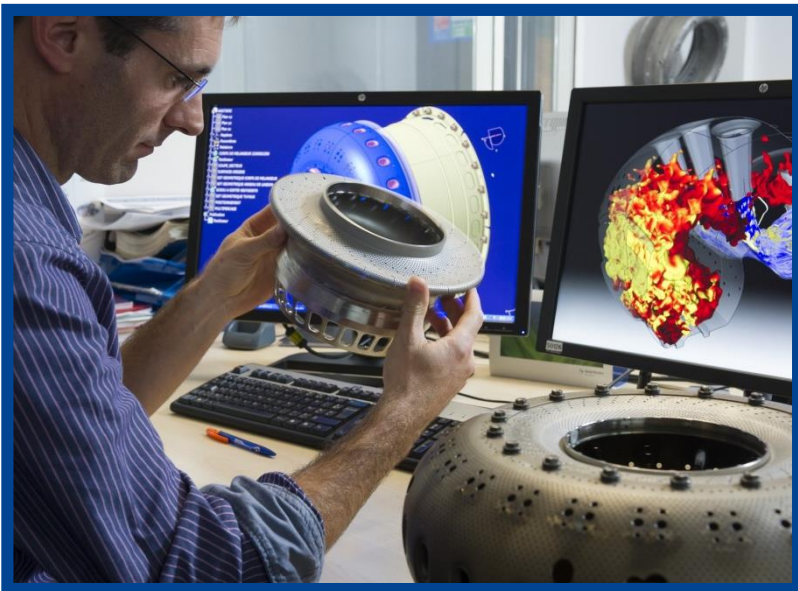
- ◆ 100 % Turbomeca
- ◆ +1,100 engines in service
- ◆ In service in 18 armed forces

### Applications

- ◆ NHI NH90 (powering 80 % of the worldwide fleet)
- ◆ Agusta Westland AW101 Merlin (90 % of the worldwide fleet) et Apache AH Mk.1



## Strong commitment to Innovation R&D spending 15 % of revenue



**40 %: share of fuel in a helicopter's operating cost**

**10 to 15%: reduction in fuel consumption offered by our new engines**

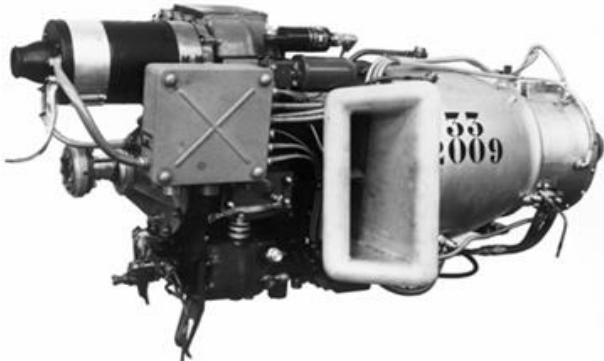
**Around 100 patents filed every year**

### **Multiple areas for innovation**

- ◆ Improvement in architectures, particularly for compressors with higher compression ratio
- ◆ New materials for lighter and more robust engines
- ◆ Factory of the future: new manufacturing process and enhanced industrial organization



# More than 75 years of aero-engine innovation

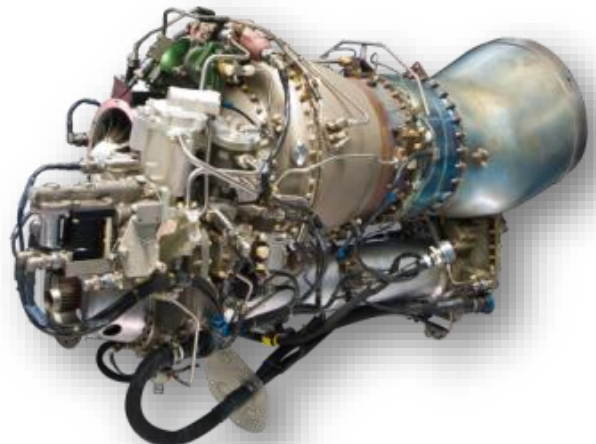


**Artouste II (1954) : 403 shp**

Weight: 143 kg

Specific power: 2.81 shp/kg

SFC: 0.429 kg/shp-h



**Arriel 2 (2004) : 945 shp +135 %**

Weight: 131 kg -8%

Specific power: 7.19 shp/kg + 160%

SFC: 0.247 kg/shp-h - 45%

# 2,500 customers in 155 countries



**Medical  
(EMS)**

11%



**Military**

31%



**Offshore**

12%



**Tourism**

6%



**Police  
Parapublic**

13%



**VIP  
Corporate**

11%



**Utility**

16%

# SAFRAN HELICOPTER ENGINES first priority: customer satisfaction

## Our mission: to keep you flying



### Customer support

- ◆ 1 out of 3 of our employees is dedicated to customers support
- ◆ 70% of our revenue
- ◆ 5 repair centers, on each continent
- ◆ 44 distributors and certified maintenance centers
- ◆ A wide range of innovative services
  - > Support By the Hour
  - > Global Support Package
- ◆ Regular meetings
  - > Symposium and operator seminars
  - > Customer Council
  - > User conference



# WE KEEP YOU FLYING





**POWERED  
BY TRUST**