

FAA CLEEN PHASE III

CONSORTIUM – PUBLIC PRESENTATION

SAFRAN NACELLES - L_EAD PROJECT

November 3rd, 2021



AGENDA

Company overview

FAA CLEEN 3 program

Context

LeAD concept

Project features

AN INTERNATIONAL HIGH-TECHNOLOGY GROUP

More than **79,000**
employees
In **30 countries**

€16.46 Billion*
in revenue

World's No.3
aerospace
company
(excluding aircraft
manufacturers)

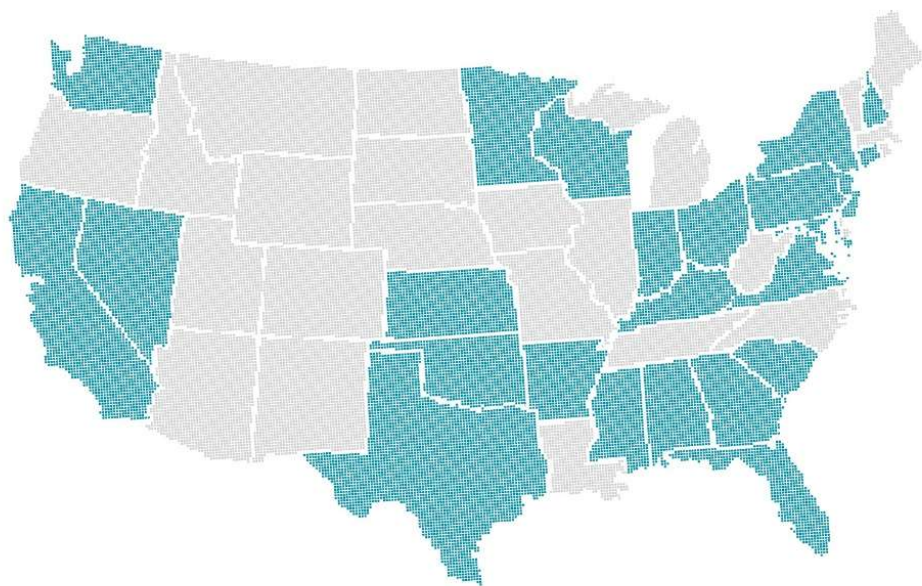
World's No.2
aeronautical
equipment
company

4 core
businesses:
Aerospace propulsion
Aircraft equipment
Aircraft interiors
Defense

€1.21 Billion*
in R&D expenditures

* 2020 figures

SAFRAN'S U.S. FOOTPRINT



Nearly
50 years
of committed
operations in the U.S.

**8,000
employees
in
24 states**

Safran Companies:

Safran Aero Boosters
Safran Aerosystems
Safran Aircraft Engines
➤ Safran Cabin
➤ Safran Electrical & Power
Safran Electronics & Defense
Safran Helicopter Engines
➤ Safran Landing Systems
Safran Nacelles
Safran Passenger Innovations
Safran Power Units
Safran Seats

Safran Joint Ventures:

A-Pro
CFAN
CFM International
FADEC International
Nexcelle
Propulsion Technologies International

SAFRAN NACELLES



3,500
employees



A world leader
for nacelles and services



**A worldwide
footprint**
with over 10 sites



€1.2 Billion
in sales*

* 2020 figures

SAFRAN NACELLES - MARKET SEGMENT

Commercial
aviation



Regional
aviation



Business
aviation



**More than
78,000**
flight hours everyday



**19,000 Safran
Nacelles components**
in service



A thrust reverser
cycle every
2 seconds



250+ airline
customers

2020 figures

A large footprint: from the commercial and regional aviation...

Long range aircraft

A330neo -800/-900

AIRBUS

Trent 7000



A330ceo

AIRBUS

Trent 700



A380

AIRBUS

Trent 900



Beluga XL

AIRBUS

Trent 700



A380

AIRBUS

GP7200



A340 -500/-600

AIRBUS

Trent 500



777X -8/-9 (exhaust)

BOEING

GE9X



Short and medium range aircraft

A320ceo family

AIRBUS

CFM56



A320neo family

AIRBUS

LEAP-1A engine



C919(JV* Nexcelle)

COMAC

LEAP-1C engine



Regional aircraft

170 / 175 (JV* MHD)

EMBRAER

CF34-8E



ERJ 135 / 145

EMBRAER

AE 3007A



SUPERJET 100

SUKHOI

SaM146



* Joint-venture

SAFRAN

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... to the business aviation

Medium business jets

Citation Longitude
CESSNA (TEXTRON)

HTF7700



Legacy 500 / Praetor 600
EMBRAER

HTF7500E



Challenger 300 / 350

BOMBARDIER

HTF7000



Legacy 450 / Praetor 500

EMBRAER

HTF7500E



G280

GULFSTREAM

HTF7250G



Large business jets

Global 5000 / 6000

BOMBARDIER

BR710A2-20



Global 5500 / 6500

BOMBARDIER

Pearl 15



Global 7500 (JV* Nexcelle)

BOMBARDIER

GE Passport™



Falcon 7X (JV* MHD)

DASSAULT AVIATION

PW307



Falcon 8X (JV* MHD)

DASSAULT AVIATION

PW307



G550

GULFSTREAM

BR710C4-11



G700

GULFSTREAM

Pearl 700

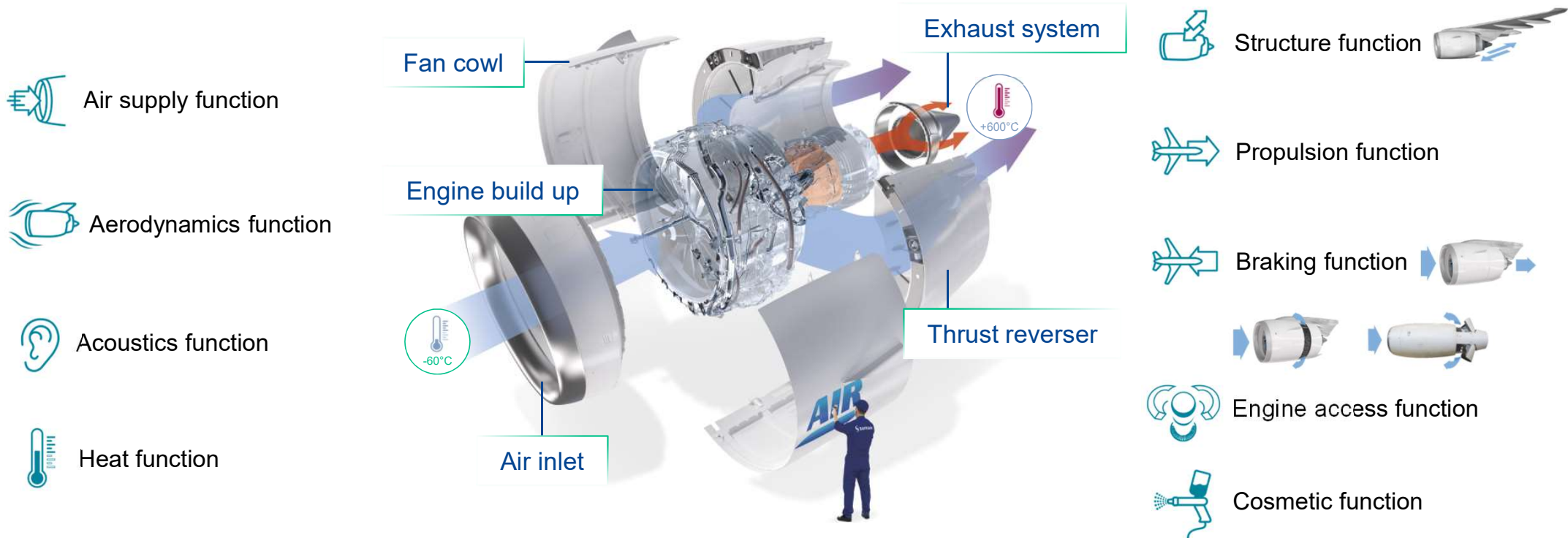


* JV: Joint-venture

SAFRAN

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The nacelle - A major, high-tech system at the interface between the engine and the aircraft



Our nacelle is a key system for performance and operating cost

Design & manufacturing plants – Worldwide presence

UNITED KINGDOM

Burnley  

FRANCE

Florange  
 Le Havre   
 Paris 
 Toulouse  


UNITED STATES

Cincinnati* 
 Seattle 
 Mobile 


GERMANY

Hamburg 

RUSSIA

Komsomolsk 

CHINA

Xi'an* 

MOROCCO

Casablanca 



*Joint-venture

Greenness & affordability drive research for future developments...



Green



- Mass reduction
- Sound effect reduction
- Drag reduction

“Affordable”



- Learning factory for operating cost and products solutions competitiveness
- “Zero default” approach
- Highly-automatised production

More than **12%**
turnover dedicated to R&D

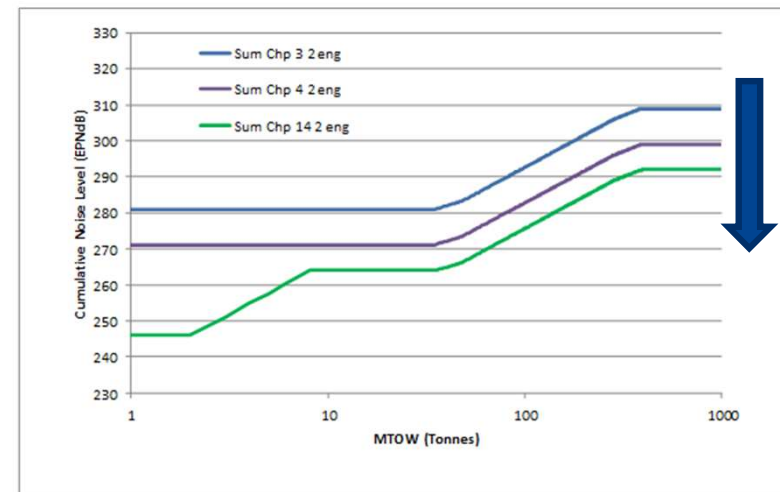
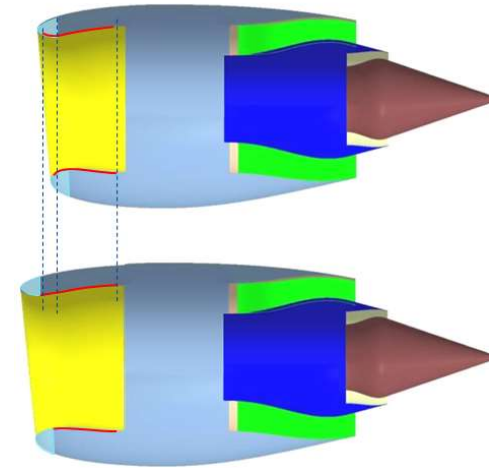
More than **15%**
of the workforce in R&D

*Council for Civil Aeronautics Research

Context

- Shorter and thinner nacelles evolution
- Better acoustic performance

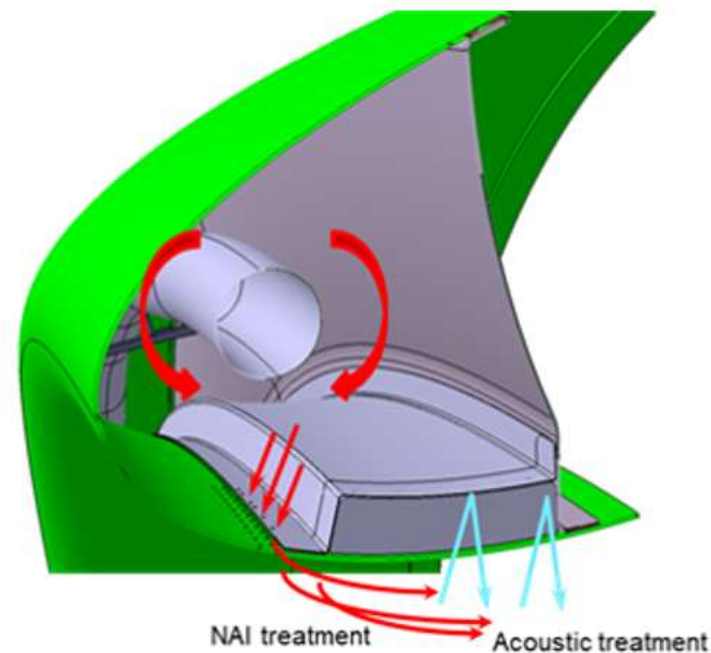
Have been considered for the selection of innovation and project proposed for CLEEN PHASE III program



1977 - 2006
2007 - 2017
> 2017

Concept

The LeAD CLEEN III project proposes an additional acoustic surface in D-Duct area while supporting de-icing functionality

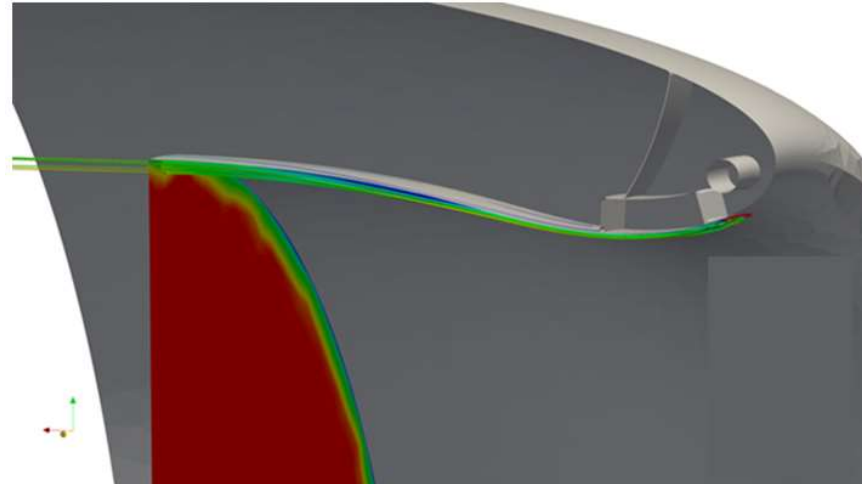


LeAD BENEFITS

- **Significant Fuel Burn reduction (shorter inlet)**
- **Opportunity to increase nacelle's acoustic performance**
- **Quick development as based on mature technologies**
- **Can be deployed on standard inlet designs**

LeAD CHALLENGE

- Add an acoustic function into D-Duct area
- Secure de icing performance with this new configuration
- Limit impact of heating film in engine operability



LeAD OBJECTIVES

- **Concept / fonctionnalité**

- Demonstrate the performance of de-icing by heating air film
- Demonstrate the acceptability of heating air film in the engine operation
- Demonstrate the acoustic performance

- **Design tools & methods**

- Structural design of a LeAD inlet

- **Manufacturing materials & processes**

- Demonstrate LeAD inlet manufacturability

Development plan

