

Never mind 20:20
Our vision goes
beyond 20:40



GE
AND
SNECMA
NOW COMMIT
UNTIL 2040
AND BEYOND

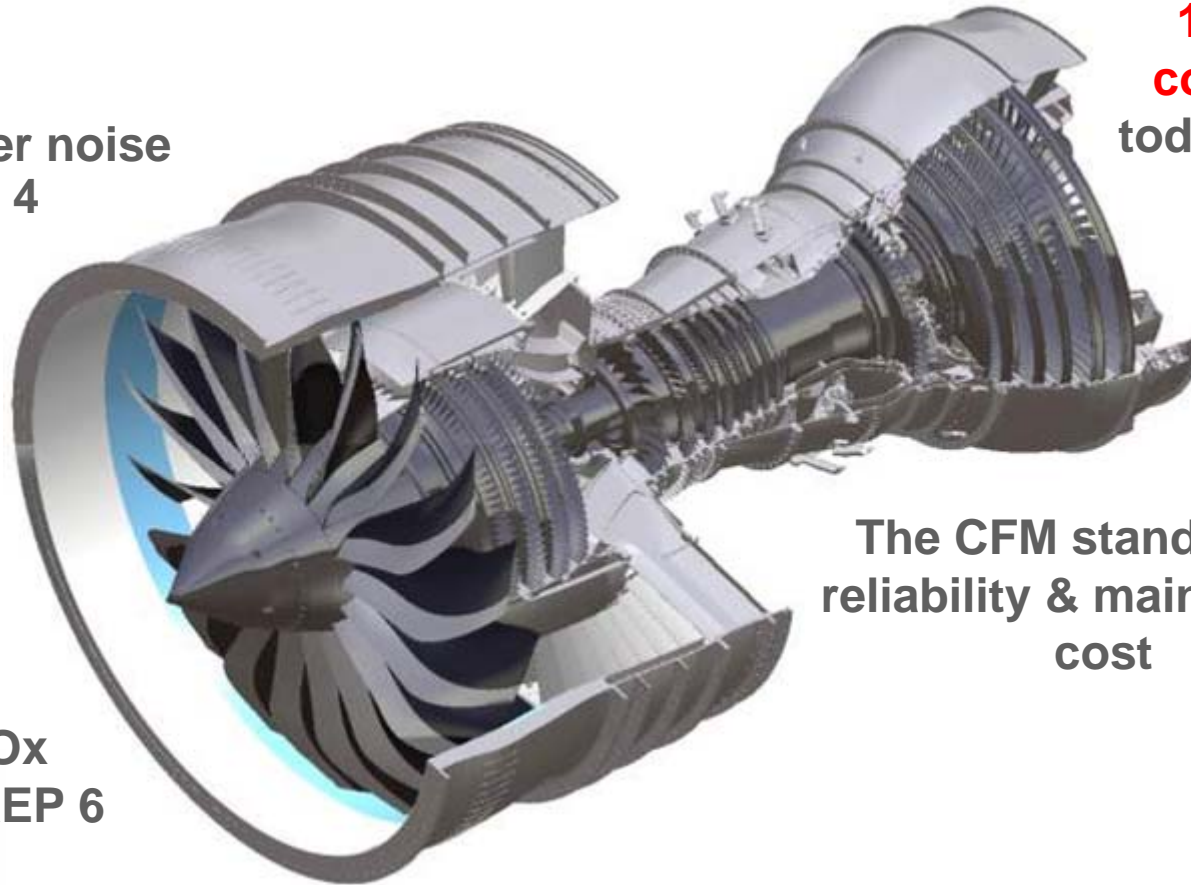
LEAP-X: Balancing Economics & the Environment

LEAP-X ... a new baseline engine ready by 2016



10 – 15 dB lower noise
vs. Stage 4

**16% lower fuel
consumption** vs.
today's best CFM56



**50+% lower NOx
emissions** vs. CAEP 6

The CFM standard for
reliability & maintenance
cost

LEAP-X advancing the state of the art ...



GE90



GE90-115B



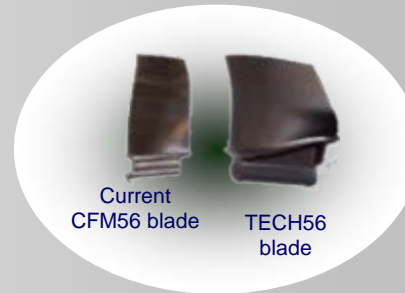
GEnx



TECH56



TECH56 / Tech
Insertion



LEAP

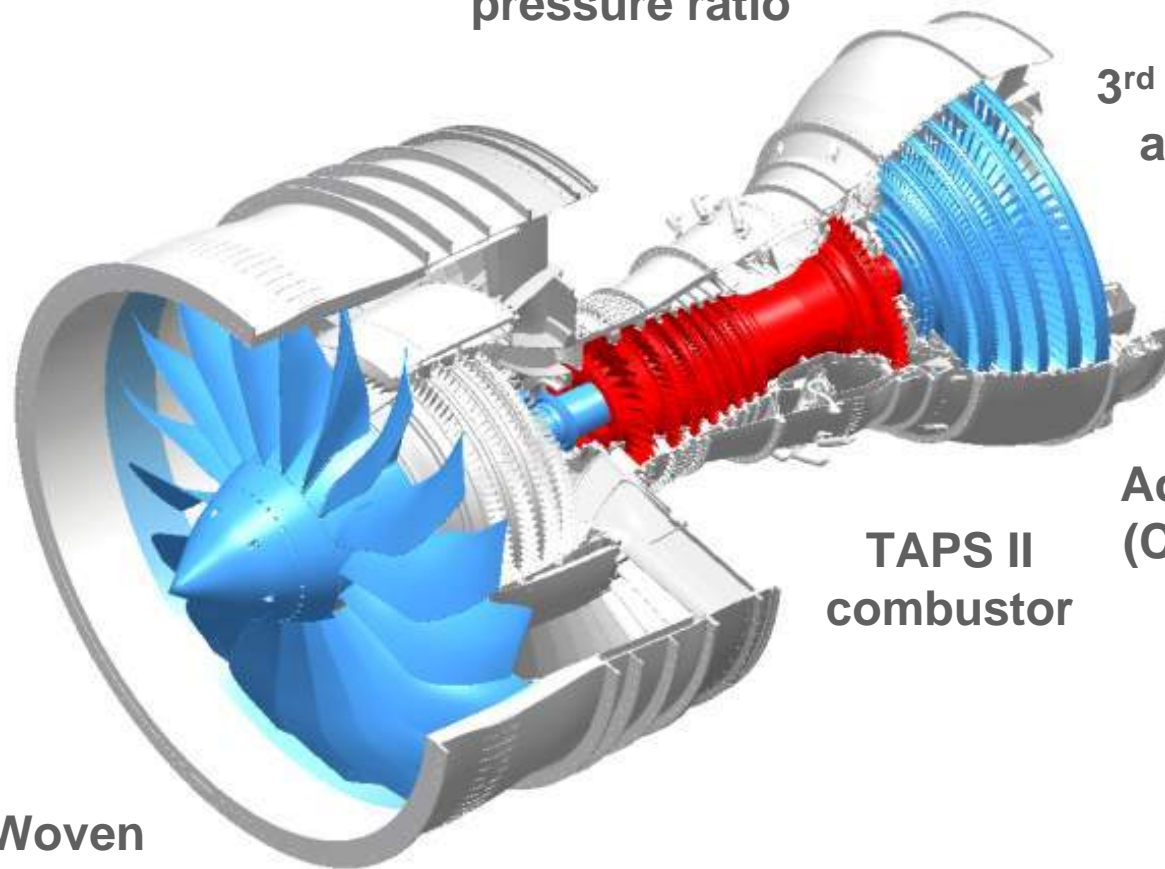
Up to 2X higher core pressure ratio; high efficiency and durability

LEAP-X technology

Up to 2X higher core pressure ratio

3rd generation 3-D aerodynamics

Up to 2X higher bypass ratio



TAPS II combustor

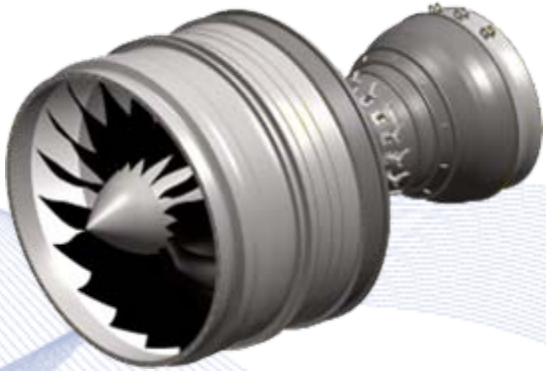
Advanced materials (CMC, ATAMS, etc.)

3-D Woven RTM fan blade & composite fan case

Key R&D disciplines deliver mature technology

Composites

Weight, reliability



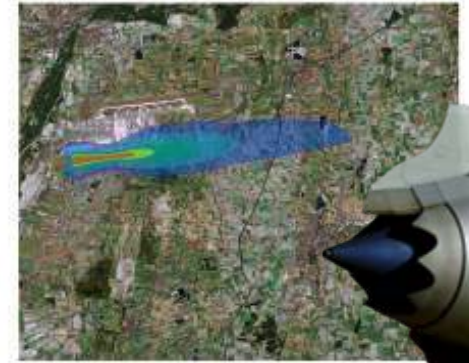
Aerodynamics

Efficiency



Acoustics

Access, productivity



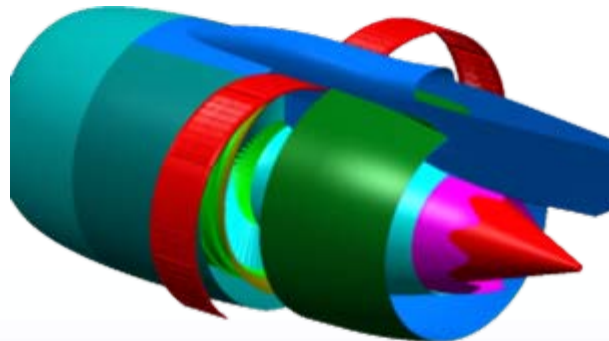
Materials

SFC, weight



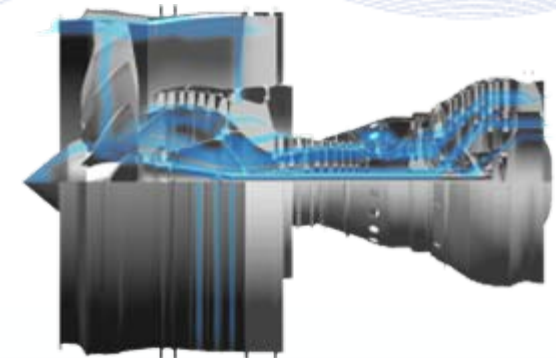
Integrated Propulsion System

Weight Efficiency



Diagnostics

Reliability



Revolutionary, patented technology...

3-D woven Resin Transfer Molding (RTM)

- Durability
- Weight
- Noise
- Maintenance



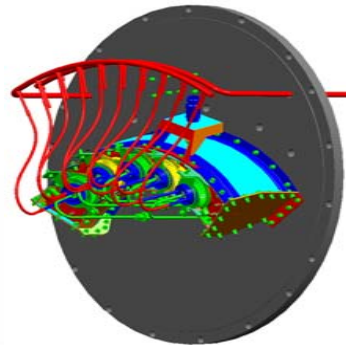
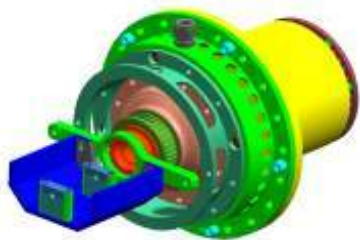
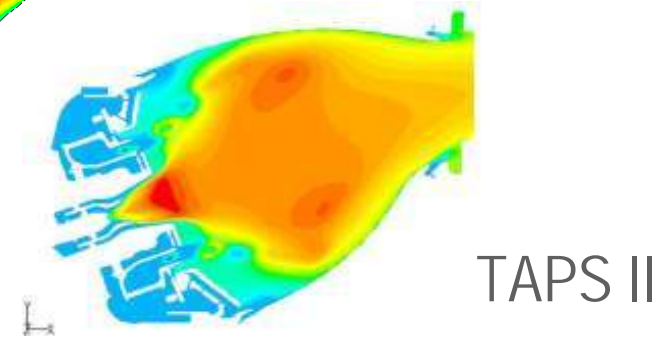
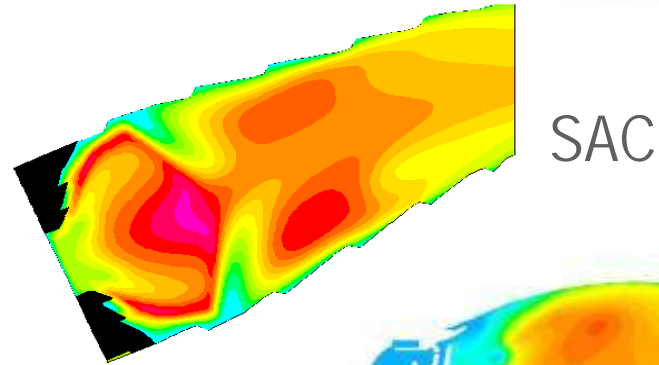
Composite fan case

- Weight
- Fatigue resistance

... provides 1,000 lb weight benefit per aircraft

LEAP-X TAPS II combustor

- TAPS II combustor
 - 50% NO_x margin vs. CAEP 6
 - Durability
 - Longer time on wing
- Engine-scale component rig tests throughout development
- Validate design & performance



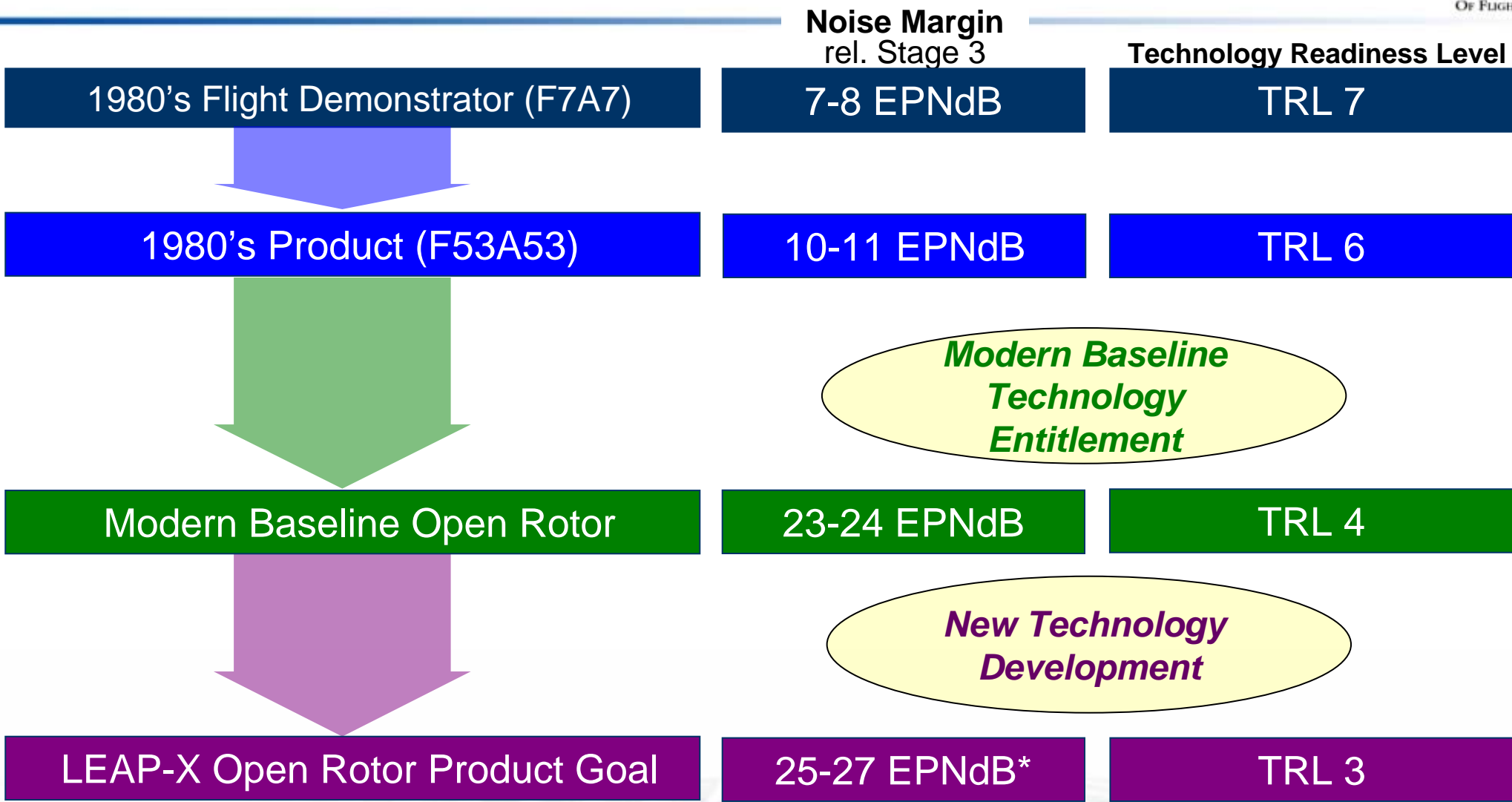
Open Rotor alternative architecture...

*... could provide up to 26% **lower** fuel burn vs. current CFM56*



... dedicated technology development & maturation on going

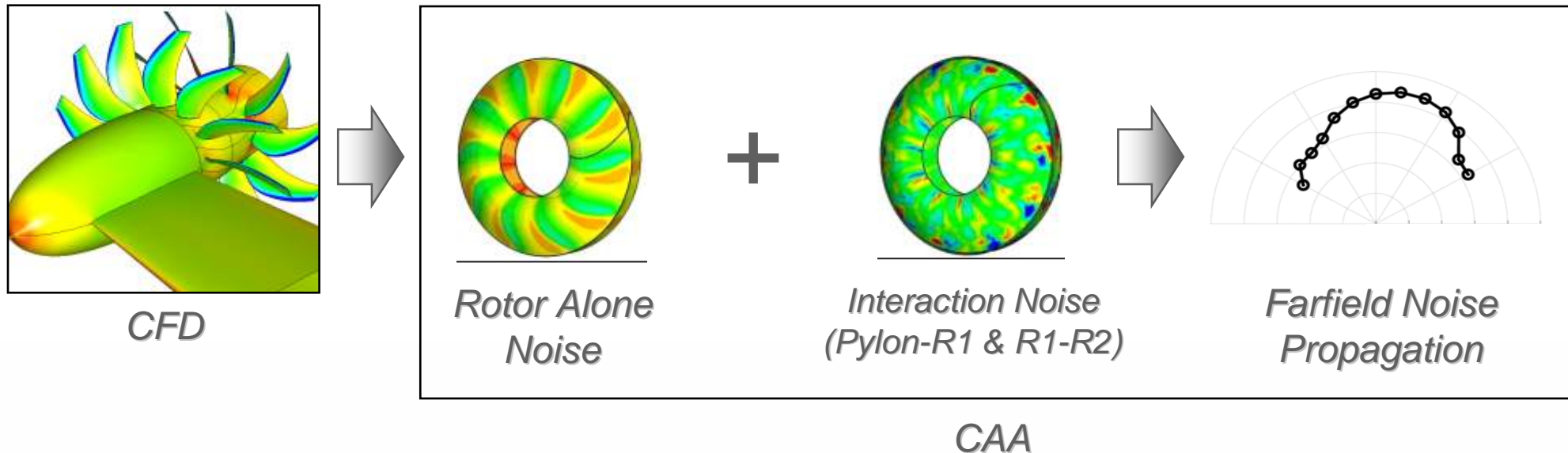
Installed Aircraft System Noise Status Evolution



*req'd to meet 20dB margin guarantee

Open Rotor Noise Prediction

Advanced CFD/CAA solution to estimate noise sources
–Rotor-alone + interaction noise sources

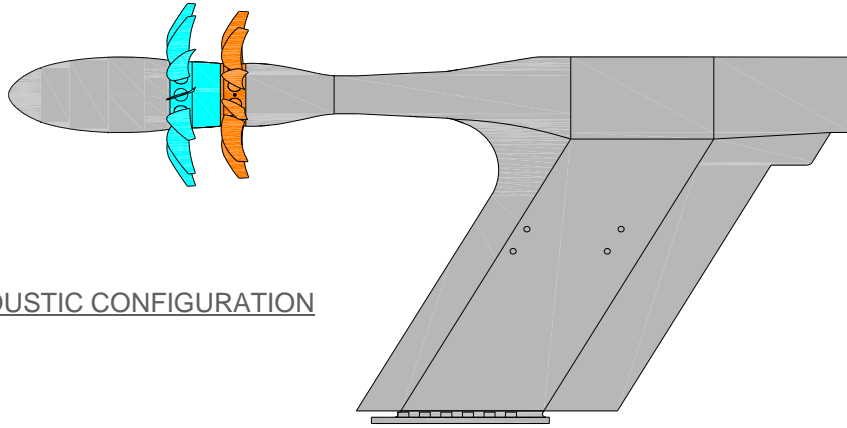


Modern Tools Used to Guide Aeroacoustic Screening

NASA ORPR Test Configurations

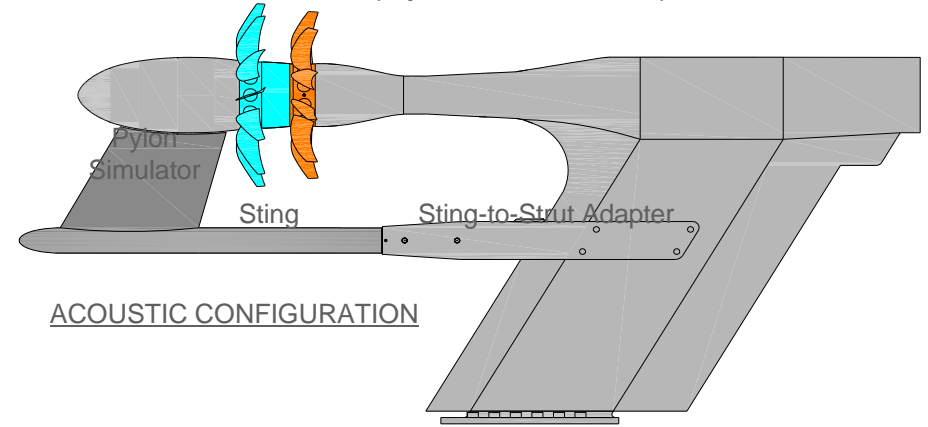


Isolated Rig Configuration



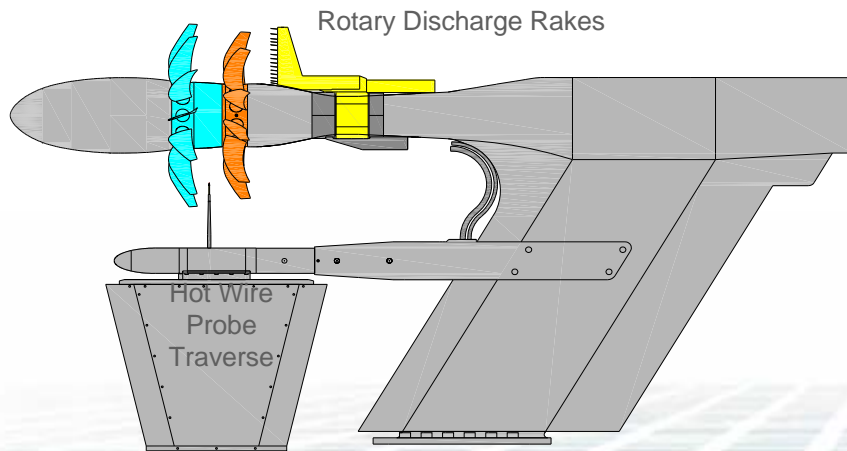
ACOUSTIC CONFIGURATION

Installed Rig Configuration (Pylon Simulation)



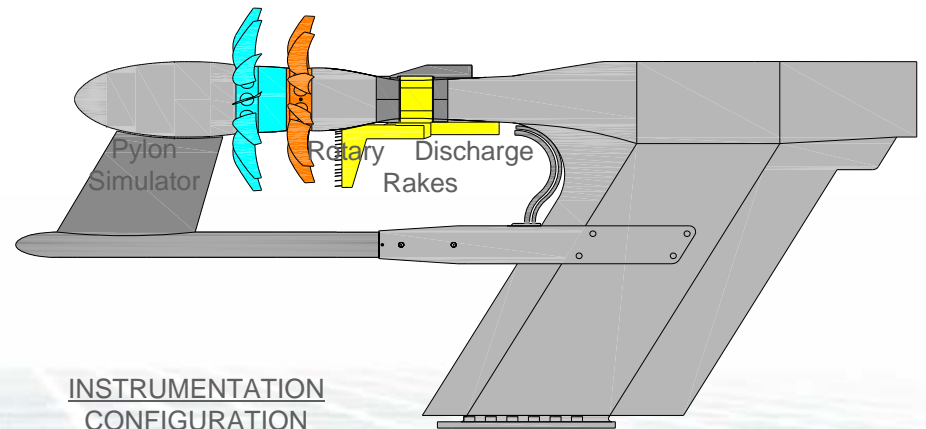
ACOUSTIC CONFIGURATION

Isolated Rig Configuration (Instrumented)



INSTRUMENTATION CONFIGURATION

Installed Rig Configuration (Instrumented)



INSTRUMENTATION CONFIGURATION

LEAP-X on track to redefine the state of the art

- CFM investing in advanced aerodynamic, materials, and environmental technology
- Technology and maturation programs on schedule
- First full LEAP-X demo engine in 2012
- Could be certified by 2016
- Keeping our options open ... LEAP-X providing foundational technologies for potential open rotor architecture

