# COLLINS AEROSPACE

## ACOUSTIC EXHAUST TECHNOLOGY DEMONSTRATOR

## CLEEN III CONSORTIUM PUBLIC INDUSTRY DAY

- May 4th, 2022

This document contains no technical data subject to the EAR or the ITAR
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# OUTLINE

- Perspective Changes Everything
- Collins CLEEN III Focus
- Program Summary
  - Acoustic Exhaust Technologies
- Project Schedule
  - Overall initial plan
- Summary

# PERSPECTIVE CHANGES EVERYTHING

## SUSTAINABILITY AT COLLINS AEROSPACE

JANUARY 2022





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# FROM OUR VIEWPOINT, THE FUTURE LOOKS BRIGHT

## OUR PERSPECTIVE – WHERE WE ARE

- Aviation is going through a drastic change requiring the industry to **redefine air travel** in a sustainable way.
- As one of the largest aerospace companies in the world, we are **in a unique position** to lead a positive impact on the future and are **committed to doing more**.
- Now, we are **amplifying and accelerating** our efforts together with our partners.





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# OUR PERSPECTIVE

## IT'S TIME TO DO MORE

**Advancing the future of sustainable aerospace for and with our customers, employees and stakeholders.** Building lighter, leaner and more fuel-efficient solutions is at the core of how we operate and innovate. Now, we are asking new questions and looking at the work we do differently to build on that foundation. This is the time to redefine what sustainability means in aerospace and work together throughout our industry, and beyond, to bring that vision to life.

### FOCUS AREAS:

**COLLABORATION**

Inspiring our people, communities, customers and industry to work together for a brighter future

**RESEARCH AND DEVELOPMENT**

Investing in R&D to pioneer more sustainable technologies

**PRODUCT SOLUTIONS**

Innovating safer, smarter and more resilient solutions

**ENVIRONMENTAL IMPACT**

Driving resource-efficient practices throughout aviation





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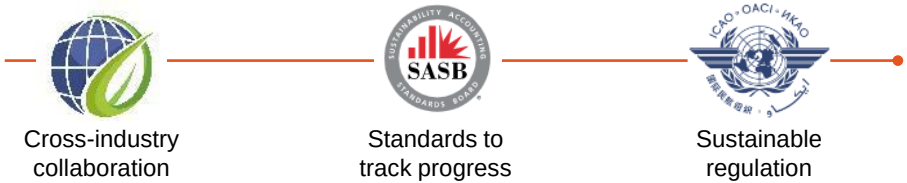
# STRATEGIES FOR A SUSTAINABLE FUTURE

**STAKEHOLDER ENGAGEMENT**

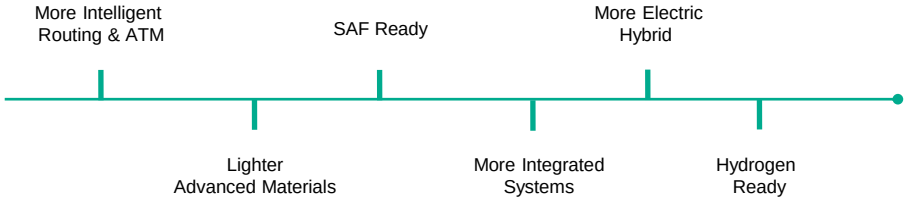
Supporting industry-wide sustainable aviation




Aligned Priorities & Shared Goals for Aviation

**TECHNOLOGY ROADMAP**

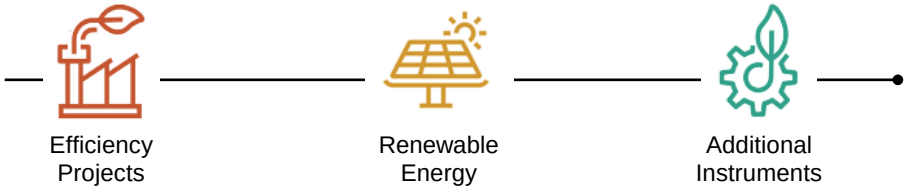
Collaborating to Fly Net Zero by 2050




From Evolution to Revolution in Sustainable Technologies

**INDUSTRIAL ROADMAP**

Sustaining progress of -37% GHG emissions intensity




Sustainable Supply Chain for the Future

Collins has achieved a 37% reduction in operations emissions intensity (GHG emissions / $sales) since 2015





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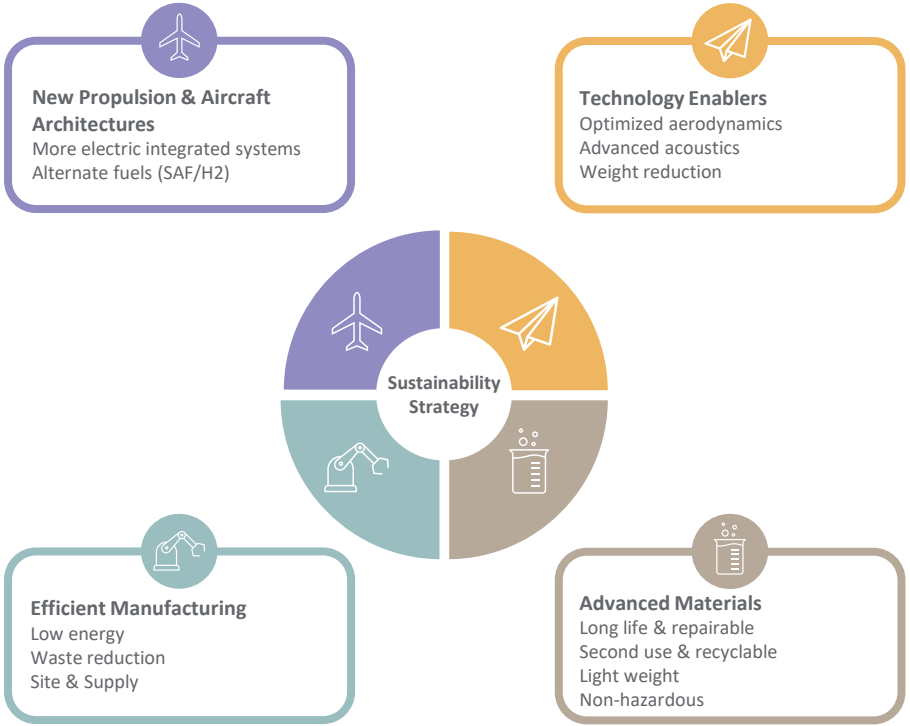
# AEROSTRUCTURES SUSTAINABILITY FOCUS





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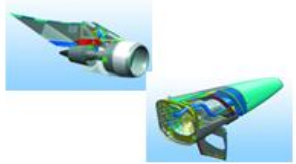
# COLLINS AEROSPACE – AEROSTRUCTURES

## Key Products and Systems

Nacelle systems

Pylons and fairings

Flight control surfaces



## Key Platforms










Collins Aerospace – Aerostructures

Industry-leading independent supplier and integrator of nacelles and pylons, offering complete lifecycle design/build/support for large commercial, regional and business jet customers around the world





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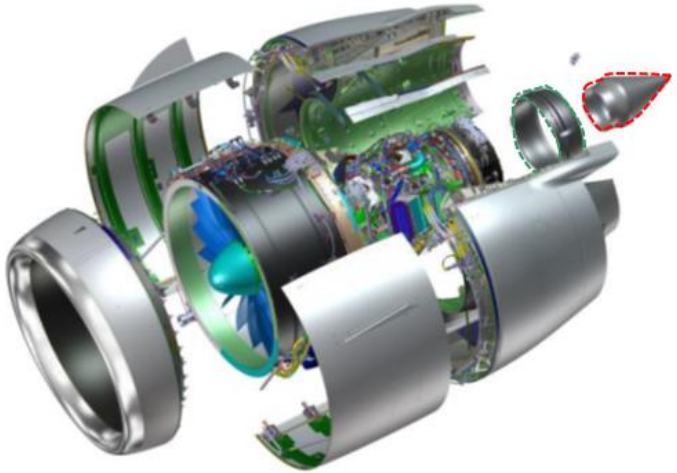
# COLLINS CLEEN III FOCUS

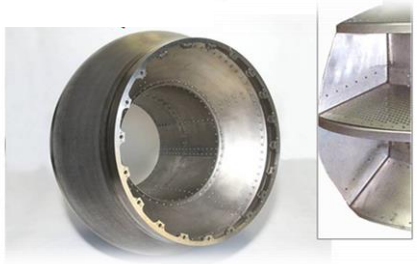
Develop advanced exhaust acoustic systems with applications across nacelles components, enabling lower energy, emissions and noise initiatives, aimed at maximizing efficiency of next-generation propulsion systems.

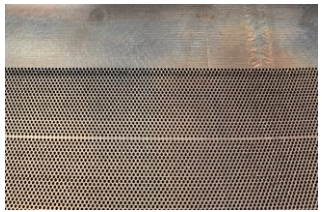
# ACOUSTIC EXHAUST TECHNOLOGIES

| Technology | Goal Impact | Benefits and Application |
|---|---|---|
| Advanced Acoustic Exhaust | Noise Reduction | 0.9 – 1.5 EPNdB |



**Acoustic Chamber….**





**….combined with novel liners**

**Large Acoustic Cell Liners In Work**
**IP Sensitive**

INNOVATIVE
PRODUCIBLE ✓ COST EFFECTIVE





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# Advanced Acoustic Exhaust

## Benefits:

- **Noise Reduction: 0.9-1.5 EPNdB**
- Fuel Burn Improvement: Neutral

## Risks/Mitigations:

- Novel core producibility with exhaust relevant materials is unknown / Perform fabrication trials
- Close tolerances of bonding skins / Assess build repeatability

## Objectives:

- Develop and demonstrate an advanced acoustic exhaust
- Advance manufacturing maturity/producibility of novel cores

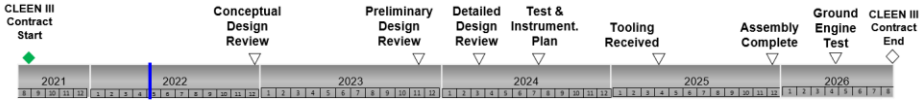
## Work Statement:

- Novel core geometries tuned to exhaust tones
- Manufacturing feasibility studies with relevant alloys
- Flat panel mechanical and acoustic property tests
- Demonstrator design, fabrication, and acoustic testing

## Progress Update:

- On schedule for Conceptual Design Review
- Producibility trials in work

## Schedule:





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# SUMMARY

- Advanced acoustic exhaust technology, noise reduction 0.9 – 1.5 EPNdB
- Acoustic evaluations in work
- Novel core geometry finalized
- Fabrication evaluations with relevant materials in work

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