Clean Sky 2 JU

Giuseppe PAGNANO

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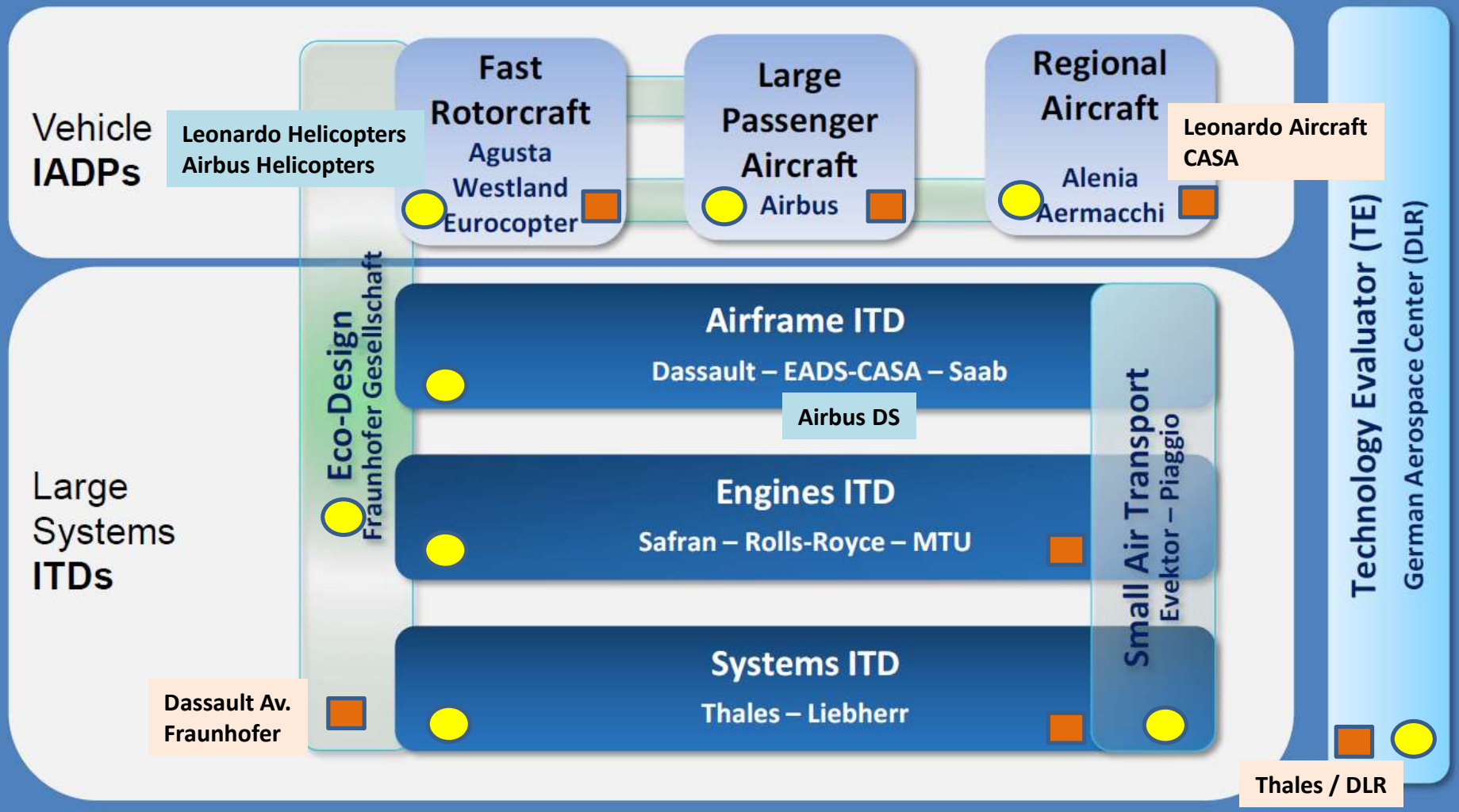
TECHNOLOGYBIZ 2018

- **Brief intro to Clean Sky programmes**

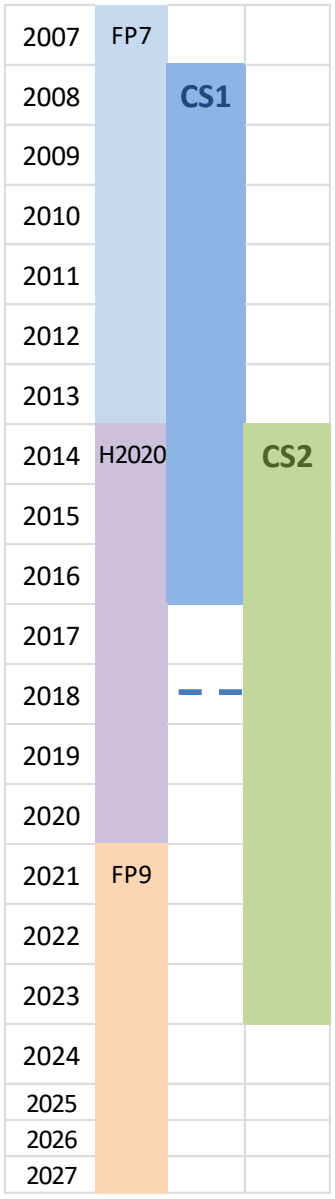
Clean Sky Organisation



Clean Sky – (2008-2016) – 1.6 billion (800 mil from FP7, industry in kind)

Clean Sky 2 – (2014-2024) - 4 billion (1755 mil from H2020, industry in kind)

Clean Sky participation



The Clean Sky 1 programme
(2008-2016)

funded 696 entities from 26 countries
and 105 EU regions
with approx. 780 M€

The Clean Sky 2 programme

has funded so far (end 2018)
more than **650** entities from **27** countries
and **110** EU regions
with approx. **€ 1,05 billion**

~ € 700 million funding and 3 calls yet to come

Clean Sky Overview

Clean Sky aims environmental improvement through developing and demonstrating clean aircraft technologies

	Clean Sky 1	Clean Sky 2
Nº of Demonstrators	28	37
EU funding in € million	800 (from FP7)	1 755 (from Horizon 2020)
	50% for actions of the Leaders	40% for actions of the Leaders
	25% for actions of the Associates	30% for actions of the Core Partners
	25% for actions for Partners	30% for actions for Partners
Private contribution in € million	600	2 193

50% rate

Clean Sky

- **Call for Proposals 09**

9th Call for Proposal at a glance

Call Launch	06 Nov 2018
Call Closure	06 Feb 2019
Evaluation Phase	March 2019
Q&A last publication*	1 month before Call Closure
Technical sessions & Grant preparation	~Q2 – Q3 2019
Indicative Start date of activities	~Q3 2019**

**Questions received up until 5th December 2019, 17:00 (Brussels time) will be answered after analysis and published in the Q&A when appropriate. In total, three publications of Q/As are foreseen: 06/11, 22/11, and 19/12/2018 (estimated dates).*

***Indicative start date for Thematic Topics*

For Q&A: Info-Call-CFP-2018-02@cleansky.eu (email address only active as from 23/10/2018).

Find out more about Call latest news and related Info Days: www.cleansky.eu

9th Call for Proposal at a glance

PART A: Call topics launched within the complementary framework of IADP/ITD/TA

1. Overview of number of topics and total indicative funding value per SPD

SPD Area	No. of topics	Ind. topic Funding (M€)
IADP Large Passenger Aircraft	20	26.50
IADP Regional Aircraft	0	0
IADP Fast Rotorcraft	3	11.45
ITD Airframe	11	10.25
ITD Engines	4	3.35
ITD Systems	10	6.70
Small Air Transport (SAT) related topics*	[2]	[1.55]
ECO Design related topics	[1]	[1.50]
Technology Evaluator	3	0.85
TOTAL	**51**	**59.10**

*TA related topics are proposed and embedded in the following SPD and as follows:
AIR ITD: 2 SAT topics, 1.55 M€; ENG ITD: 1 ECO topic, 1.50 M€

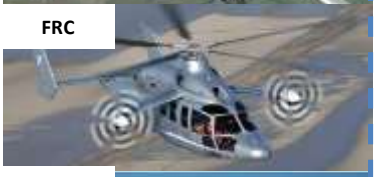
AIR Key General Objectives

More Efficient Airframes ✓ Weight ✓ Drag ✓ Cabin ✓ Noise ✓ New Materials ✓ Maintenance

Efficiency of the engineering & manufacturing process ✓ Manufacturing Cost ✓ Time to Market (lead Time)

IADP/Integrated Demonstrators

SUPPORT TO IADP: Maturate technologies **up to TRL 6**



High Performance & Energy Efficiency					High Versatility & Cost Efficiency			
Innovative Aircraft Architecture	Advanced Laminarity	High Speed Airframe	Novel Control	Novel travel experience	Next generation optimized wing	Optimized high lift configs.	Advanced integrated structures	Advanced Fuselage

TRANSVERSE **Eco-Design** for Airframe & **Modeling to certification ability**

FUTURE: De-risk novel generation product in the prospect of changing step by 2030+

Clean Sky
JOINT UNDERTAKING

AIRFRAME ITD

JTI-CS2-2018-CFP09-AIR-01-40	Anticontamination Coatings and Cleaning Solutions for Laminar Wings	RIA	2.00	Airbus
JTI-CS2-2018-CFP09-AIR-02-68	Spring-in prediction capability for large integral wing structure [SAT]	IA	0.75	Israel Aircraft Industries
JTI-CS2-2018-CFP09-AIR-02-69	Biphasic Heat Transport Integration for Efficient Heat Exchange within Composite materials Nacelle	RIA	0.80	Airbus Defence & Space
JTI-CS2-2018-CFP09-AIR-02-70	Development and application of an innovative methodology devoted for high temperature characterization of high efficient composite structures	RIA	0.70	Airbus Defence & Space
JTI-CS2-2018-CFP09-AIR-02-71	Model Manufacturing and Wind Tunnel Testing of High Lift System for SAT Aircraft [SAT]	RIA	0.80	Piaggio Aero
JTI-CS2-2018-CFP09-AIR-02-72	MEMS sensors, wireless and innovative measurement systems for validation of HVDC system Structure integration and for new SHMS architectures	IA	0.60	Airbus Defence & Space
JTI-CS2-2018-CFP09-AIR-02-73	Material modelling platform for generation of thermoplastic material allowable	RIA	1.25	Airbus
JTI-CS2-2018-CFP09-AIR-02-74	Development of a multipurpose test rig and validation of an innovative rotorcraft vertical tail	IA	0.70	Fokker Aerostructure
JTI-CS2-2018-CFP09-AIR-02-75	Design Against Distortion: Part distortion prediction, design for minimized distortion, additive manufactured polymer aerospace parts	RIA	0.75	Airbus
JTI-CS2-2018-CFP09-AIR-02-76	Cost analysis software platform for evaluating innovative manufacturing technology for SMART fuselage	RIA	0.40	Imperial College London
JTI-CS2-2018-CFP09-AIR-03-06	Calibrating Ultrasonic Sensors for atmospheric corrosion.	RIA	1.50	Dassault Aviation

AIR-02-70: Development and application of an innovative methodology devoted for high temperature characterization of high efficient composite structures

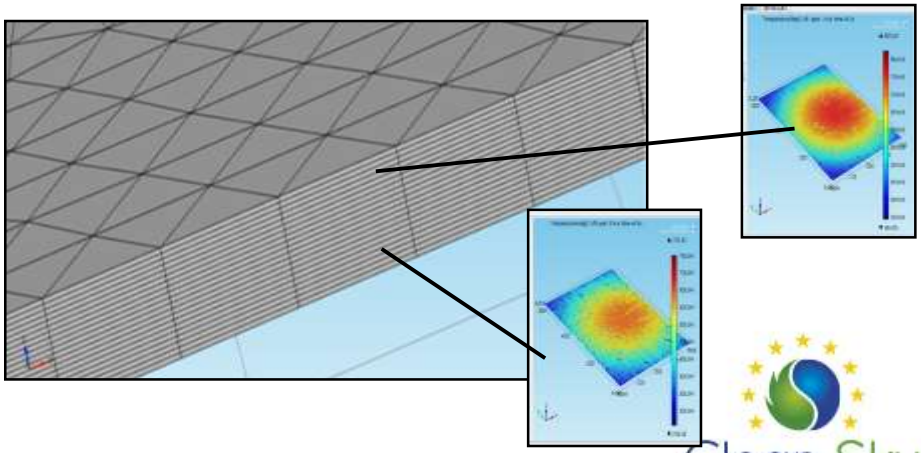
Funding	700 K€	Duration	24 months
Type of action		RIA	

OBJECTIVES

- Provide an innovative testing lab environment for:
  - thermal events monitoring by innovative passive filtering techniques applied to termography
  - composite thermal properties characterization by flash method or equivalent
- Evaluate thermo-mechanical behavior of thermoplastic loaded structures submitted to fire and high temperature air exhausts

COMPETENCES

- R&T management of complex and international projects for aeronautical composite & metalic components
- Fast track trial and error methodology
- 3D Design SW, Structural Analysis
- Thermomechanical FEM competences
- Thermoplastic & thermosetting manufacturing and assembly processes
- Thermoplastic Raw materials internal development
- Fast NDI
- Material physic-chemical analysis



AIR-02-73: Virtual Allowable Platform for thermoplastics

Objectives

- Replace a significant amount of physical tests (material screening/characterisation & certification phases)
- Reduce lead time for material data availability for design (early phases of A/C development)

Main activities

- Thermoplastic material test characterization at ply and interface level in order to observe main damage and failure mechanisms
- Creation of a novel thermoplastic material damage and failure model to be implemented in ABAQUS solver
- Parametric coupon models creation for virtual design allowable automated generation (eg. Open hole tension/compression)
- Uncertainty Quantification and Management principles definition for virtual design allowable (B-values)
- Platform/tool encompassing all above activities with a friendly user interface

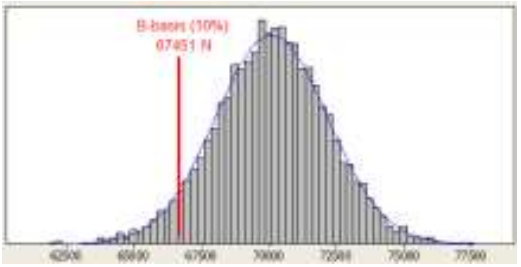
Competences requested

- Specialist in advanced structural numerical analysis with advanced skills in composite failure modelling.
- Experience with probabilistic methods (e.g. Monte Carlo, Latin Hypercube, Mean Value Method, 1st and 2nd order Reliability Methods, etc.).
- Track-record in having material models selected to be implemented in commercial Finite Element codes.
- Track-record in defining best-practice guidelines for the use of analysis methods at industry level.
- Experience in high strain rate testing of polymer composites using Hopkinson Bars.
- Track-record in manufacturing thermoplastic composites.
- Nadcap and ISO17025 accredited lab to perform experimental characterization of non-metallic materials.

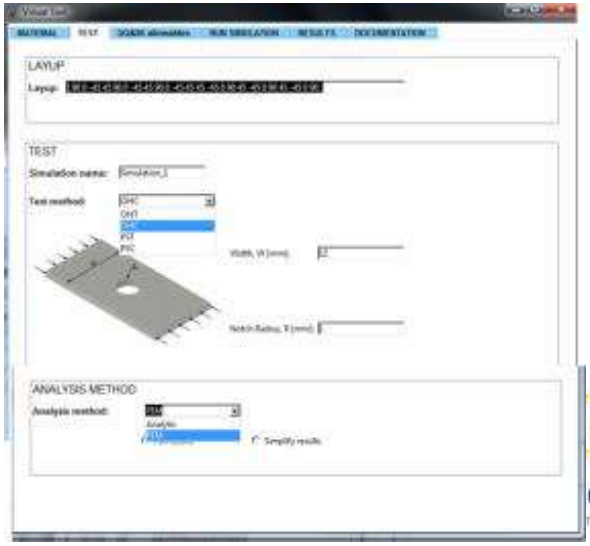
Funding	1250 K€	Duration	36 months
Type of action		RIA	

Open-hole coupon

B-values



Tool prototype



AIR-02-75: Design against Distorsion: Part distorsion prediction, design for minimized distorsion, additive manufactured polymer aerospace parts

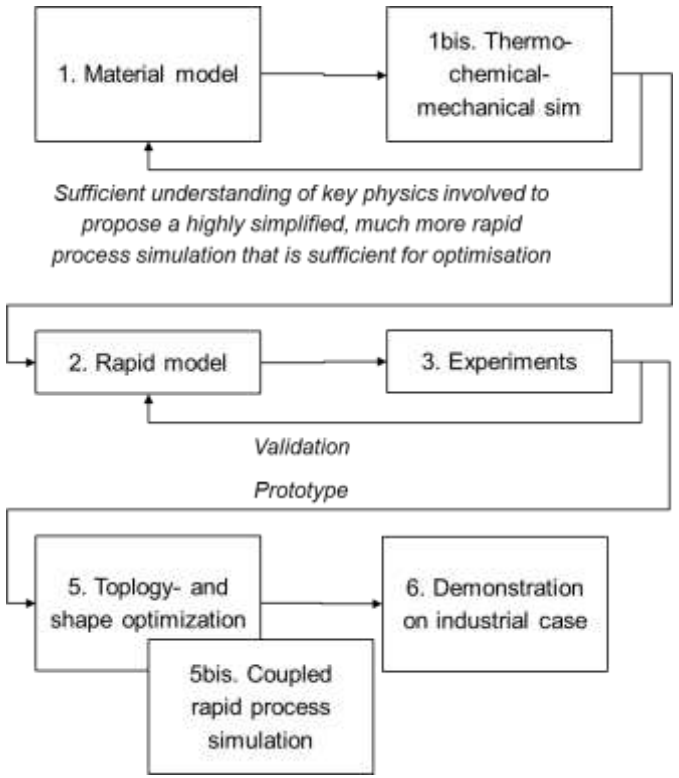
Funding	750 K€	Duration	36 months
Type of action		RIA	

Objectives:

- Develop rapid methods to predict material degradation, crystallinity and distortion of additive manufactured PAEK parts, with or without fibre reinforcement;
- Develop methods and tools for topology and shape optimization accounting for distortion;
- Fused Filament Fabircation and ThermoMELT (has certain similarities with Selective Laser Sintering).

Required:

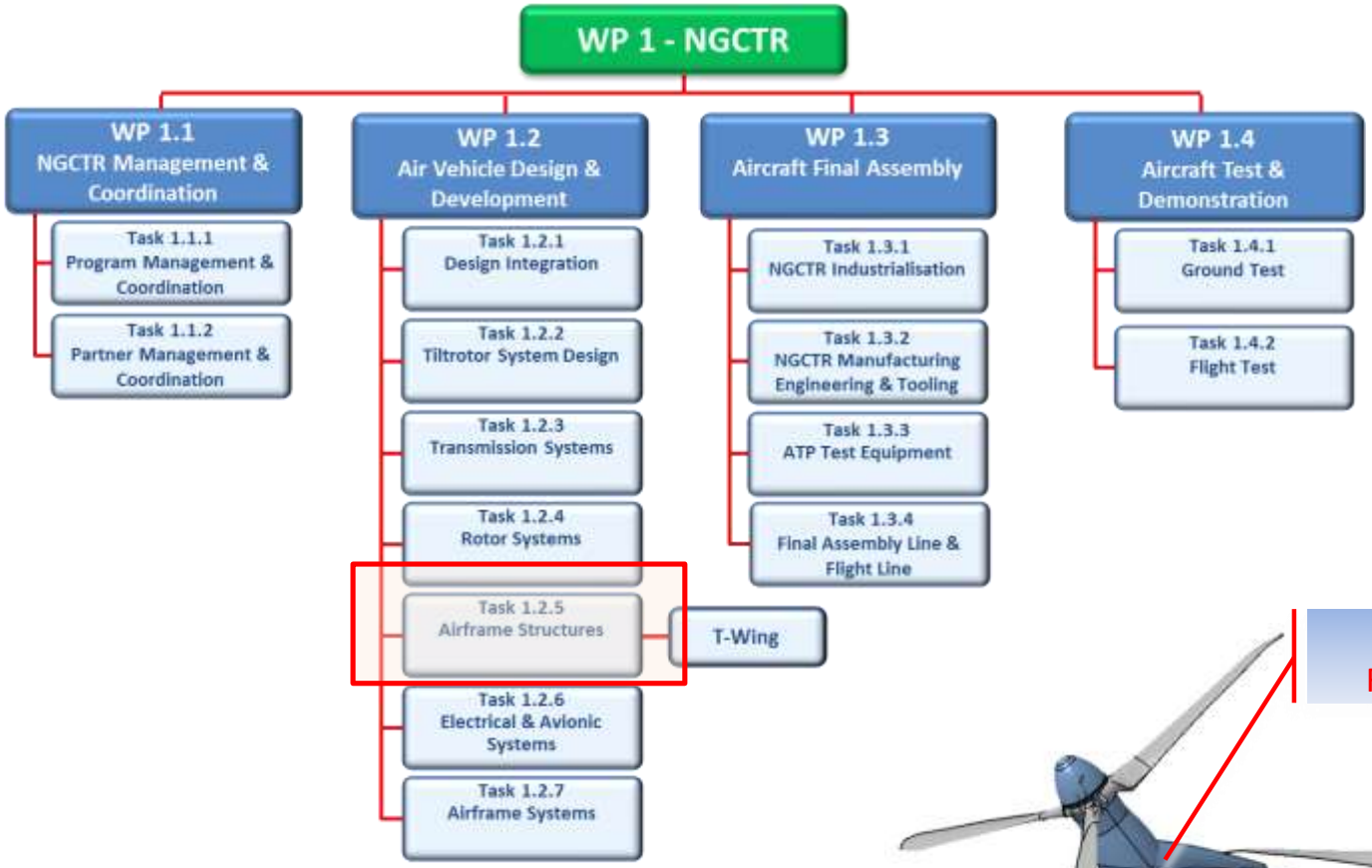
- Experience with non-linear simulation of polymer transformation processes, such as moulding, welding, selective laser melting: coupled thermal-chemical-mechanical analysis.
- Fused Filament Fabrication machine, capable of building PAEK test articles. Laboratory-type environment: experiment with build strategies, measure shape distortions accurately.
- Experience with topology-, shape- and fibre reinforcement optimisation, the corresponding sensitvity analysis (both for shape- as well as for topology optimization) and prior work on design optimisation algorithms for 3D cases involving process simulation and optimization with uncertainties.

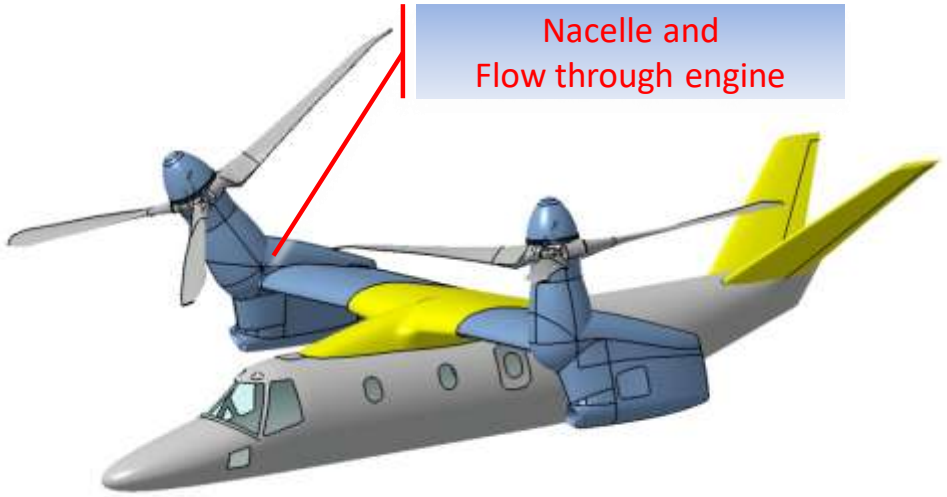


FAST ROTORCRAFT IADP

JTI-CS2-2018-CFP09-FRC-01-25	Smart Active Inceptors System definition for Tilt Rotor application	RIA	1.25	Leonardo Helicopters
JTI-CS2-2018-CFP09-FRC-01-26	Design, manufacture and deliver a high performance, low cost, low weight Nacelle Structure for Next Generation TiltRotor (NGCTR) - Technology Demonstrator (TD)	IA	5.20	Leonardo Helicopters
JTI-CS2-2018-CFP09-FRC-01-27	Tilt Rotor Whirl Flutter experimental investigation and assessment	RIA	5.00	Leonardo Helicopters
JTI-CS2-2018-CFP09-FRC: 3 topics			**11.45**	

JTI-CS2-2018-CFP09-FRC-01-26

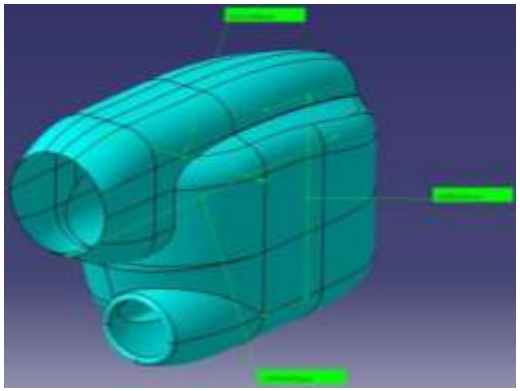




JTI-CS2-2018-CFP09-FRC-01-26

The Partner shall work with the IADP Leader and the Core partner responsible for the wing to develop the NGCTR TD Nacelle Structure to be installed on the NGCTR TD for flight test.
The selected Partner shall be responsible for:

- Detail design and manufacture of the nacelle tilting structural elements.
- Detail design and manufacture of the nacelle fixed structural elements interfacing with the tilting ones including the interface mechanism(e.g the cowling / fairing support)
- Detail design and manufacture of the nacelle engine bay structural elements(e.g. firewalls, seals, ducts, engine mounts, thermal blankets and engine bay floor.
- Develop and execute plans for design, analysis, manufacture and test as necessary for the elements (fire test; bird strike; structural element; endurance of tilting fairing mechanism; any other tests required) in order to support to LHD for the production of the relevant documentation to achieve a permit to fly for the TD.



Thematic topics

PART B: Thematic Topics

1. Overview of Thematic Topics

List of Topics for Calls for Proposals (CFP09) – Part B

Identification Code	Title	Type of Action	Value (Funding in M€)
JTI-CS2-2018-CFP09-THT-03	Conceptual Design of a 19 passenger Commuter Aircraft with near zero emissions	RIA	0.75
JTI-CS2-2018-CFP09-THT-04	Design Optimisation providing optimum performance towards limiting aviation's contribution towards Global Warming	RIA	0.75
JTI-CS2-2018-CFP09-THT-05	Advanced High Bypass Ratio Low-Speed Composite Fan Design and Validation	RIA	2.00
JTI-CS2-2018-CFP09-THT-06	Research for the development of Particulate Matter (PM) regulations and guidelines	RIA	1.00

- **Way forward to next FP**

European Commission

Commission proposal for

Horizon Europe

THE NEXT EU RESEARCH & INNOVATION PROGRAMME (2021 – 2027)

#HorizonEU

Research and Innovation

Horizon Europe: evolution not revolution

Specific objectives of the Programme

Support the creation and diffusion of high-quality knowledge

Strengthen the impact of R&I in supporting EU policies

Foster all forms of innovation and strengthen market deployment

Optimise the Programme's delivery for impact in a strengthened ERA

Pillar 1
Open Science

- **European Research Council**
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2
Global Challenges and Industrial Competitiveness

Clusters
- Health
- Inclusive and Secure Society
- **Digital and Industry**
- **Climate, Energy and Mobility**
- Food and natural resources

- **Joint Research Centre**

Pillar 3
Open Innovation

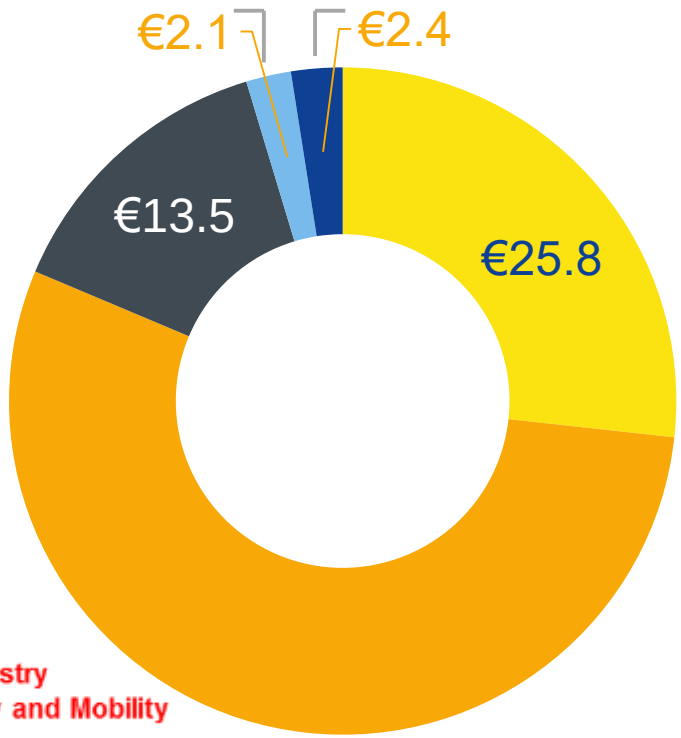
- **European Innovation Council**
- European innovation ecosystems
- European Institute of Innovation and Technology

Strengthening the European Research Area

- Sharing excellence
- Reforming and Enhancing the European R&I system

European Commission

Budget: €100 billion*



- Digital and Industry
- Climate, Energy and Mobility

15 B€ each

€ billion
In current prices

- Open Science
- Global Challenges & Ind. Competitiveness
- Open Innovation
- Strengthening ERA
- Euratom

* This envelope includes EUR 3.5 billion allocated under the InvestEU Fund.

European Commission

Lessons Learned
from Horizon 2020 Interim Evaluation

Key Novelties
in Horizon Europe

Support breakthrough innovation	European Innovation Council
Create more impact through mission-orientation and citizens' involvement	R&I Missions
Strengthen international cooperation	Extended association possibilities
Reinforce openness	Open science policy
Rationalise the funding landscape / reduce admin burden Promote Synergies among different sources	New approach to Partnerships / simpler rules

European Commission

Final remarks

Clean Sky is considered a successful example of the PPP approach in the EU aeronautics landscape.

CS2 was built on the pioneering experience of CS1.

A potential CS3 needs to adapt to the new indications of Horizon Europe in terms of

- missions,
- synergies
- and content
  - across the clusters of the pillar *Global Challenges and industrial competitiveness :*
    - *Digital and Industry* and
    - *Climate, Energy and Mobility*

Thank You

www.cleansky.eu