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Clean Sky 2

Clean Sky 2
Information Day dedicated to the 8th Call for Proposal Partners (CfP08)

LPA – IADP

Presented by
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Toulouse / France, 17 May 2018

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Clean Sky 2

From Clean Sky towards Clean Sky 2

CS1 Smart Fixed Wing Aircraft -ITD (SFWA)

- Is a unique environment for high TRL integrated Research and Development
- Provides the frame for well aligned objective driven R&T covering development and maturation through numerical simulation, rig demonstrators, wind tunnel testing, large scale and flight testing under conditions relevant for operation

SFWA key technologies

- NLF – wing for large transport aircraft and bizjets
- CROR engine integration
- Innovative empennage for next generation bizjets
- Innovative control surfaces
- Buffet Control Technologies
- Advanced load control architectures and function
- Advanced Flight Test instrumentation

CS2 Large Passenger Aircraft IADP (LPA)

- Will provide a platform for even more focussed large scale, highly integrated demonstrators with core partners and partners
- Build on down best candidate technologies emerging from CleanSky 1 other national and EU R&T programs and additional technologies developed in CS2 ITDs

Contribute to TRL - Scale

1	2	3	4	5	6

Clean Sky

Setup and Implementation

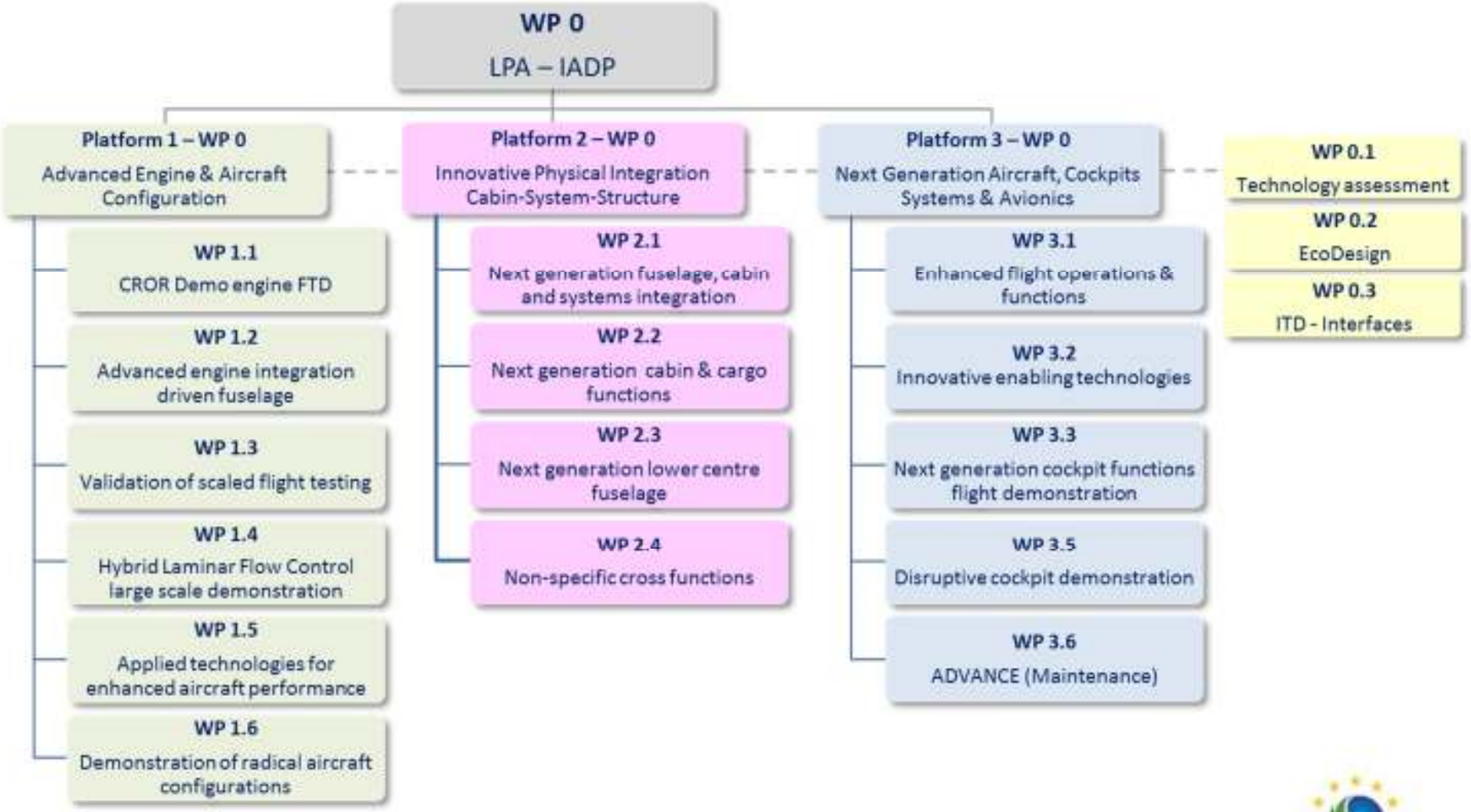
„Mature and validate disruptive technologies for next generation Large Passenger Aircraft through large scale integrated demonstration“

Platform 1
Advanced Engine and Aircraft Configuration

Platform 2
Innovative Physical Integration Cabin-System-Structure

Platform 3
Next Gen. A/C Systems, Cockpit Systems & Avionics

LPA-IADP Work Breakdown Structure



Overview of the LPA-CfP08 topics

Platform 1

11 topics / 15,20M€ ind. funding

ITD/IADP/TA	Title	WP Ref.	Start Date of activities	Duration (number Years)	Value (Funding in M€)	Topic Manager (TM)	Action type (IA or RIA)
JTI-CS2-2018-CfP08-LPA-01-47	High Performance Electrical Components for Bleed Control	WP 1.1.10	Q2/2019	2,5	0,9	Safran Power Units	IA
JTI-CS2-2018-CfP08-LPA-01-48	Advanced Pitch Control Mechanism TRL4 Demonstration	WP 1.1.3	Q2/2019	4	3,5	Safran Aircraft Engines	IA
JTI-CS2-2018-CfP08-LPA-01-49	Oil Transfer Bearing for Advanced Pitch Change Mechanism	WP 1.1.3	Q2/2019	3	2,5	Safran Aircraft Engines	IA
JTI-CS2-2018-CfP08-LPA-01-50	Development and manufacturing of innovative tooling for composite parts	WP 1.4.4	Q2/2019	2,5	1	ANNCO (Aernnova Composites)	IA
JTI-CS2-2018-CfP08-LPA-01-51	Design and manufacturing of a large-scale HLFC wing model for a transonic WTT	WP 1.4.4	Q2/2019	2	1,7	ONERA	IA
JTI-CS2-2018-CfP08-LPA-01-52	Thermo-mechanical design validation of compact heat exchanger by thermal cycling life prediction	WP 1.5.2.2	Q3/2019	3	1,2	LTS	IA
JTI-CS2-2018-CfP08-LPA-01-53	Compact Matrix Air Oil Heat Exchanger	WP 1.5	Q2/2019	3	0,7	Rolls-Royce	IA
JTI-CS2-2018-CfP08-LPA-01-54	Development of Measurement Techniques for Visualisation and Evaluation of Reverse Flow Interactions with Fan	WP 1.5	Q2/2019	3	1,6	Rolls-Royce	RIA
JTI-CS2-2018-CfP08-LPA-01-55	Development of AC cabling technologies for >1kV aerospace applications	WP 1.6.1	Q2/2019	2	0,75	Rolls-Royce	IA
JTI-CS2-2018-CfP08-LPA-01-56	Aerospace standard Lightweight SSPC for High voltage >1kA application.	WP 1.6.1	Q2/2019	2	0,9	Rolls-Royce	RIA
JTI-CS2-2018-CfP08-LPA-01-57	Innovative Power and data transfer solutions for nacelle	WP1.6.4	Q2/2019	3,2	0,45	Airbus	IA
TOTAL Platform 1 CFP08	**11 CfP-Topics**				**15,20**		

Overview of the LPA-CfP08 topics

Platform 2

4 topics / 3,25M€ ind. funding

ITD/IADP/TA	Title	WP Ref.	Start Date of activities	Duration (number Years)	Value (Funding in M€)	Topic Manager (TM)	Action type (IA or RIA)
JTI-CS2-2018-CfP08-LPA-02-23	Development and execution of new test procedures for thermoplastic aircraft fuselage panels	WP2.1.4	Q2/2019	2,5	0,50	Aernnova Enginering Devision - AED	IA
JTI-CS2-2018-CfP08-LPA-02-24	Generic added structures on shells made from thermoplastic sheet material	WP2.1.5	Q2/2019	2	0,8	Diehl Aircabin	IA
JTI-CS2-2018-CfP08-LPA-02-25	Micro mechanical characteristics of a PEKK Co-consolidation / welded joint	WP2.1.5	Q2/2019	2,5	0,85	Fokker	IA
JTI-CS2-2018-CfP08-LPA-02-26	Multifunctional Aircraft Power Network with Electrical Switching	WP2.1.5	Q2/2019	2,5	1,10	Fokker	IA
TOTAL Platform 2 CFP08	**4 CfP-Topics**				**3,25**		

Platform 3

1 topic / 0,7M€ ind. funding

ITD/IADP/TA	Title	WP Ref.	Start Date of activities	Duration (number Years)	Value (Funding in M€)	Topic Manager (TM)	Action type (IA or RIA)
JTI-CS2-2018-CfP08-LPA-03-15	Pilot monitoring in service data collection	WP3.1.4	Q2 2019	2	0,7	HWL	IA
TOTAL Platform 3 CFP08	**1 CfP-Topic**				**0,70**		

LPA TOTAL CFP08	**16 topics**				**19,15**		

Overview of the LPA-CfP08 topics

Platform 2

4 topics / 3,25M€ ind. funding

ITD/IADP/TA	Title	WP Ref.	Start Date of activities	Duration (number Years)	Value (Funding in M€)	Topic Manager (TM)	Action type (IA or RIA)
JTI-CS2-2018-CfP08-LPA-02-23	Development and execution of new test procedures for thermoplastic aircraft fuselage panels	WP2.1.4	Q2/2019	2,5	0,50	Aernnova Enginering Devision - AED	IA
JTI-CS2-2018-CfP08-LPA-02-24	Generic added structures on shells made	WP2.1.5	Q2/2019	2	0,8	Diehl Aircabin	IA
JT						ker	IA
JT						ker	IA
TOTAL P							

Important for Partner-Applicants to note:

Cooperation between the GAP Partners and LPA members acting in the „hosting“ work packages shall be done by means of an Implementation Agreement (IA) for all CfP#08 topics.

The IA shall be used as published with the CfP#08 Call documents.

Platform 3

1 topic / 0,7M€ ind. funding

			activities	Years)	M€)	Manager (TM)	Action type (IA or RIA)
JTI-CS2-2018-CfP08-LPA-03-15	Pilot monitoring in service data collection	WP3.1.4	Q2 2019	2	0,7	HWL	IA
TOTAL Platform 3 CFP08	1 CfP-Topic				0,70		
LPA TOTAL CFP08	17 topics				19,15		

LPA-IADP WBS – “Platform 1”

Airbus with SAAB, Dassault, SNECMA and Partners

Large Passenger Aircraft Platform – integration topics

„Platform 1 - OAD“

Advanced Engine and Aircraft Configurations

„Platform 2 - OPD“

Innovative Physical Integration Cabin-System-Structure

„Platform 3 - OSD“

Next Gen. A/C Systems, Cockpit Systems & Avionics

TRL 4-6
Aircraft Level

Platform 1 Advanced Engine and Aircraft Configurations

WP 1.1 CROR demo engine FTD

WP 1.2 Advanced engine integration driven rear fuselage

WP 1.3 Validation of scaled flight testing

WP 1.4 Hybrid laminar flow control large scale demonstration

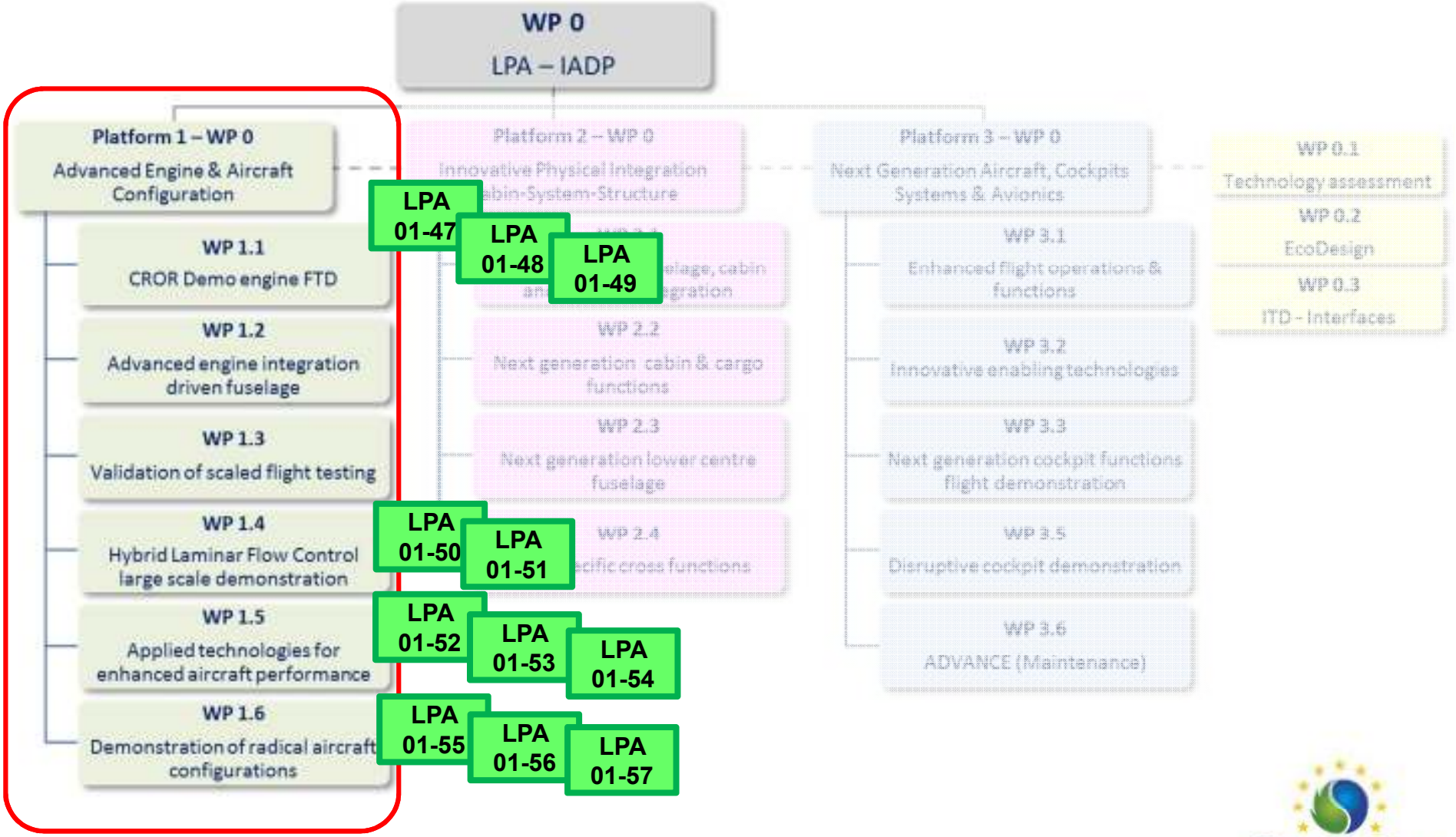
- HLFC applied on fin in long-term flight operation
- HLFC wing pre-flight demonstrator

WP 1.5 Applied technologies for enhanced aircraft performance

WP 1.6 Demonstration of radical aircraft configurations

Estimated Volume of Activities ~560M€

LPA-IADP WBS – “Platform 1”



JTI-CS2-2018-CfP08-LPA-01-47

High Performance Electrical Components for Bleed Control

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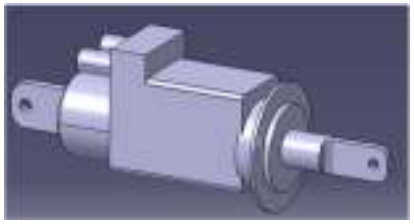
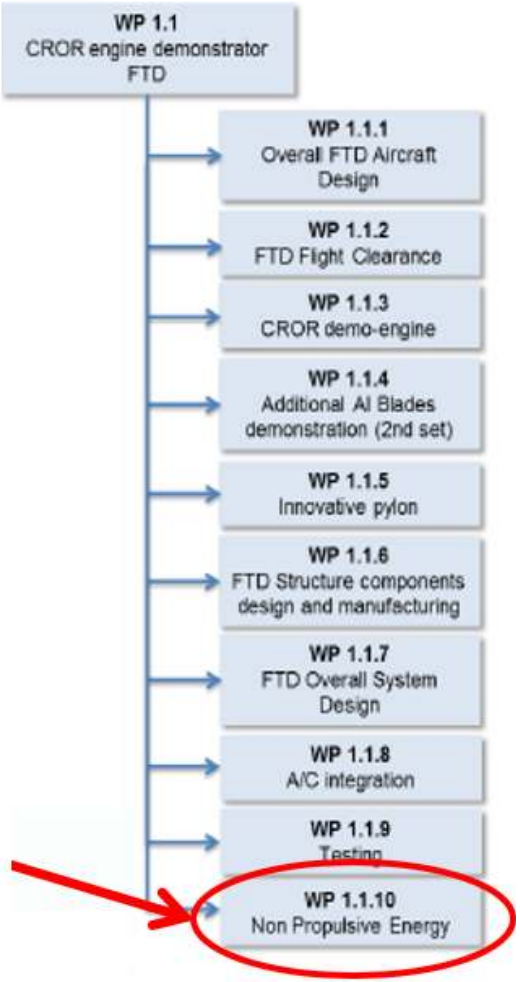
JTI-CS2-2018-CfP08-LPA-01-47

- **JTI-CS2-2018-CfP08-LPA-01-47**
- **WP1.1.10 : Non Propulsive Energy**
  - **Leader : Safran Aircraft Engine**
  - **Contributor : Safran Power Units, Airbus, Dassault**
- **Title:** *High Performance Electrical Components for Bleed Control*
- **Objective:** This topic aims at developing of high performance, high reliability, low cost, low weight electrical bleed control valves and electrical inlet guide vane actuator, in order to be able to control the APU bleedflow of an innovative Non Propulsive Energy generation system.
- **Volume:** 900 k€ funding





JTI-CS2-2018-CfP08-LPA-01-47

- **Schedule/Milestones**

Deliverables			
Ref. No.	*Title – Description*	*Type**	*Due Date*
D2.1	Preliminary Requirements Specification	R	T0+3
D2.2	Module Architecture Report	R	T0+6
D2.3	Industrialisation Assessment Report	R	T0+12
D2.6	Test report	R	T0+27
D2.7	Two components shipsets for integration	HW	T0+27
D2.8	Final report (incl. reliability prediction)	R	T0+30
Milestones (when appropriate)			
Ref. No.	*Title – Description*	*Type**	*Due Date*
D2.4	Preliminary Design Review	D	T0+12
D2.5	Detailed Design and Manufacturing Review	D	T0+18

**Type: R=Report, D=Data, HW=Hardware*

- **Targeted applicant**: Partner will be expert in the field of pneumatic and control systems, including the disciplines of electronics, digital control, mechanical and thermal engineering, and in the selection of components and specification and/or manufacture of components such as valves, actuators and control units for high reliability applications.
- **Required skills**:
  - Specialist in pneumatics systems & control systems
  - Links with, or internal, design & industrial capacity in power electronics
  - Mechanical design of actuators
  - Knowledge of aeronautical constraints (environments)
  - Test & analysis capability to support detailed behavior characterization of power components

JTI-CS2-2018-CfP08-LPA-01-48

Advanced Pitch Control Mechanism TRL4 Demonstration

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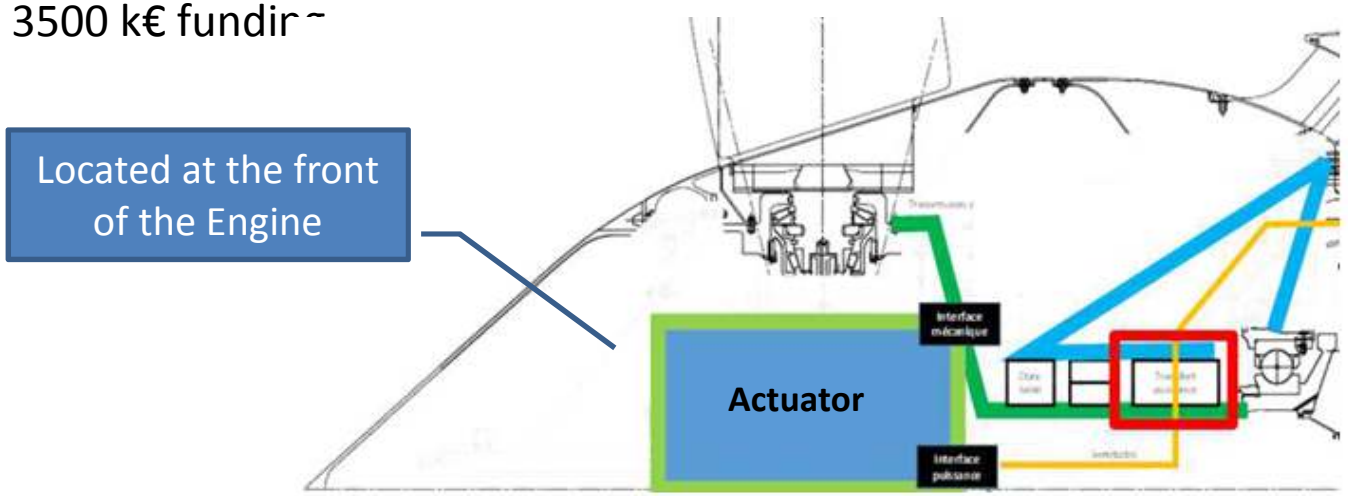
http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CfP08-LPA-01-48 : Advanced Pitch Control Mechanism TRL4 demonstration

- **JTI-CS2-2018-CfP08-LPA-01-48**
- **WP1.1.3.4 : 2030+ Engine Techno Bricks**
  - **Leader : Safran Aircraft Engines**

- **Title:** Advanced Pitch Control Mechanism TRL4 demonstration
- **Objective:** This topic aims at developing a new PCM technology with advanced performance pitch control mechanism featuring reduced mass; enhanced stiffness; improved maintainability; high accuracy and increased actuation capability.
- **Volume:** 3500 k€ fundir ~



JTI-CS2-2018-CfP08-LPA-01-48 : Advanced Pitch Control Mechanism TRL4 demonstration

- **Milestones**

Milestones (when appropriate)			
Ref. No.	*Title - Description*	*Type**	*Due Date*
PCM_MS_01	Specification Review	R	Q2 2019
PCM_MS_02	COR	R	Q3 2019
PCM_MS_03	PDR	R	Q2 2020
PCM_MS_04	CDR	R	Q4 2020
PCM_MS_05	TRL3 review	R	Q4 2020
PCM_MS_06	Manufacturing Review	R	Q3 2021
PCM_MS_07	Component Testing Review	R, HW	Q2 2021
PCM_MS_09	Assembly Review (PCM and PCM rig)	R	Q4 2021
PCM_MS_11	PCM Rig Commissioning Review	R	Q2 2022
PCM_MS_12	Acceptance and Qualification Test Review	R	Q3 2022
PCM_MS_13	TRL4 Review	R	Q3 2022
PCM_MS_14	Tested PCM Commissioning	R, HW	Q3 2022
PCM_MS_15	PCM investigations; lessons learned ; way forward	R	Q4 2022

**Type: R=Report, D=Data, HW=Hardware*

- **Targeted applicant**:

The applicant will be able to understand and challenge the specifications to develop an advanced Pitch Change Mechanism in a **aeronautical environment**. This PCM can be powered by an **high range of energies** : hydraulic, electric, mechanic, hybridation… **Creativity and innovation are expected.**

- **Required skills or subjects to deal with** :
  - Architecture design
  - Mechanical design
  - Hydraulic design
  - Electrical design
  - Manufacturing and assembly
  - Testing and inspecting

JTI-CS2-2018-CfP08-LPA-01-49

Oil Transfer Bearing for Advanced Pitch Change Mechanism

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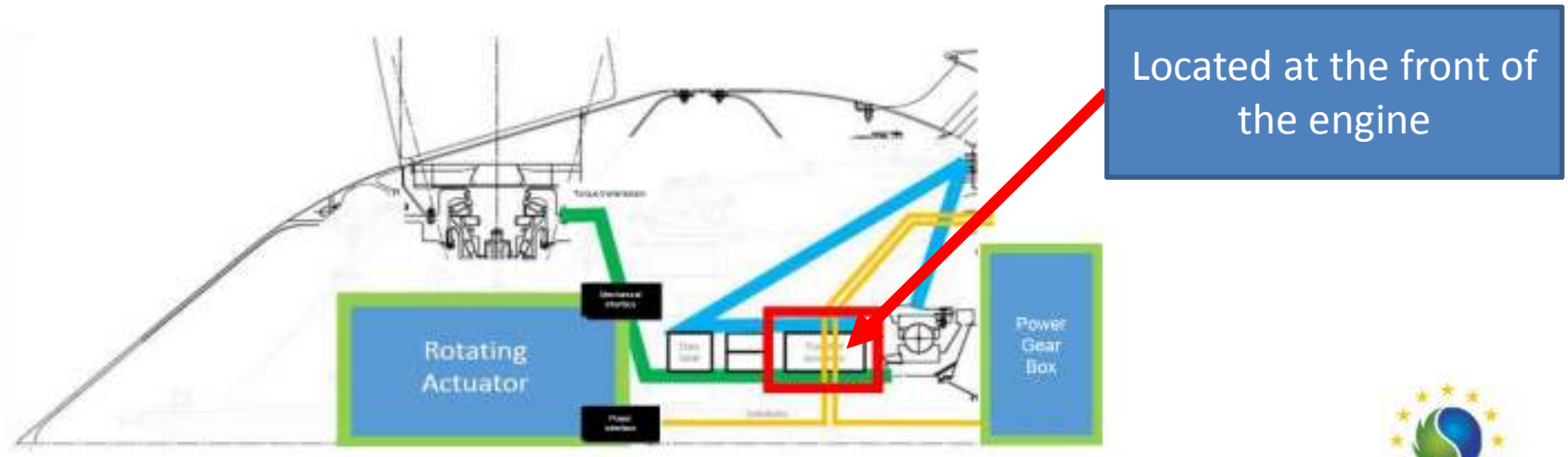
http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CfP08-LPA-01-49 : Oil Transfer Bearing for Advanced Pitch Change Mechanism

- JTI-CS2-2018-CfP08-LPA-01-49
- **WP1.1.3.4 : 2030+ Engine Techno Bricks**
  - **Leader : Safran Aircraft Engines**

- **Title:** Oil Transfer Bearing for Advanced Pitch Change Mechanism
- **Objective:** The project intends to identify most relevant concept; to design it from concept to detailed design; to manufacture, assemble and test it in representative testing conditions (vibration, endurance, performance, etc).
- **Volume:** 2500 k€ funding



JTI-CS2-2018-CfP08-LPA-01-49 : Oil Transfer Bearing for Advanced Pitch Change Mechanism

- **Milestones**

Milestones (when appropriate)			
Ref. No.	***Title - Description***	***Type****	***Due Date***
OTB_MS_01	Specification Review	R	Q2 2019
OTB_MS_02	COR	R	Q3 2019
OTB_MS_03	PDR	R	Q1 2020
OTB_MS_04	CDR	R	Q4 2020
OTB_MS_05	TRL3 review	R	Q4 2020
OTB_MS_06	Manufacturing Review	R	Q1 2021
OTB_MS_07	Component Testing Review	R, HW	Q1 2021
OTB_MS_08	N/A	N/A	Q1 2021
OTB_MS_09	Assembly Review (OTB and OTB rig)	R	Q1 2021
OTB_MS_10	N/A	N/A	N/A
OTB_MS_11	OTB Rig Commissioning Review	R	Q1 2021
OTB_MS_12	Acceptance and Qualification Test Review	R	Q2 2021
OTB_MS_13	TRL4 Review	R	Q2 2021
OTB_MS_14	Tested OTB Commissioning	R, HW	Q2 2021
OTB_MS_15	OTB investigations; lessons learned and way forward analysis review	R	Q4 2021

**Type: R=Report, D=Data, HW=Hardware*

- **Targeted applicant**:

The applicant will be able to understand and challenge the specifications to develop an Oil Transfer Bearing in a **aeronautical environment**. This OTB will have to cover both function of oil transfer at high pressure for actuation system and oil transfer at low pressure for lubrication. **Creativity and innovation are expected.**

- **Required skills or subjects to deal with** :
  - Architecture design
  - Mechanical design
  - Hydraulic design
  - Manufacturing and assembly
  - Testing and inspecting

JTI-CS2-2018-CfP08-LPA-01-50

Development and manufacturing of innovative tooling for composite parts

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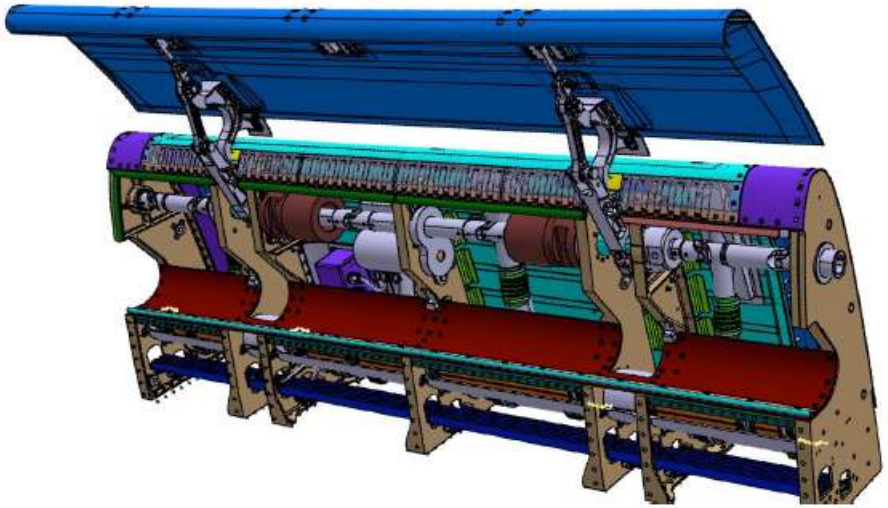
Clean Sky 2

JTI-CS2-2018-CfP08-LPA-01-50

- **JTI-CS2-2018-CfP08-LPA-01-50**
- **Title:** *Development and manufacturing of innovative tooling for composite parts.*
- **Objective:** RTM tooling set for development of a Hi-integrated HLFC wing. A 600 mm trials tooling will be required for manufacturing test for Microperforated sheet and new composite materials integration. A 5 m length tooling for final demonstrator will be required, including in both cases leading edge and upper skin of the wing, cured at the same time
- **Volume:** 1 M€ funding



JTI-CS2-2018-CfP08-LPA-01-50

- **Schedule**

Tasks
Concurrent engineering with the Topic Manager to reach the detail design level.
Tradeoff for material selection, heating and thermal control systems and integration of different materials.
Defining the manufacturing process for the tooling
Manufacture of the tooling
Validation process according with aeronautical standards.
Delivery of the prototype tooling to the Topic Manager facilities.
ALM technology manufacturing for trailing edge specimen.

Deliverables			
Ref. No.	***Title - Description***	***Type***	***Due Date***
D1	Tradeoffs report: – Materials – Systems – Integration	Report	To+9
D2	Manufacturing process definition	Report	To+21
D3	Manufacturing tooling report	Report	To+27
D4	Manufacturing and validation tooling	Report	To+29
D5	Final report: Conclusions and lesson learned	Report	To+30

JTI-CS2-2018-CfP08-LPA-01-50

- **Targeted applicant and Required skills**:,
  - Experience in design and manufacturing of manufacturing tooling for structures in conventional and innovative composite and metallic materials and components (M).
  - Experience in management, coordination and development technological (Aeronautical) programs. (M).
  - Proved experience in collaborating with reference aeronautical companies with industrial air vehicle developments.
  - Experience in shared international R&T projects cooperating with industrial partners, institutions, technology centres, universities and OEMs (Original Equipment Manufacturer). (A)
  - Quality System international standards (i.e. EN 9100:2009/ ISO 9001:2008/ ISO 14001:2004). (M)
  - Capacity to repair or modify “in-shop” the prototype manufacturing tooling for components due to manufacturing deviations. (A).
  - ALM technology knowledge and development capacity for big parts.
  - Qualification as strategic supplier of manufacturing tooling on aeronautical elements. (A).
  - Since the tooling is defined as a high-rate production tooling, experience in continuous production manufacturing (as in plastic infusion processes) (A)
  - Experience and know-how with diverse tooling for both composites and metallic technologies, specifically OoA (RTM) for composites.
  - Experience and know-how with tooling for manufacturing metallic components. (M)
  - Into the eco design field, the Partner shall have the capability to monitor and decrease the use of hazardous substances regarding REACH regulation (M).

(M) – Mandatory; (A) – Appreciated

JTI-CS2-2018-CfP08-LPA-01-51

Design and manufacturing of a large-scale HLFC wing model for a transonic WTT

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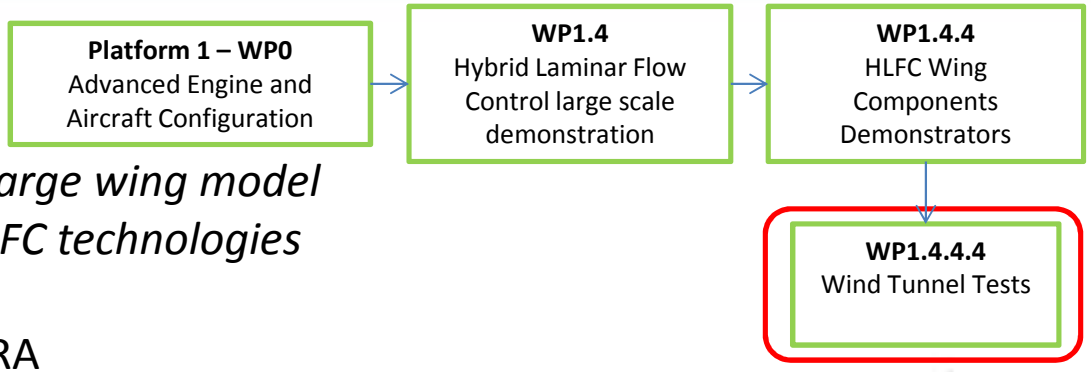
JTI-CS2-2018-CfP08-LPA-01-51

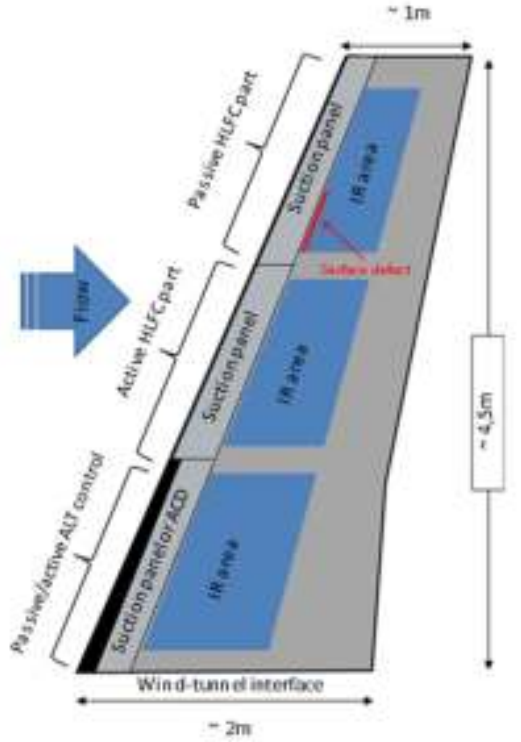
- **JTI-CS2-2018-CfP08-LPA-01-51**



- **Title:** *Design and manufacture of a large wing model equipped with active and passive HLFC technologies*

- **Company managing the topic:** ONERA

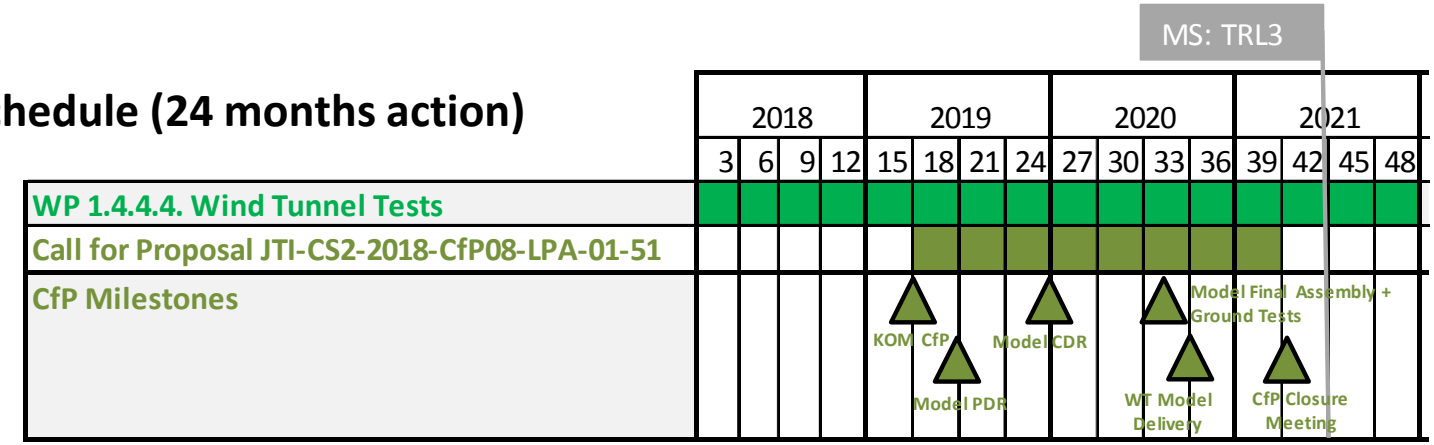
- **Objective:** The main purpose of this topic is to design and manufacture (instrumentation included) a large wing-model which will be equipped with wall-suction parts in the leading-edge region in order to perform Hybrid Laminar Flow Control (HLFC) by using active and passive suction systems. The ultimate objective (not included in the scope of this topic) is to perform Wind-Tunnel Tests (WTT) of the model inside a large transonic facility in order to prove the aerodynamic efficiency and the robustness of active and passive HLFC technologies under transonic flow conditions.



Clean Sky JOINT UNDERTAKING

JTI-CS2-2018-CfP08-LPA-01-51

- **Volume:** 1700 k€ funding
- **Type of action:** IA
- **Schedule (24 months action)**



- **Targeted applicant/Required skills** : The Applicant(s) must have proven experience in the design and manufacture of large models intended for transonic WTT. The Applicant(s) must have experience in the manufacture of parts with a surface quality that comply with laminarity requirements included in the IR measurements areas. Experience in former HLFC European or collaborative programmes would be highly appreciated. International standard quality management system would be appreciated.

JTI-CS2-2018-CfP08-LPA-01-52

Thermo-mechanical design validation of compact heat exchanger by thermal cycling life prediction

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JTI-CS2-2018-CFP08-LPA-01-52

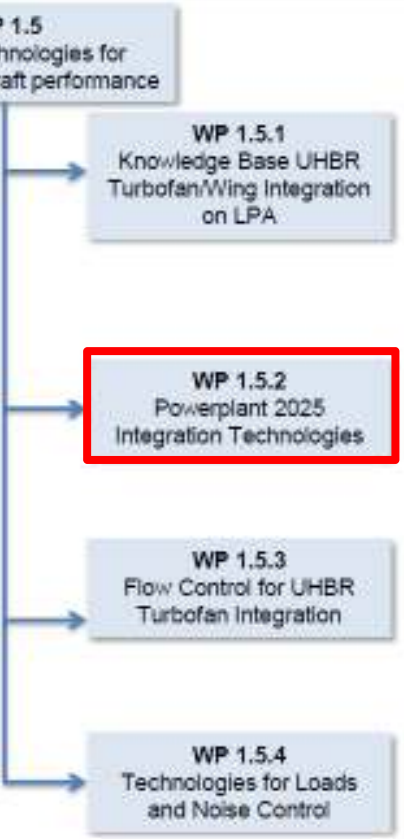
- **JTI-CS2-2018-CFP08-LPA-01-10**

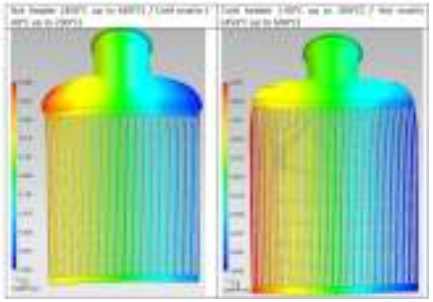
- **Title:** Thermo-mechanical design validation of compact heat exchanger by thermal cycling life prediction

- **Objective:** Compact heat exchangers featured in innovative bleed systems could be early damaged when used in severe operating conditions (temperature, pressure and vibrations) such as the ones to be encountered in UHBR nacelle. The objective of this topic is to gain knowledge on physics involved in heat exchanger deterioration. Hence, models which can deal with multi-scale and multi-disciplinary physics shall be built, communicating between each other, with the objective to accurately simulate real operational conditions. Furthermore, sensitivities analysis, design of experiments and probabilistic approach shall be coupled with these models. Finally, innovative virtual demonstration means shall be developed to replace experimental validation.

- **Volume:** 1200k€ funding

- **Type of action**: IA





JTI-CS2-2018-CFP08-LPA-01-52

- **Scope of work**

Tasks		
Ref. No.	***Title – Description***	***Due Date***
Task 1	Building of a multi-scale and multi-disciplinary model	T0+8
Task 2	Multiple simulations	T0+36
Task 3	Models validation by laboratory tests	T0+36
Task 4	Degradation law and accelerated test definition	T0+48

- **Deliverables**

Deliverables			
Ref. No.	**Title – Description**	**Type***	**Due Date**
1	First multi-scale and multi-disciplinary model	M+R	T0+6
2	Multi-scale and multi-disciplinary model updated	M+R	T0+12
3	Sensitivity analysis results: influent parameters and response surface	M+R+D	T0+24
4	Model updated with probabilistic law and meta-model	M+R+D	T0+30
5	Correlated models with laboratory tests results	M+R+D	T0+32
6	Measurement methodology definition and measurement set-up delivery	R+HW	T0+36
7	Degradation law & accelerated test definition	R+D	T0+36

*Type: R=Report, D=Data, HW=Hardware, M=Model

JTI-CS2-2018-CFP08-LPA-01-52

- **Targeted applicant**: The applicant shall demonstrate their skills detailing their activities, own bibliographic references and descirption of past projects linked to the present topic.

- **Required skills & capabilities**:
  - ✓ Skills:
    - Demonstrated knowledge of CFD: thermal and aerodynamic simulations of CHX
    - Demonstrated knowledge of finite elements methodology: model condensation or homogeneisation, thermomechanical simulation
    - Demonstrated knowledge of probalistic approach in simulation
    - Demonstrated knowledge of numerical design of experiments in simulation, metamodel construction and response surface methodology (RSM)
    - Understanding of CHX design and manufacturing (including brazing metallurgy)
  - ✓ Capabilities:
    - In-house computing facilities
    - In-house CFD & Finite Elements tools: Star-CCM+ (Simcenter CFD) for the aerothermal CFD simulation, NX Thermal for thermal analysis and NX Nastran for thermomechanical Finite Element Analysis
    - Metallic sheet and brazed assembly characterization
    - Testing facilities to test precooler coupons (temperature range: -40°C to 200°C on cold path and 250°C to 600°C on hot path, flow range: 0.5 kg/s, pressure: 0-5bars)

JTI-CS2-2018-CfP08-LPA-01-53

Compact Matrix Air Oil Heat Exchanger

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFP08-LPA-01-53

Type of action (RIA/IA/CSA)	IA		
Programme Area	LPA		
(CS2 JTP 2015) WP Ref.	WP 1.5.2		
Indicative Funding Topic Value (in k€)	700		
Topic Leader* **full name, no abbreviation*	Rolls-Royce plc	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	36	**Indicative Start Date**	Q2 2019

Topic Identification Code	**Title**
JTI-CS2-2018-CFP08-LPA-01-53	Compact Matrix Air Oil Heat Exchanger

Short description

Ultra High Bypass Ratio engine development will place a significant demand on the aircraft and engine's heat management system. With the current size and shape of Matrix Air Oil Heat Exchanger technology, it is becoming difficult to locate them on ever more, space constrained engines. New technology is required that increases compactness and allows conforming shaped units to be produced by exploiting novel design, manufacturing methods and materials.

The successful applicant is expected to sign an implementation agreement

JTI-CS2-2018-CFP08-LPA-01-53

Timeplan - milestones

Tasks		
Ref. No.	***Title - Description***	***Due Date***
1	Design a MAOHE incorporating novel geometry and construction	T0+6
2	Create a thermal model of the proposed design using computation techniques	T0+9
3	Build a thermally representative MAOHE	T0+12
4	Performance test the MAOHE concept and validate the thermal model	T0+15
5	Refine MAOHE design and build an optimised MAOHE	T0+26
6	Test and validate the MAOHE in line with the Topic Managers requirements	T0+34

Required skills and expertise in field of:

- Substantial technical knowledge in the domain of the proposed tasks.
- Proven capability in Heat Exchanger design and modelling methods that support the design of an optimised Novel Heat Exchanger.
- Material data suitable for MAOHE aerospace application.
- Be knowledgeable in the current state of the appropriate art manufacturing methods.
- Proven DFMEA, PFMEA and risk management practices.
- Aerospace certification expectations
- Test knowledge of heat exchangers in the following areas:

I. EUROCAE ED-14G – *Environmental Conditions and Test Procedures for Airborne Equipment*

II. Vibration testing in accordance with CS-E-80.

JTI-CS2-2018-CfP08-LPA-01-54

Development of Measurement Techniques for Visualisation and Evaluation of Reverse Flow Interactions with Fan

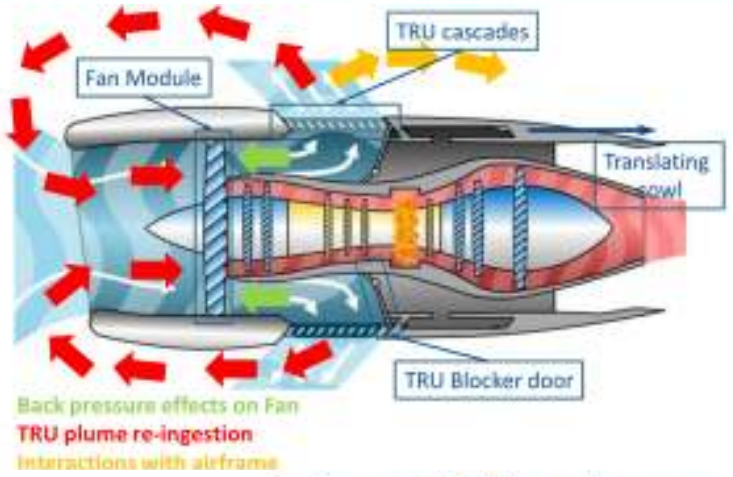
Innovation Takes Off

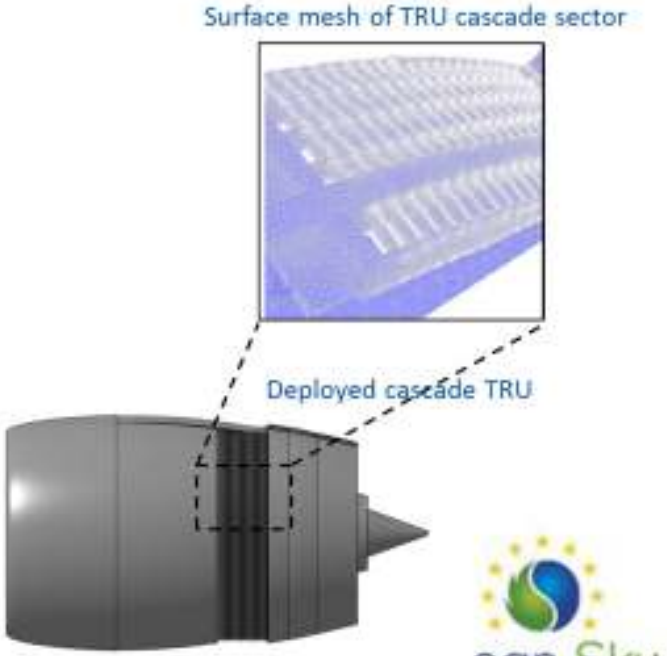
http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFP08-LPA-01-54

- **JTI-CS2-2018-CFP08-LPA-01-54**
- **Type of action (RIA or IA):** RIA
- **Programme Area:** LPA
- **Joint Technical Programme (JTP) Ref.:** WP1.5.2
- **Topic Leader:** Rolls-Royce Deutschland Ltd & Co KG
- **Title:** *Development of Measurement Techniques for Visualization and Evaluation of Reverse Flow Interactions with Fan*
- **Objective:** Reverse flows generated by the thrust reverser unit (TRU) are of significant complexity. In order to ensure reliable fan performance when the TRU is deployed, the flow topologies up- and down-stream of the fan module need to be investigated and understood. For this purpose, advanced measurement techniques for a novel level of visualisation and evaluation of reverse flow interactions with fan aerodynamics need to be developed.
- **Volume:** 1600 k€ funding





JTI-CS2-2018-CFP08-LPA-01-54

- **Schedule**

Duration	36 months
Start	Q2/2019

Tasks		
Ref. No.	***Title – Description***	***Due Date***
T1	Conceptual design phase: development of TRU rig model for experimental evaluation.	T0+9 months
T2	Development of a novel technique for WT flow visualisation.	T0+18 months
T3	Detailed design and manufacturing of WTT models	T0+18 months
T4	Calibration, commissioning and testing.	T0+24 months
T5	Concept evaluation and numerical methodology development.	T0+24 months
T6	Development of surrogate model for simulation of cascade type TRU.	T0+36 months
T7	Analysis of results.	T0+36 months

- **Targeted applicant**: Partner with proven validated experience in the field of experimental and numerical aerodynamics of engine nozzle jet flows. It is desirable that the wind tunnel facilities for the experimental part of the project are capable of dual airflows (jet and freestream flow) with a freestream Mach number range from 0 to 0.25. The expected scaling range of the models should be higher than 1:7 for the isolated case. For the installed case, it should be higher than 1:15.
- **Required skills**:
  - Experience in experimental and numerical analysis of nozzle jet flows
  - Expertise in experimental methods, especially optical methods for engine jet flows
  - Experience in mathematical modelling of hyperbolic and parabolic differential equations
  - Demonstrate experience in project participation, international cooperation, project and quality management

JTI-CS2-2018-CfP08-LPA-01-55

Development of AC cabling technologies for >1kV aerospace applications

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFP08-LPA-01-55

Type of action (RIA/IA/CSA)	IA		
Programme Area	LPA		
(CS2 JTP 2015) WP Ref.	WP 1.6.1		
Indicative Funding Topic Value (in k€)	750		
Topic Leader* **full name, no abbreviation*	Rolls-Royce Plc	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	24	**Indicative Start Date**[3]	Q2 2019

Topic Identification Code	**Title**
JTI-CS2-2018-CFP08-LPA-01-55	Development of AC cabling technologies for >1kV aerospace applications.
Short description	
Build a simulation model to develop an understanding of the present capability of aerospace cables to withstand the demands of aerospace High Voltage (HV), high current, high frequency operation in an aerospace environment and identify an optimised aerospace cable for use with HV aerospace systems.	

JTI-CS2-2018-CFP08-LPA-01-55

Timeplan - milestones

Ref. No.	*Title - Description*	*Type**	*Due Date*
M1.1	Review of identified potential failure modes	D	T0 + 4
M2.1	Demonstration of model	D	T0 + 9
M2.2	Review of rig design and test plans	D	T0 + 9
M2.3	Review of validated model	D	T0+13
M2.4	Commissioning of test rig	D	T0 +11
M3.1	Cable design complete	D	T0 +16
M3.2	Cable manufacture complete	D	T0 +19
M3.3	Cable testing complete	D	T0 +23

Required skills and expertise in field of:

- Medium Voltage Capability
- Understanding of insulation design, development and testing
- Understanding of cable and termination design
- Understanding of material interactions and compatibility testing

High level requirements for build and test:

- The project will focus on designing and developing a modelling tool and demonstration of an optimised HVAC cable at full power, up to TRL5
- Testing should be in a representative aerospace environment as cables are to be mounted in an unpressurised zone with a temperature range of -40 to +70 C
- >1MW, >10kHz switching and >1kHz fundamental, >1kVAC voltage rating

JTI-CS2-2018-CfP08-LPA-01-56

Aerospace standard Lightweight SSPC for High voltage >1kA application

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFP08-LPA-01-56

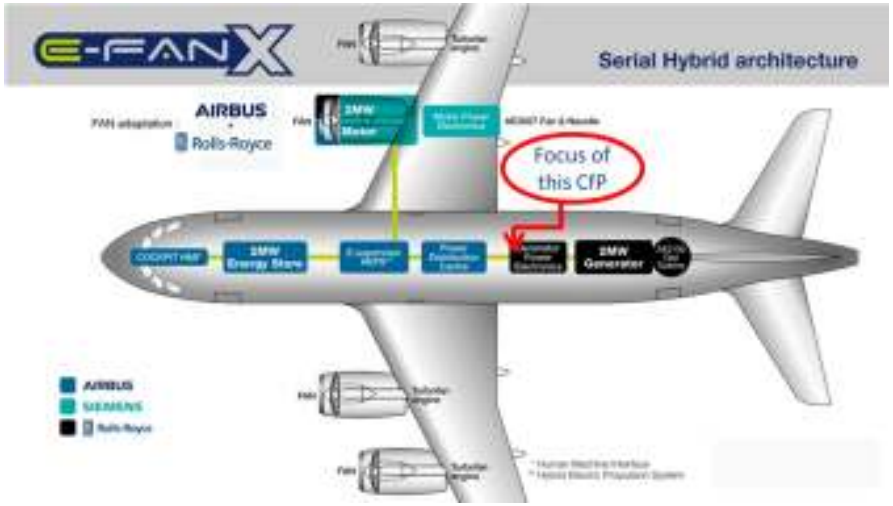
Type of action (RIA/IA/CSA)	RIA		
Programme Area	LPA		
(CS2 JTP 2015) WP Ref.	WP 1.6.1		
Indicative Funding Topic Value (in k€)	900		
Topic Leader* **full name, no abbreviation*	Rolls-Royce plc	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	24	**Indicative Start Date[3]**	Q2 2019

Topic Identification Code	**Title**
JTI-CS2-2018-CFP08-LPA-01-56	Aerospace standard Lightweight SSPC for High voltage >1kA application.
Short description	
Design and development of aerospace standard lightweight solid state protection component for >1kV and >1kA electrical architectures. Cooling and shielding should be integrated into the solution.	

JTI-CS2-2018-CFP08-LPA-01-56

Timeplan - milestones

Ref. No.	*Title - Description*	*Type **	*Due Date*
M1.1	Requirements capture document	R	T0 + 2
M1.2	Mid-point review of protection device design	D	T0 + 7
M1.3	Review of prototype protection device design	D	T0 + 11
M2.1	Review of thermal and EMI models	D	T0 + 18



Required skills and expertise in field of:

- Solid-state protection device design
- Development and testing
- Understanding of influence of aerospace operating environments on requirements and design of solid-state devices

High level requirements for build and test:

- The project will focus on modelling, designing and developing a lightweight and efficient solid-state protection device, including integrated isolation capability, up to TRL3/4
- Operate at nominal voltage 540V DC and up to or greater than 1kV DC
- Nominal current capacity between 500A and up to or greater than 1kA

JTI-CS2-2018-CfP08-LPA-01-57

Innovative Power and data transfer solutions for nacelle

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFP08-LPA-01-57

Innovative data and power transfer solution for nacelle

New challenge:

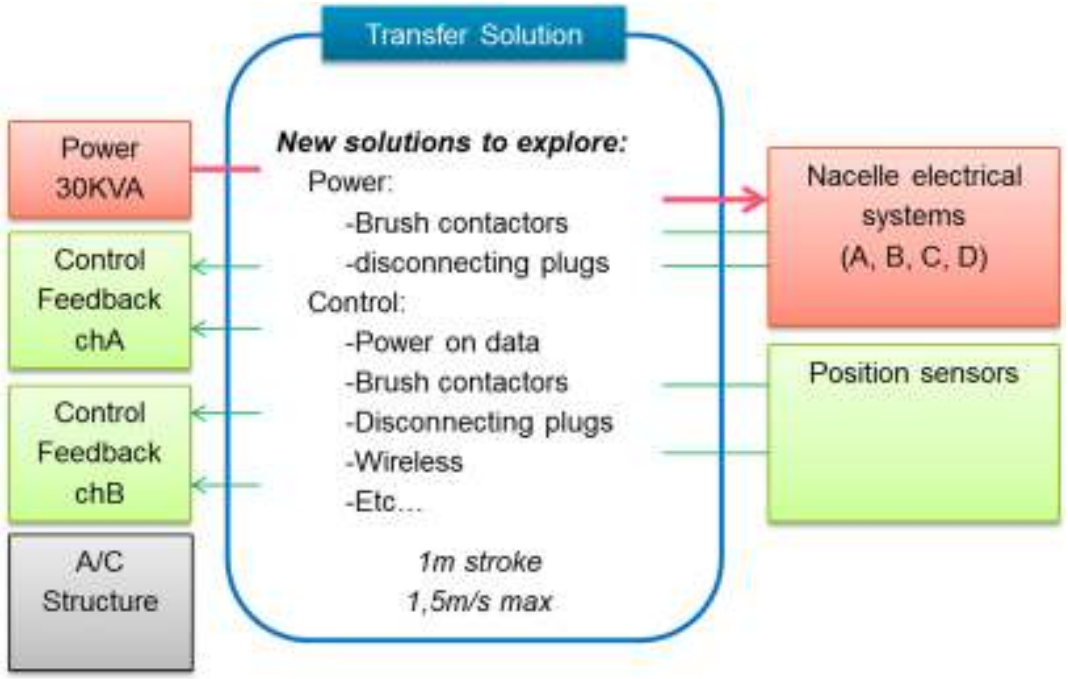
- Future UHBR and, as a consequence, short nacelle adn slim aerolines, leads to develop more compact electrical solutions from the fixed part of the thrust reverser to the translating one

State of the art:

Electrical harness capable of small relative displacements

No existing solution of the shelf

Proposed activities: defining and testing new electrical power and data (wireless) transfer solution compliant with new requirements (see next chart) , with a target for a TRL6 level



JTI-CS2-2018-CFP08-LPA-01-57

Innovative data and power transfer solution for nacelle (cont'd)

- Main function is to transfer data between 2 parts when thrust reverser is in a determined stowed or deployed configuration and also during its translation (1.5m/s maximum speed, 1m stroke)
- Enable wireless data transfer between emission & reception modules located at a distance of 0.5m (TRU stowed) to 1.5m (TRU deployed) w/o disturbance of surrounding electrical systems
- Transfer numerical data generated of 2 channel by about 12 sensors (RVDT, PS) shared between 2 different systems
- Operate 30000 flight cycles
- Be tolerant to relative displacements when operating (few millimeters in all direction, will be refined during the activity)
- Maintain data quality in a harsh environment (water/sand/dust contamination, high vibrations as per DO160 issue G curve W, wide temperature range -55°C to 100°C
- Target high reliability MTBF > 100000 FH (close to connectors reliability)

The selected Partner should:

- Elaborates the technical solution compliant to Airbus specification => TRL 2, TRL3
- Develop Technical solution for power transfer
- Develop Technical solution for data transfer (Wireless)
- Follow Simplified qualification process
- Design (3D), size, qualify and test the solution => TRL4
- Provides a test hardware for Airbus functional Integration test (TRL5)
- Finalize test lab of the solution after Demonstrator flight test data (TRL6)

LPA-IADP WBS – “Platform 2”

Airbus with, Liebherr, Fraunhofer and Partners

Large Passenger Aircraft Platform – integration topics

„Platform 1 - OAD“

Advanced Engine and Aircraft Configurations

„Platform 2 - OPD“

Innovative Physical Integration Cabin-System-Structure

„Platform 3 - OSD“

Next Gen. A/C Systems, Cockpit Systems & Avionics

TRL 4-6
Aircraft Level

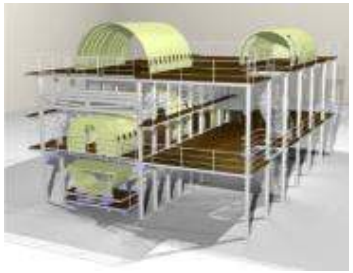
Platform 2 Innovative Physical Integration Cabin-System-Structure

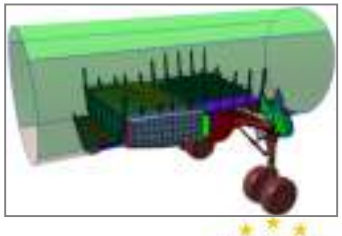
WP 2.1 Next generation fuselage, cabin and systems integration

WP 2.2 Next generation cabin & cargo functions

WP 2.3 Next generation lower centre fuselage

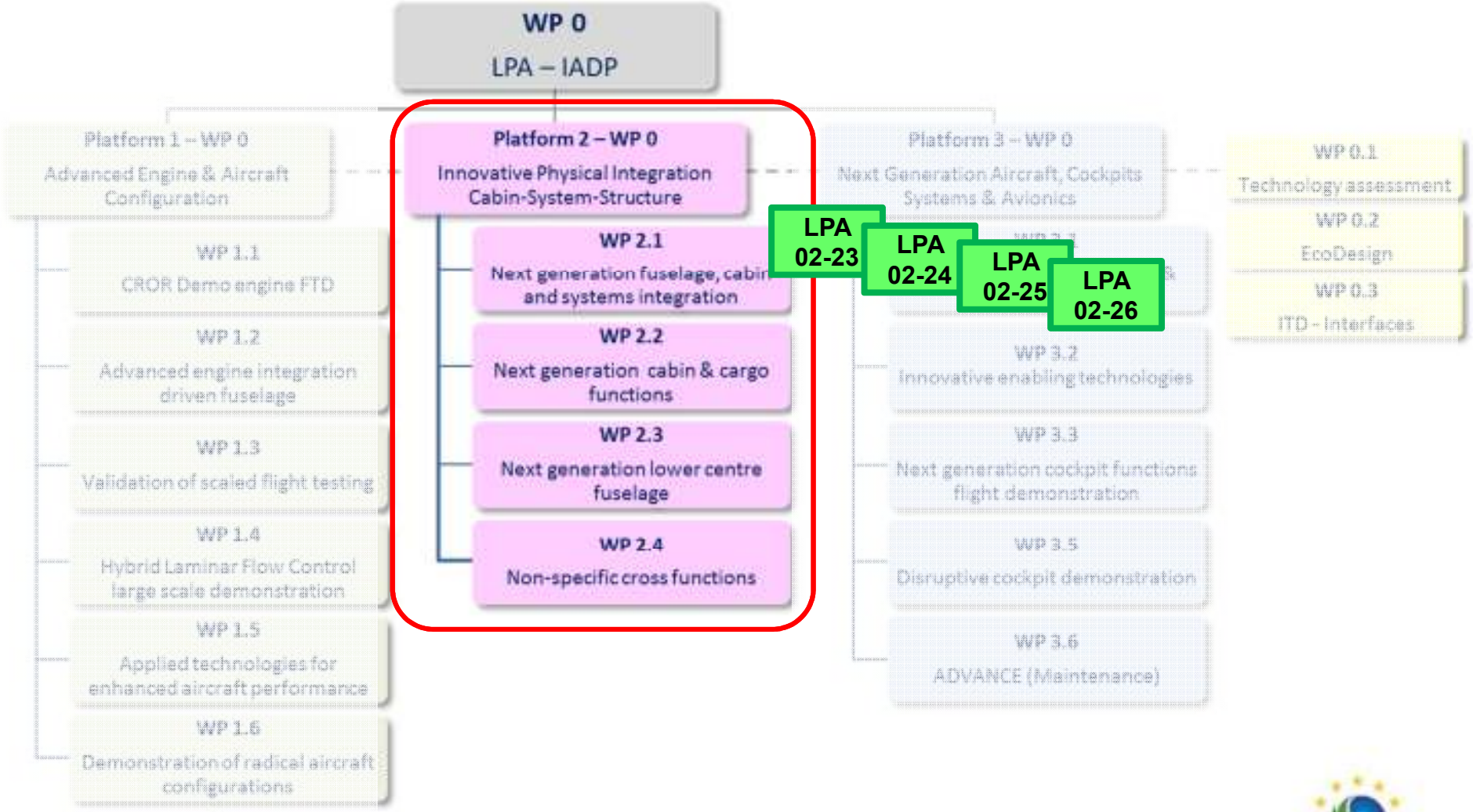
WP 2.4 Non-specific cross function





Estimated Volume of Activities ~290M€

LPA-IADP WBS – “Platform 2”



JTI-CS2-2018-CfP08-LPA-02-23

Development and execution of new test procedures for thermoplastic aircraft fuselage panels

Innovation Takes Off

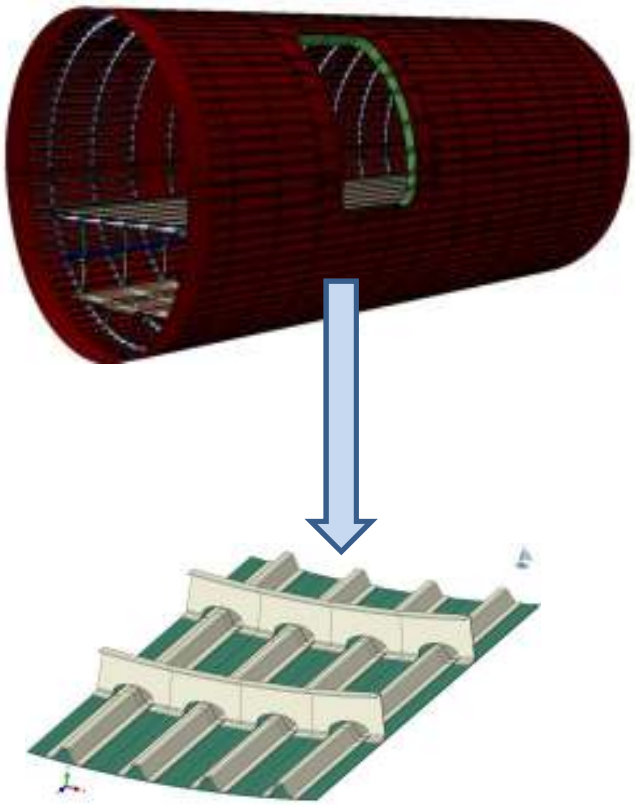
http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFP08-LPA-02-23

Type of action (RIA/IA/CSA)	IA		
Programme Area	LPA		
(CS2 JTP 2015) WP Ref.	WP 2.1 multifunctional fuselage-thermoplastics		
Indicative Funding Topic Value (in k€)	500 K€		
Topic Leader* **full name, no abbreviation*	AERNNOVA ENGINEERING DIVISION	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	30 months	**Indicative Start Date**[1]	Q2 2019

Topic Identification Code	**Title**
JTI-CS2-2018-CFP08-LPA-02-23	Development and execution of new test procedures for thermoplastic aircraft fuselage panels
Short description	
The main objective of the topic is to validate the structural behavior of thermoplastic aircraft fuselage panels in relation to new analytical methods for out of autoclave thermoplastic curing processes by static testing of panels under representative loads conditions. The tests will ensure the improved understanding of the structural response of the developed concept and proper design solutions for future application.	



Level 3 tests

JTI-CS2-2018-CFP08-LPA-02-23

Tasks & Schedule

Tasks		
Ref. No.	***Title – Description***	***Due Date***
Level 2 tests		
L2-Tk0	Test Plan preparation of Level 2 tests (in collaboration with the topic manager)	T0+1
L2-Tk1	Design and manufacturing of test tooling	T0+3
L2-Tk2	Level 2 testing	T0+7
L2-Tk3	Level 2 test report	T0+9
Level 3 tests		
L3-Tk0	Test Plan preparation of Level 3 tests (in collaboration with the topic manager)	T0+14
L3-Tk1	Design and manufacturing of test tooling	T0+19
L3-Tk2	Level 3 testing	T0+25
L3-Tk3	Level 3 test report	T0+30

Main Required skills

- Design and analysis tools of the aeronautical industry (i.e. CATIA v5).
- Testing equipment suitable for the tests execution: universal test machines, load cells, hydraulic actuators, control system work stations, strain gage data acquisition channels, displacement transducers.
- Tools and methods for 3D non-contact displacement measurement.
- Tools and methods for non-destructive inspection.
- Laboratory flexibility in the design and the performance of structures tests.
- Quality System to assure the Quality of all Products and Services (Quality System International Standards, i.e., EN 9100: 2016/ ISO 9001: 2015/ ISO 14001:2015)
- Participation in international technological programs cooperating with reference aeronautical companies
- Approvals from main aircraft/airframe manufacturers to perform structural tests for certification as well as for development purposes

JTI-CS2-2018-CfP08-LPA-02-24

Generic added structures on shells made from thermoplastic sheet material

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CfP08-LPA-02-25

Micro mechanical characteristics of a PEKK Co-consolidation / welded joint

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CfP08-LPA-02-26

Multifunctional Aircraft Power Network with Electrical Switching

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

Setup and Implementation LPA Platform 3

Airbus with Thales, Liebherr, SAFRAN and Partners

Large Passenger Aircraft Platform – integration topics

TRL 4-6
Aircraft Level

„Platform 1 - OAD“

Advanced Engine and Aircraft Configurations

„Platform 2 - OPD“

Innovative Physical Integration Cabin-System-Structure

„Platform 3 - OSD“

Next Gen. A/C Systems, Cockpit & Avionics

Platform 3 Next Gen. Aircraft A/C Systems, Cockpits & Avionics

WP 3.1 Enhanced flight operations and functions

WP 3.2 Innovative enabling technologies

WP 3.3 Next generation cockpit functions flight demonstration

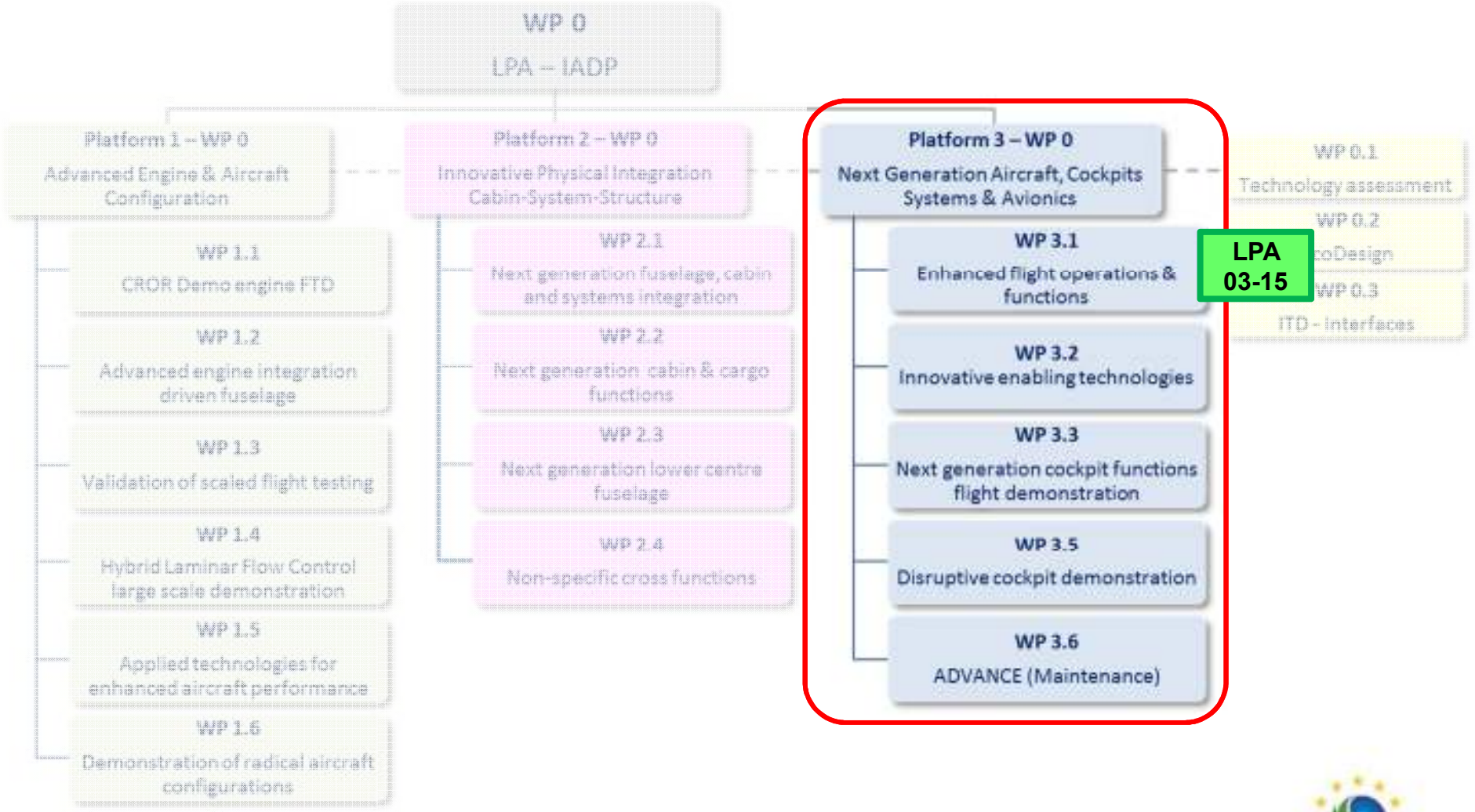
WP 3.5 Disruptive cockpit demonstration

WP 3.6 Maintenance

Cockpit of the future (Fenics)

Estimated Volume of Activities ~222M€

LPA-IADP WBS – “Platform 3”



JTI-CS2-2018-CfP08-LPA-03-15

Pilot monitoring in service data collection

Innovation Takes Off

http://www.cleansky.eu/content/homepage/about-clean-sky-2

Clean Sky 2

JTI-CS2-2018-CFPW08-LPA-03-15

Type of action (RIA/IA/CSA)	IA		
Programme Area	LPA		
(CS2 JTP 2015) WP Ref.	WP 3.1.4.9		
Indicative Funding Topic Value (in k€)	700 k€		
Topic Leader	Honeywell International s.r.o	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	24 months	**Indicative Start Date**[1]	Q2 2019

Topic Identification Code	**Title**
JTI-CS2-2017-CFP08-LPA-PF3-02	Validation of Pilot State Monitoring technology benefits
Short description	
This project will help ensuring that the Pilot State Monitoring technologies developed by the Topic Manager have a tangible path towards exploitation in commercial aircraft operations, especially in the light of its societal acceptance by its users and its adequation to their real needs. This will be achieved through active participation of the partner to the Topic Leader's activities.	

JTI-CS2-2018-CFPW08-LPA-03-15

- **Objective:** This task will cover the installation of a Pilot State Monitoring system onboard a commercial aircraft (either a large commercial aircraft and/or a Business Jet) and gathering pilot's feedback and various operational data in a real operational environment. The foreseen requirements for the feedback and data collection are:
  - Installation of the pilot state monitoring into a simulator and target aircraft platform
  - Information shall be collected during commercial flights
  - Data exchange with the Topic leader shall occur regularly
  - A successfull bidder shall be able to collect root causes for prejudice and social acceptance

- **Tasks and schedule**
  - Expected start date: Q2/2019

Tasks		
Ref. No.	**Title - Description**	**Due Date**
Task 1	*Installation requirements definition*	*T0 + 3m*
Task 2	*Performance and usability requirements definition*	*T0 + 6m*
Task 3	*Installation of Pilot Monitoring sensors including simulator test*	*T0 + 9m*
Task 4	*Validation execution and data collection (phase 1)*	*T0 + 15m*
Task 5	*Pilot Monitoring sensors and usability feedback I*	*T0 + 16m*
Task 6	*Validation execution and data collection (phase 2)*	*T0 + 22m*
Task 7	*Pilot Monitoring sensors and usability feedback II*	*T0 + 23m*
Task 8	*Socio-economic analysis of Pilot Monitoring benefits potential*	*T0 + 24m*

JTI-CS2-2018-CFPW08-LPA-03-02

- **Targeted applicant:** partner operating a mix of short-haul and long-haul aircraft (either a large commercial aircraft and/or a Business Jet) with possibility to collect pilot‘s feedback and data from provided sensors.

- **Desired skills:**
  - Ability to collect root causes for prejudice and social acceptance
  - Ability to collect data in a full motion simulator
  - Possibility to involve people with operational experience
  - Possibility to regularly exchange the data and pilot’s feedback with the Topic leader
  - Ability to categorize its pilot population according to diversity criteria (e.g. gender, origin, etc.)

Any questions?

Info-Call-CFP-2018-01@cleansky.eu

Last deadline to submit your questions:
1st June 2018, 17:00 (Brussels time)

Thank You


Clean Sky 2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THALES


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JOINT UNDERTAKING