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

SYSTEM ITD

Presented by
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Toulouse / France, 17th May 2018

Clean Sky 2

From *Clean Sky* towards *Clean Sky 2*

Systems ITD follows and expands Clean Sky SGO activities

- Management of Trajectory and Mission is included in wider, more integrated cockpit & mission demonstrations

- Management of Aircraft Energy carries on in work-packages dedicated to innovative wing, electrical chain, … new domains of aircraft power management are explored. Demonstrators and test rigs used in Clean Sky are continued in Clean Sky 2 and completed with new integration environments.

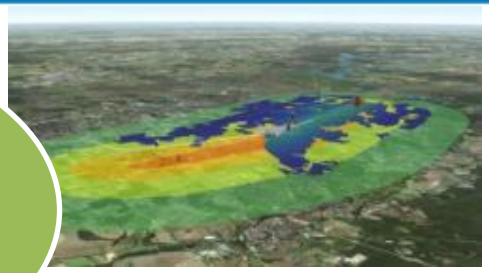
- Systems ITD focuses on demonstration and tight integration with IADPs.

Systems ITD → **IADPs**

TRL up to 5 → **5/6**

Clean Sky 2

System Demonstrations – Context & objectives



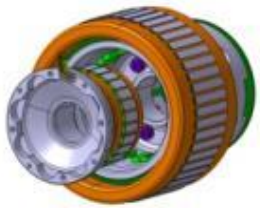
Direct contributions to environmental objectives

Smart answers to market demands

Increased Equipment performance for extended A/C needs

Enablers for A/C innovations

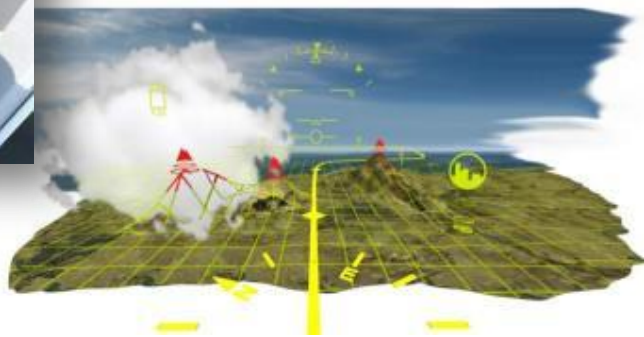
Enablers for Air Transport System optimisation

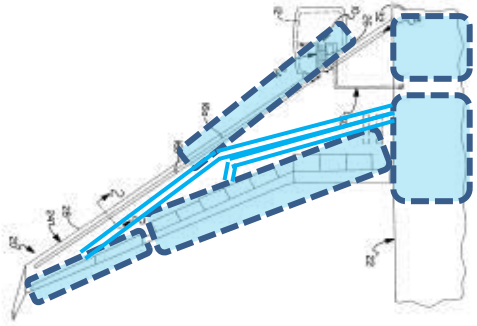


Systems ITD main demonstrations (1/2)

Integrated Cockpit

D1 – 50M€



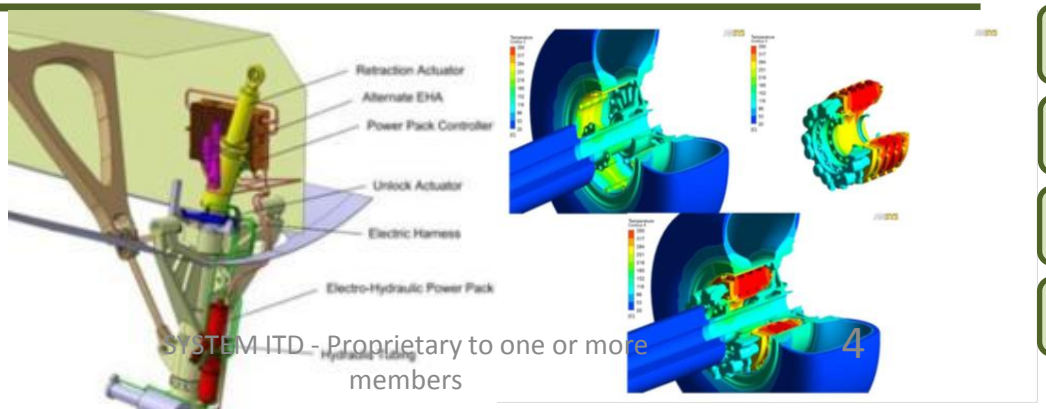


Innovative Electrical Wing

D3 – 19M€

D4 – 4M€

Landing Gears Systems



D5 – 10M€

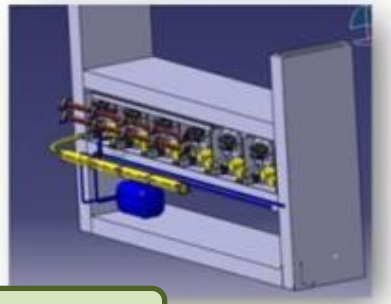
D6 – 9M€

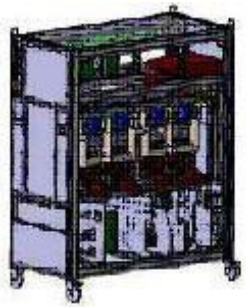
D7 – 8M€

D17 – 4M€

Systems ITD main demonstrations (2/2)

Power Generation & Distribution

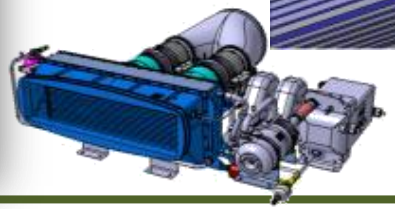




D8 – 11M€

D9 – 28M€

D10 – 14M€



Major Loads

D11 – 12M€

D12 – 2M€

D13 – 2M€

D14 – 7M€

D15 – 6M€

D16 – 9M€

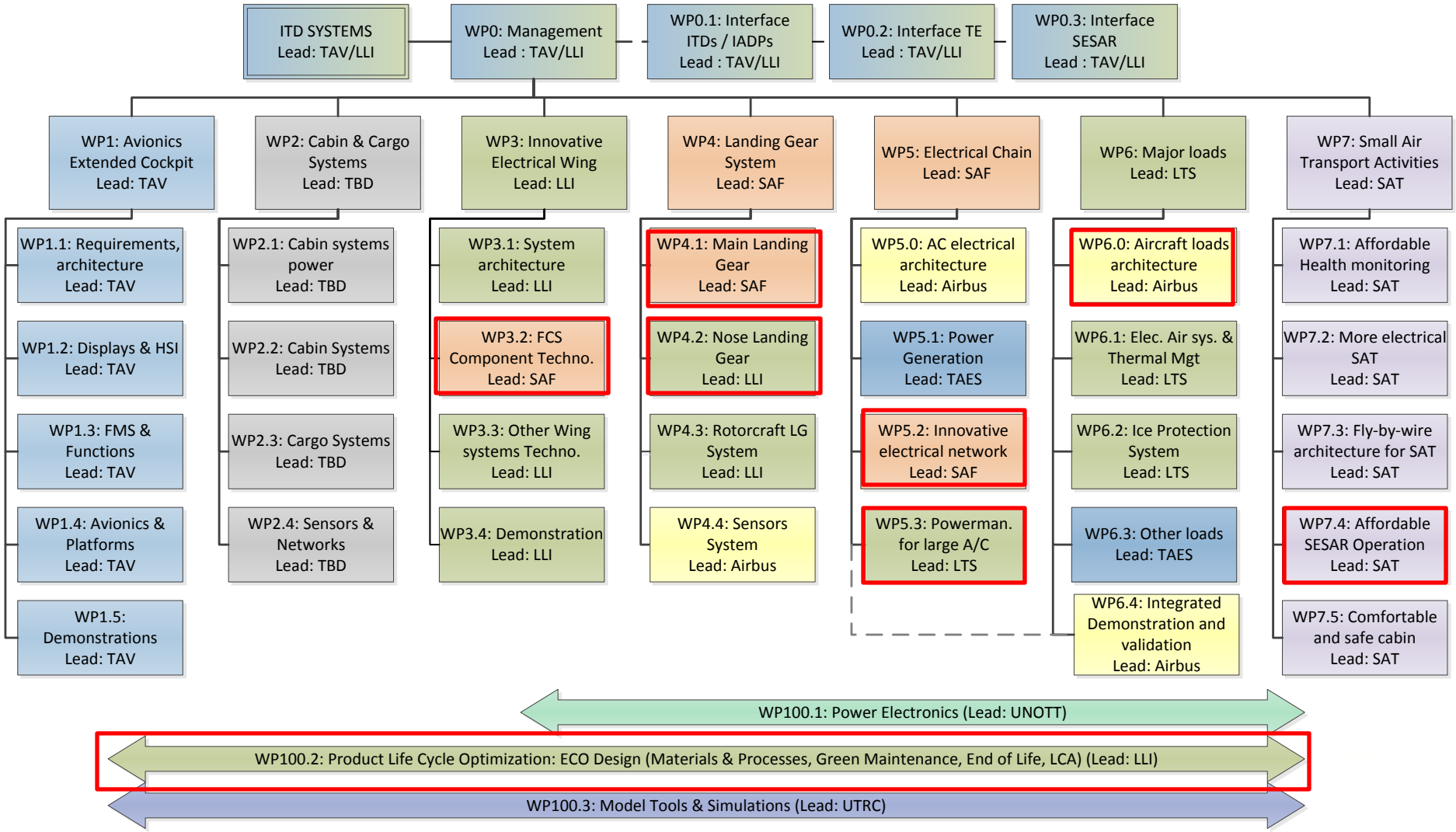
Systems for Small Air Transport

D18 to D23– 24M€

Cabin and Cargo

D2 – 8M€

Setup and WBS



SYSTEM ITD CfP 08 list of topics

Topic	Title	WP	Type of Action	Value	Topic Leader
SYS-02-46	Modeling of friction effects caused by surface contact with high pressure and rapid movement	3.2	RIA	0.7	Liebherr
SYS-02-47	New grip generation for active inceptor	3.2	IA	0.5	Safran
SYS-02-48	Design and development of a long stroke Piezo Electric Actuator	4.1	IA	0.8	Safran
SYS-02-49	Health Monitoring for Electro-Hydraulic Actuator fluid	4.1	IA	0.5	Safran
SYS-02-50	CFRP electrically heated tools for high pressure RTM	4.2	IA	0.75	Fokker Landing Gear
SYS-02-51	Innovative quality inspection methods for CFRP primary structural parts	4.2	IA	0.75	Fokker Landing Gear
SYS-02-52	Innovative Composite Material Qualification Methodologies	4.2	IA	1	Fokker Landing Gear
SYS-02-53	Development of an optimized DC-DC converter for a smart electrical system	5.2	IA	0.7	Safran
SYS-02-54	Development of a HVDC current Limiter	5.3	IA	0.65	Zodiac Aero Electric
SYS-02-55	Air treatment system for airborne microbe removal from air circulation or chambers	6.0	RIA	0.65	United Technologies Research Centre
SYS-03-17	Improved Thermal Properties of Computing Platforms for Next-Generation Avionics	7.4	RIA	0.8	Honeywell International
SYS-03-18	Development and testing of innovative Cr free anodic layers removal solution	100.2	RIA	0.5	Liebherr

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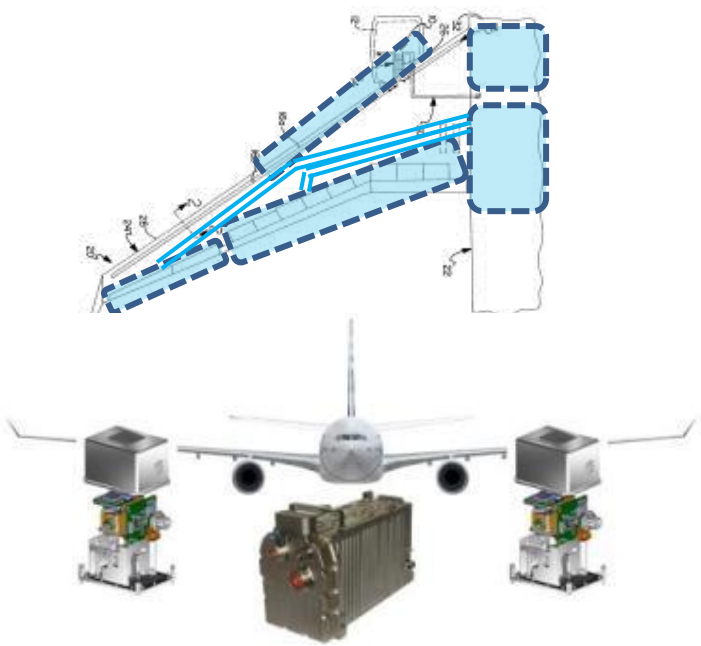
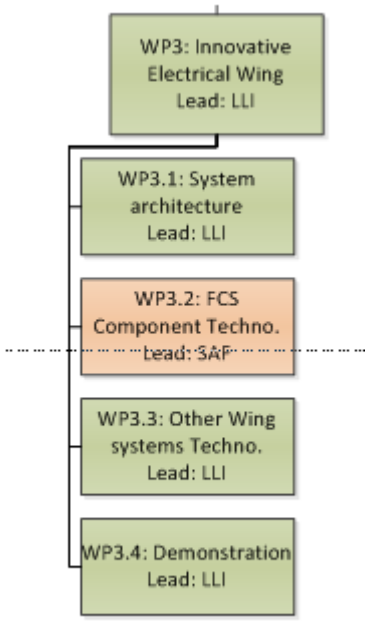




Innovative Electrical Wing

JTI-CS2-2018-CFP08-SYS-02-46

Modeling of friction effects cause by surface contact with high pressure and rapid movement

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CFP08-SYS-02-46

Type of action (RIA/IA/CSA)	RIA		
Programme Area	LPA / REG / FRC / AIR / ENG / **SYS** / SAT / ECO / TE		
(CS2 JTP 2015) WP Ref.	WP 3.2.2		
Indicative Funding Topic Value (in k€)	700 k€		
Topic Leader	Liebherr-Aerospace Lindenberg (LLI)	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	33 months	**Indicative Start Date**[3]	> Q2 2018

Topic Identification Code	**Title**
JTI-CS2-2018-CFP08-SYS-02-46	Modeling of friction effects caused by surface contact with high pressure and rapid movement
Short description	
The goal of this work package is to investigate the in-situ surface processes at a bearing contact of a landing gear shock strut during operation and to develop an enhanced model for simulation of stress / fatigue levels depending on the operational conditions.	

Goal/Scope of work

Goal of this topic is to develop, create and validated a simulation environment, which can reproduce 'Burn Mark' effects based on the critical parameters of aircraft landing scenarios. The innovation aspect lays in the capacity to simulate and predict - in a unique co-simulation environment - the combined effect of mechanics, lubrication, thermal phenomena affecting the performance of the contact surface under the different operating conditions, which lead to critical stress scenarios and fatigue accretion up to severe decay in landing gear performances.

The co-simulation environment should ideally combine and integrate in 1-D and 3-D modeling with a view to instantiate it to the specificity of the „burn mark" phenomenon.

The simulation environment should support:

- Simulation of the relevant scales of surface contact (reflecting area of impact for stress, but also energy transport.
- Evaluation of effects caused by the contact, reflecting forces, movement, lubrication, heat build-up and heat conduction as well as tolerances respectively possible deviations of the structural elements in shape and dimensions. The combination of these effects and the investigation of the contribution of each effect represents the innovative step.
- Simulation should enable a prediction of structure change, dynamic distribution of heat caused by friction, evaluation of critical local thermal conditions and resulting effects.

Input parameters for the simulation should be a time signal, describing the applied forces and start temperature of the involved components, and a description of the near-surface condition of the simulated structures resulting from their tribological history.

JTI-CS2-2018-CFP08-SYS-02-46

Special skills, Capabilities expected from the Applicant(s)

- Detailed experience in tribology, surface physics, multi-physics and multi-scale simulation
- Experience in thermodynamics and fluid mechanic
- Experience in modelling and simulation of surface contact reactions/behavior

JTI-CS2-2018-CFP08-SYS-02-46

Schedule

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Phase 1	Investigate material samples											
Phase 2	Modeling of physical contacts											
Phase 3	Simulation of physical contact											
Phase 4	Translation of movement											
Phase 5	Comparison simulation - test											

JTI-CS2-2018-CFP08-SYS-02-47

New grip generation for active inceptor

Innovation Takes Off

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

Clean Sky 2

Development of a new grip generation for Active Inceptor
General Information

Type of action (RIA/IA/CSA)	IA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP3.2.5		
Indicative Funding Topic Value (in k€)	500		
Topic Leader	Safran	Type of Agreement	Implementation Agreement
Duration of the action (in Months)	24	Indicative Start Date (at the earliest)119	Q1 2019

Topic Identification Code	Title
JTI-CS2-2018-CFP08-SYS-02-47	New grip generation for active inceptor
Short description	
New generation of active Inceptor will give the opportunity to provide to pilots more and more functionalities, especially fitted directly on the grip. The aim of this topic is to investigate new grip generation including new sensing devices, and the associated connections constraints, while keeping high integrity level, compliant with aeronautic requirements.	

Links to the Clean Sky 2 Programme High-level Objectives120	
This topic is located in the demonstration area:	Cockpit & Avionics
The outcome of the project will mainly contribute to the following conceptual aircraft/air transport type as presented in the scene setter	Compound helicopter Next-Generation Tiltrotor Advanced Short/Medium-range

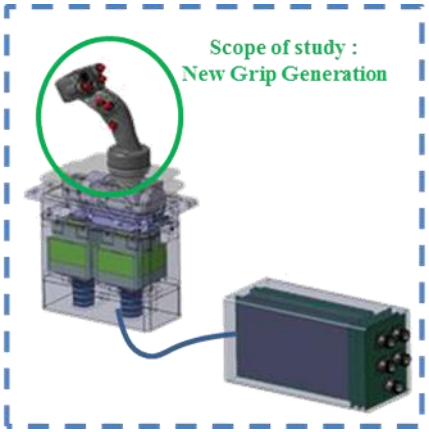
With expected impacts related to the Programme high-level objectives:				
Reducing CO2 emissions	Reducing NOx emissions	Reducing Noise emissions	Improving EU Competitiveness	Improving Mobility
☐	☐	☐	☒	☐

Clean Sky 2

Main Challenges

- The development of new generation of inceptors is an opportunity improve pilot awareness (flight limitations or control surface positions) and also to capture more information coming from pilot actions and/or behaviors, which will pass through the grip, eg detection sensors for Hands On/Hands Off management, new buttons, new devices (eg screens), ...
- Beyond the interest of new sensors to catch or manage A/C conditions and behavior, these additional devices need to be connected to dedicated computers, and consequently will increase number and type of wires between grip and inceptor base.
- The reduction of connection points and wire size will become a challenge (eg multiplexing up to 40 discrete & 10 analogic signals in a volume < 10cm3, complying with high integrity requirements).

➔The aim of the topic is to focus on all new functionalities to be fitted on grip, including sensor or specific device (e.g. screens, visual indicators, etc.) and the way to connect all these devices on the inceptor taking into account reduced volume, safety constraints and integrity requirements.



Activities

- New functionalities and associated sensors/devices
  - Functionality analysis
    - Context and constraint analysis
    - New functions definition (Hands On/Hands Off, Remote Switches Concentrator, Embedded safety,…)
    - Safety analysis
    - Technological analysis and components design
  - Physical integration and interfaces between grip and inceptor
    - Integration of new functions/components on grip
    - Interfaces constraints with inceptor (mechanical & electrical)
  - Expected performances
    - Integrity level (mix of high integrity and low integrity level according to signal type and criticity):

      Some functions are considered as critical, for example: AP disconnect, Hands On detection ➔DAL-A / Monitoring
      Other fuctions are considered as not critical, for example: Push to talk ➔ Dal-C simplex
      Partition between critical functions and other fuctions will be frozen during preliminary design phase.
    - Sizing: up to 40 discrete & 10 analogical signals in a volume < 10cm3
    - Max weight: 600 g (including all components and functions)

Activities

- Mock-up for test bench
  - Prototype manufacturing
  - Integration on inceptor
  - Evaluation
    - Functional and performance tests
    - Ergonomics (based on TM and pilot evaluations

- Development of flight equipment (according to evaluation conclusions)
  - Definition file
  - Manufacturing
  - Test
    - Test plan and procedures
    - Qualification tests

Development of a new grip generation for Active Inceptor
Proposed planning

Tasks		
Ref. No.	Title – Description	Due Date
T1	Design Phase	M6
T2	Evaluation (based on prototype)	M12
T3	Equipment Detailed Design for flight test	M16
T4	Manufacturing	M20
T5	Qualification	M24

Clean Sky 2

SYSTEM ITD CfP 08 list of topics

Topic	Title	WP	Type of Action	Value	Topic Leader
SYS-02-48	Design and development of a long stroke Piezo Electric Actuator	4.1	IA	0.8	Safran
SYS-02-49	Health Monitoring for Electro-Hydraulic Actuator fluid	4.1	IA	0.5	Safran
SYS-02-50	CFRP electrically heated tools for high pressure RTM	4.2	IA	0.75	Fokker Landing Gear
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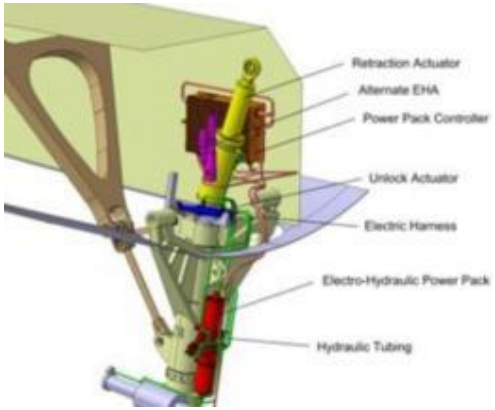
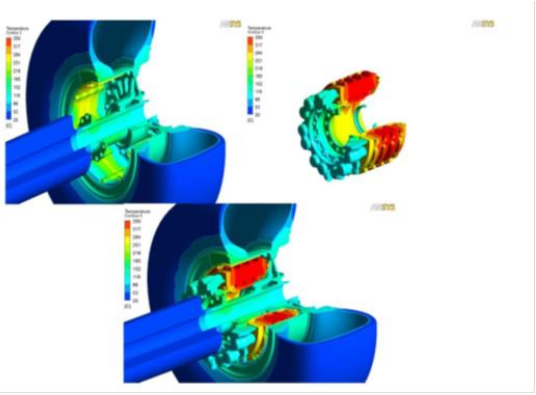
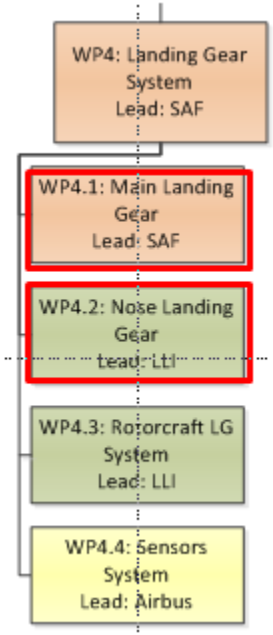






Landing Gears Systems

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 03

Design and development of a long stroke Piezo Electric Actuator

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 03

Type of action (RIA/IA/CSA)	IA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 4.1		
Indicative Funding Topic Value (in k€)	800 k€		
Topic Leader	SAFRAN LANDING SYSTEMS	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	36 months	**Indicative Start Date**	09/2018

Topic Identification Code	**Title**
CFP08-SYS-WP4.1 **[ID Code for JU to complete]**	Design and development of a long stroke Piezo Electric Actuator
Short description	
The purpose of this topic is to design and develop a prototype of a long stroke piezo electric actuator with increased stroke and load capabilities. The actuator functionalities and performances will be assessed on a prototype laboratory in order to achieve a TRL4.	

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 03

- **Goal:**

  The purpose of the proposed research topic is to develop a long stroke actuator based on piezo technology for future A/C locking actuation applications.

- **Target:**

  Next generation of Single Aisle aircrafts developped in the decade 2020-2030 that are likely to place a far greater emphasis on electrical actuation.

- **The Applicant should be able to perform the following tasks with associated milestones:**

Tasks		
Ref. No.	***Title - Description***	***Due Date***
T1	Preliminary studies and concept validation	M1 – M09
T2	Laboratory Prototype Design	M10 – M22
T3	Manufacture of Laboratory prototype	M23 – M29
T4	Testing the Laboratory prototype	M30 – M36

Milestones			
Ref. No.	***Title - Description***	***Type****	***Due Date***
M1	Conceptual Review validated	R	M09
M2	Design Review passed	R	M22
M3	Technology Maturity Review (TRL4) achieved	R	M36

JTI-CS2-2018-CFP08-SYS-WP 4.1- TOPIC 03

- **The applicant offer should be able to deliver the following items:**

Deliverables			
Ref. No.	***Title - Description***	***Type****	***Due Date***
D1	Preliminary studies and concept validation report	R	M09
D2	Laboratory prototype specification	R	M22
D3	Laboratory Prototype	HW	M29
D4	Test report	R	M36

- **Skills & Capabilities expected from the Applicant:**
  - Proven experience in the use of Piezo-electric technology in industrial sector such as Aerospace or Automotive.
  - Relevant experience in aircraft system integration and installation.
  - Experience in collaborative research.
  - Relevant experience in multi-disciplinary integration.
  - Knowledge of aerospace development, quality standards and certification processes.
  - Demonstrated experience in project and quality management in the context of aerospace development.
  - Access to a supply chain for all the necessary components and material.

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 07

Health Monitoring for Electro-Hydraulic Actuator fluid

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 07

Type of action (RIA/IA/CSA)	IA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 4.1		
Indicative Funding Topic Value (in k€)	500 k€		
Topic Leader	SAFRAN LANDING SYSTEMS	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	24 months	**Indicative Start Date**	03/2019

Topic Identification Code	**Title**
CFP08-SYS-WP4.1 **[ID Code for JU to complete]**	Health Monitoring for Electro-Hydraulic Actuator fluid
Short description	
The purpose of this research topic is to develop and validate a system to monitor the level of contamination of the aviation hydraulic fluids (e.g. number and size of the particles, the percentage of water, etc.) within a representative aircraft environment. Early detection of unacceptable level of fluid contamination will allow preventing detrimental effects on the equipment lifetime as well as improving efficiency and reducing the costs of maintenance operations. This research targets TRL6 validation	

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 07

- **Goal:**

  The aim of the project is to monitor the ageing and contamination of aircraft hydraulic fluid (in particular in case of use of EHA) with the objective to anticipate any detrimental effect to the hydraulic system and its components, and to schedule a preventive maintenance operation.

- **Target:**

  Existing and future A/C implementing Hydraulic circuits.

- **The Applicant should be able to perform the following tasks with associated milestones**:

Tasks		
Ref. No.	***Title - Description***	***Due Date***
T1	Preliminary studies and concept validation	M01 – M03
T2	Experimental Design testing in laboratory	M04 – M09
T3	Tests with representative Aircraft environment (TRL4)	M10 – M15
T4	TRL5/6 demonstration	M16 – M24

Milestones (when appropriate)			
Ref. No.	***Title - Description***	***Type****	***Due Date***
M1	Conceptual Review validated	R	M09
M2	Technology Maturity Review (TRL4)	R	M15
M3	Technology Maturity Review (TRL5)	R	M21
M4	Technology Maturity Review (TRL6)	R	M24

JTI-CS2-2018-CFP08-SYS-WP 4.1-TOPIC 07

- **The applicant offer should be able to deliver the following items:**

Deliverables			
Ref. No.	***Title - Description***	***Type****	***Due Date***
D1	Preliminary studies and concept validation report	R	M05
D2	Experimental testing summary	R	M12
D3	TRL assessment report	R	M24

- **Skills & Capabilities expected from the Applicant:**
  - Experience in sensor technologies for measurement of fluid properties in industrial sectors not limited to Aerospace.
  - Experience in collaborative research.
  - Relevant experience in multi-disciplinary integration.
  - Knowledge of aerospace development, quality standards and certification processes.
  - Capabilities to work with aircraft fluids (including phosphate-esters)
  - Access to a supply chain for all the necessary components and material.

JTI-CS2-2017-CFP08-SYS-02-50

Innovative RTM tooling for CFRP primary structural parts

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2017-CFP08-SYS-02-50

Type of action (RIA/IA/CSA)	IA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 4.2.2		
Indicative Funding Topic Value (in k€)	750		
Topic Leader	Fokker Landing Gear	Type of Agreement	Implementation Agreement
Duration of the action (in Months)	18	Indicative Start Date (at the earliest)125	Q1 2019

Topic Identification Code	Title
JTI-CS2-2018-CFP08-SYS-02-50	Innovative RTM tooling for CFRP primary structural parts
Short description	
For complex shaped and high performance CFRP structures the metal moulding tools currently in use are complex, heavy and expensive. The topic aims to develop robust, wear resistant, lightweight, low cost tooling with integrated dynamic controlled electrical heating system, that is suitable for high-pressure resin injection processes and complex shaped products.	

JTI-CS2-2017-CFP08-SYS-02-50

- **Goal:** to develop new or improved tooling concepts (including materials and processes) for large CFRP products containing internal cavities, manufactured using RTM (resin transfer molding).

- **Target:** complex composite landing systems, TRL5 in 2020.

- **The Applicant should be able to offer**:

  Capability to develop innovative tooling that shall be able to

  - withstand high injection pressures (up to 20 bars)
  - operate in industrial manufacturing environments with manufacturing rates of up to 500 parts/year
  - allow significant reduction of energy consumption compared to current metal tools
  - improve handling (e.g. limiting the need for expensive equipment),
  - be used modularly and flexible to (partly) re-use for different parts
  - produce products of up to 2 x 0.75m (length x width)

JTI-CS2-2017-CFP08-SYS-02-50

- **The applicant offer should be able to provide:**
  - Improved tooling concepts and tooling materials (based on requirements defined by the Topic Manager), aimed at reduction of product manufacturing cost, tool weight, energy consumption, product flexibility, while still being cost-efficient and suitable for aerospace production environments.
  - A detailed design of the selected concept including relevant material testing and analyses
  - A manufactured RTM tool with relevant tool testing and tool verifications
  - Validation of the tool concept, by manufacturing demonstration products, using a dry fibre preform and process specifications supplied by the topic manager
  - Comparison of the tool concept with the baseline tool.

- **Skills & Capabilities expected from the Applicant:**
  - Proven experience in tools and tool materials for RTM processing suitable for series production, aerospace experience will be beneficial
  - Knowledge of aerospace products, development, quality requirements.
  - Experience in the development of RTM tools, including the use of composite tool materials (such as elastomers or shape memory polymers), experience with integrated heating/cooling methods will be beneficial.

JTI-CS2-2017-CFP08-SYS-02-50

Task	Description	Q1	Q2	Q3	Q4	Q5	Q6
T1	RTM tool concept design and selection						
T2	RTM tool design						
T3	RTM tool manufacturing						
T4	RTM tool test and verifiication						
T5	RTM tool demonstration						

JTI-CS2-2017-CFP08-SYS-02-51

Innovative quality inspection methods for CFRP primary structural parts

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2017-CFP08-SYS-02-51

Type of action (RIA/IA/CSA)	IA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 4.2		
Indicative Funding Topic Value (in k€)	750		
Topic Leader	FLG	Type of Agreement	Implementation Agreement
Duration of the action (in Months)	24	Indicative Start Date (at the earliest)127	Q1 2019

Topic Identification Code	Title
JTI-CS2-2017-CFP08-SYS-02-51	Innovative quality inspection methods for CFRP primary structural parts
Short description	
Development of new NDI methods and/or techniques capable of inspecting the more complex features associated with the development of highly efficient composite landing gear parts. The objective is to reliably detect anomalies in complex structures and demonstrate qualification, in a cost-efficient way, suitable for a production environment.	

JTI-CS2-2017-CFP08-SYS-02-51

- **Goal:** to develop new NDI methods and/or techniques capable of inspecting the more complex features associated with the development of highly efficient composite landing gear parts. The objective is to reliably detect anomalies in complex structures and demonstrate qualification, in a cost-efficient way, suitable for a production environment

- **Target:** complex composite landing systems, TRL5 in 2020.

- **The Applicant should be able to offer**:

  Advanced and innovative Non Destructive Inspection methods, compatible with complex geometric features in composite materials, containing new or improved NDI methods and/or techniques, capable of

  - performing reliable inspections on complex features (associated with composite landing gear parts)
  - with a high degree of automation (both in scanning and data analysis / evaluation)
  - validation of the new or improved NDI methods and/or techniques against the requirements that are applicable in civil aerospace structures (such as CS25).
  - cost efficiency (through e.g. automation of scanning and data analysis) and suitable for application within a production environment.

JTI-CS2-2017-CFP08-SYS-02-51

- **The applicant offer should be able to provide:**
  - identification and description of the improved NDI methods and/or techniques, based on requirements defined by the TM
  - testing and validation the improved methods, development and documentation of inspection plans
  - validation of the improved inspection methods by execution of the inspection plan on characteristic samples of composite landing gear parts (provided by the Topic Manager) and comparison to reference tests (for instance radiographic CT scan)

- **Skills & Capabilities expected from the Applicant:**
  - Good knowledge in defect characterisation, detection and inspection technologies, including advanced data analysis techniques to detect material anomalies in composite materials (such as fibre waviness and undulation, porosities, etc), experience in the aerospace sector will be beneficial
  - Knowledge of aerospace development, inspection methods and standards, inspection qualification process
  - Proven experience in qualification and verification strategies for inspecting complex composite structures such as civil aircraft structures (CS25/FAR25).
  - Experience in the development of innovative NDI methods and techniques, experience in inspection simulation and industrial application will be beneficial.

JTI-CS2-2017-CFP08-SYS-02-51

Task	Description	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
T1	Development of improved NDE methods (compared to state of the art)								
T2	Inspection plan definition								
T3	Inspection demonstration								
T4	Inspection validation and reporting								

JTI-CS2-2017-CFP08-SYS-02-52

Innovative Composite Material Qualification Methodologies

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2017-CFP08-SYS-02-52

Type of action (RIA/IA/CSA)	IA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 4.2		
Indicative Funding Topic Value (in k€)	1000		
Topic Leader	FLG	Type of Agreement	Implementation Agreement
Duration of the action (in Months)	24	Indicative Start Date (at the earliest)131	Q1 2019

Topic Identification Code	Title
JTI-CS2-2018-CFP08-SYS-02-52	Innovative Composite Material Qualification Methodologies
Short description	
Development and validation (testing) of a new material qualification and test methods of new composite materials in safety critical single load path aircraft structures. The aim is to reduce the number of material tests required, without compromising confidence level, robustness and reliability of the material allowables.	

JTI-CS2-2017-CFP08-SYS-02-52

- **Goal:** Development and validation (testing) of a new material qualification and test methods of new composite materials in safety critical single load path aircraft structures. The aim is to reduce the number of material tests required, without compromising confidence level, robustness and reliability of the material allowables

- **Target:** complex composite landing systems, TRL5 in 2020.

- **The Applicant should be able to offer**:

  Capability to develop improved methods for material qualification that perform better than the traditional building block method (identified as current baseline) without reducing reliability. The method shall be test validated to ensure applicability and to show equivalence to the baseline method (traditional building block approach). The method shall allow a reduction in the required number of tests without compromising material characterization, robustness and reliability of the material allowables. The improved material qualification method must be suitable to be used in the next generation of primary single load path composite aircraft structures and using the material system (CFRP using textile preforms and RTM) and design features used by the Topic Manager.

JTI-CS2-2017-CFP08-SYS-02-52

- **The applicant offer should be able to provide:**
  - definition and description of the new material qualification method, based on both current state-of-the-art and requirements, with a comparison to the baseline building block and current state-of-the-art methods and a description of the proposed analytical, statistical and test methods to be used.
  - Demonstration of the improved method through a number of tests and against the performances of the baseline methods, using a Material Test Plan
  - Propose and develop alternative and innovative approaches (for instance methods to automate test activities or advanced material analysis methods)
  - Comparison with existing methods and data by manufacturing and material testing
  - Correlation analyses for relevant test samples will be performed in close cooperation with the Topic

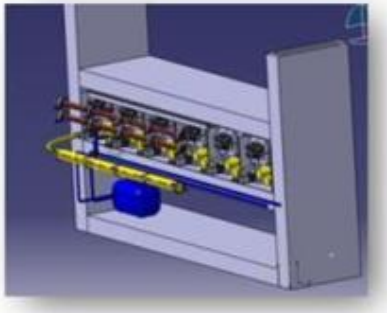
- **Skills & Capabilities expected from the Applicant:**
  - Proven experience in composite material characterisation and test technologies, such as described in CMH-17, aerospace experience is beneficial.
  - Knowledge of aerospace development, quality standards and certification processes.
  - Extensive knowledge of and preferably proven experience in certification and validation strategies for composite civil aircraft structures (CS25/FAR25), including the application of statistical methods and other methods relevant for certification and validation.
  - Experience in the development of methods, such as material analysis methods, statistical methods, etc.

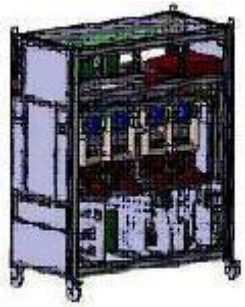
JTI-CS2-2017-CFP08-SYS-02-52

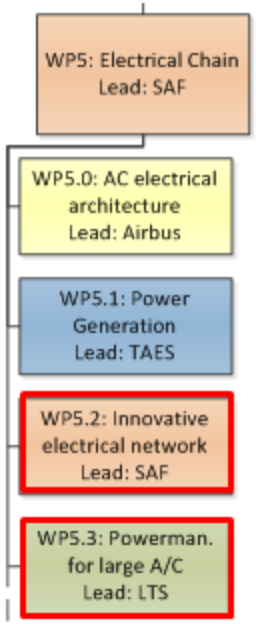
Task	Description	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
T1	Improved qualification method definition and description								
T2	Material test plan								
T3	Correlation of method with test data								
T4	Validation of method with validation data								
T5	Correlation of method with test data								

SYSTEM ITD CfP 08 list of topics

Topic	Title	WP	Type of Action	Value	Topic Leader
SYS-02-53	Development of an optimized DC-DC converter for a smart electrical system	5.2	IA	0.7	Safran
SYS-02-54	Development of a HVDC current Limiter	5.3	IA	0.65	Zodiac Aero Electric







Power Generation

&

Distribution

JTI-CS2-2018-CFP08-SPD-02-53

Development of an optimized DC-DC converter for a smart electrical system

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CFP08-SPD-02-53

Type of action (RIA/IA/CSA)	IA		
Programme Area	LPA / REG / FRC / AIR / ENG / **SYS** / SAT / ECO / TE		
(CS2 JTP 2015) WP Ref.	WP 5.2		
Indicative Funding Topic Value (in k€)	700 KEUR		
Topic Leader	Safran Electrical & Power	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	18 months	**Indicative Start Date**[1]	09-2018

Topic Identification Code	**Title**
JTI-CS2-2017-CFP07-SPD-XX-XX [ID Code for JU to complete]	Development of an optimized DC-DC converter for a smart electrical system
Short description	
In the context of the More Electrical Aircraft, the purpose of this topic is to develop an optimized and compact bidirectional modular DC/DC converter to be used in a smart electrical system.	

Clean Sky 2

JTI-CS2-2018-CFP08-SPD-02-53

- **Goal:** The target is to design a modular DC/DC bidirectional converter (LVDC to HVDC, 4-30kW) that is highly efficient (>96% efficiency to mitigate thermal issues) and achieves non-packaged power densities of over 5kW/kg:
  - Reduce losses (soft switching and wide bandgap semiconductors)
  - Reduce weight (passive component and thermal management)
  - Increase availability
  - Improve network power quality and easy network reconfiguration (Voltage control accuracy +/- 1%, current control accuracy +/- 3%, load transient voltage variation < 10% & response time < 10ms)
  - Safety: HVDC/LVDC insulation Fault < 10e-9/FH, loss off total function < 10e-5/FH

- **Target:** Large commercial aircrafts, TRL6 in early 2020.

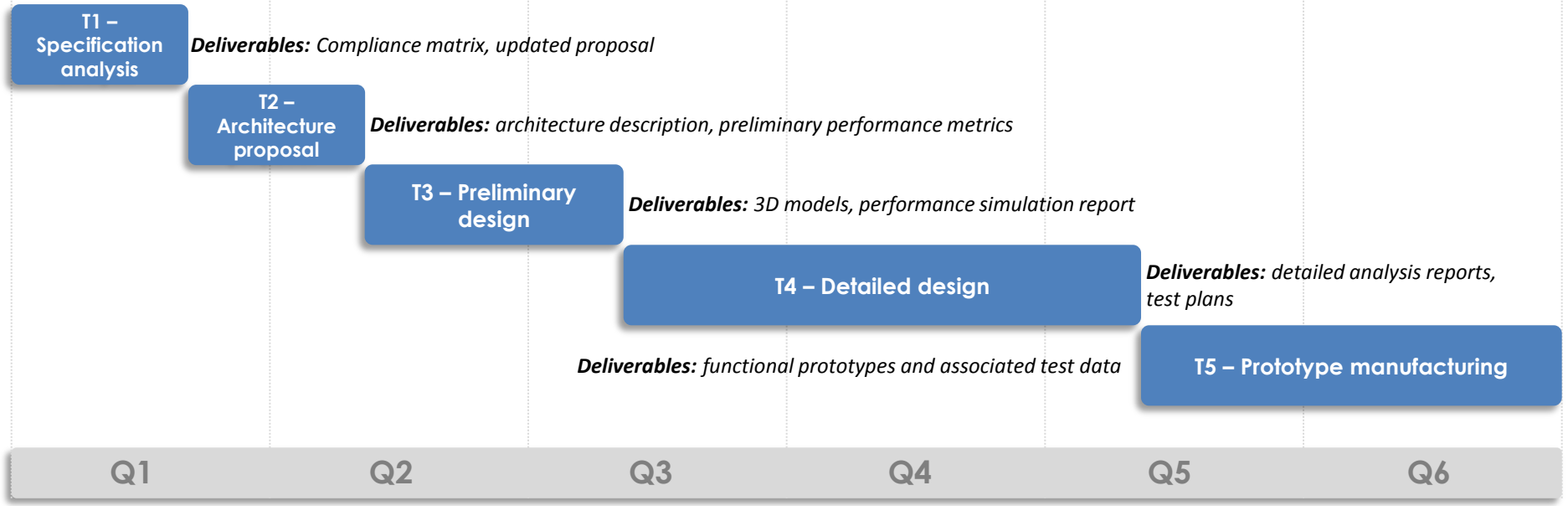
- **The Applicant should be able to offer**:
  - The design shall use wide bandgap semiconductors (GaN for LVDC / SiC for HVDC) and/or soft switching
  - topology must be robust to single failures and allow reconfiguration by using modularity and multiple elementary converters bricks
  - Prototype shall withstand aeronautical constraints for qualification
  - Prototype shall be representative of mass and volume of the final product and be able to deliver its performance within its operational environmental envelope
  - The prototype development shall consider requirements for future industrialization

JTI-CS2-2018-CFP08-SPD-02-53

- **The applicant offer should be able to provide:**
  - A complete design justification dossier (sizing parameters and cases, architecture trade-studies, electrical and mechanical drawings & analysis results)
  - A manufacturing dossier for the prototypes (assembly process, testing requirements, quality inspections)
  - 3-5 tested and validated prototypes accompanied by acceptance test results

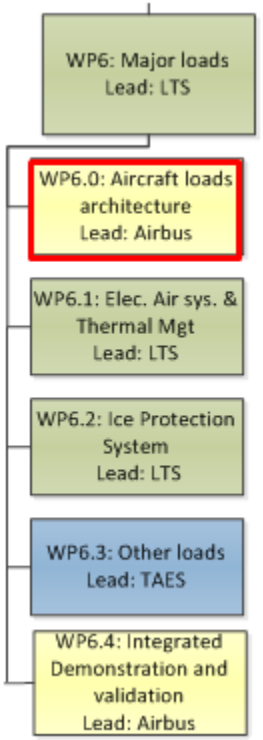
- **Special skills, Capabilities, Certification expected from the Applicant(s):**
  - Good knowledge in Power Electronics design and manufacturing, in particular for high current and high frequency converters and transformers
  - Knowledge on Mechatronics AND thermal integration; automatism and control;
  - Knowledge of aeronautics requirements (DO160)
  - Expertise on EMI
  - Capability to realize prototypes and perform functional and normalized tests according to DO160 with power supply up to 600A

JTI-CS2-2018-CFP08-SPD-02-53



SYSTEM ITD CfP 08 list of topics

Topic	Title	WP	Type of Action	Value	Topic Leader
SYS-02-55	Air treatment system for airborne microbe removal from air circulation or chambers	6.0	RIA	0.65	United Technologies Research Centre



Major Loads

JTI-CS2-2018-CfP08-SYS-02-55

Air treatment system for airborne microbe removal from air circulation or chambers

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CfP08-SYS-02-55

JTI-CS2-2017-CFP08-SYS-02-55: Air Treatment System for Airborne Microbe Removal from Air Circulation or Chambers

Type of action (RIA/IA/CSA)	RIA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 6.0.2		
Indicative Funding Topic Value (in k€)	650		
Topic Leader	United Technologies Research Centre	Type of Agreement	Implementation Agreement
Duration of the action (in Months)	24	Indicative Start Date (at the earliest)130	Q1 2019

Identification	Title
JTI-CS2-2017-CFP08-SYS-02-55	Air treatment system for airborne microbe removal from air circulation or chambers
Short description (3 lines)	
This topic will develop a prototype system designed to improve the biological quality of the air in aircraft cabins by using novel high performing technologies that do not rely on mechanical filtration. The developed system should feature rapid, efficient and durable broad range virus and bacteria deactivation potential, small footprint and low power consumption for integration into current/future aircraft ECS architecture.	

Clean Sky 2

JTI-CS2-2018-CfP08-SYS-02-55

- **Goal: develop a system to improve the biological quality of the air that do not rely on mechanical filtration and that can be integrated in the cabin recirculation loop.**

  The system shall be designed such that:

  - it rapidly and efficiently reduce a broad range of viruses and bacterial from the cabin recirculated air;
  - it is compact, lightweight, robust and with low voltage capability;
  - it should not negatively impact any other aircraft system;
  - it should not increase ozone levels in the aircraft.

- **The Applicant should be able to:**

  1. develop a concept of operations for the anti-microbial system, including trade-off of various concepts / architectures;
  2. develop a detailed system specification document addressing all requirements and KPIs;
  3. perform simulations to ensure optimal and uniform energy distribution within the air flow path to ensure the highest performance at the lowest pressure drop;
  4. conduct studies to determine the optimal performance parameters to remove relevant pathogens to improve the biological quality of recirculated air;
  5. built a TRL 3-4 prototype and the functionalities tested to verify performance against the operational KPIs.

JTI-CS2-2018-CfP08-SYS-02-55

- **Skills & Capabilities expected from the Applicant.**

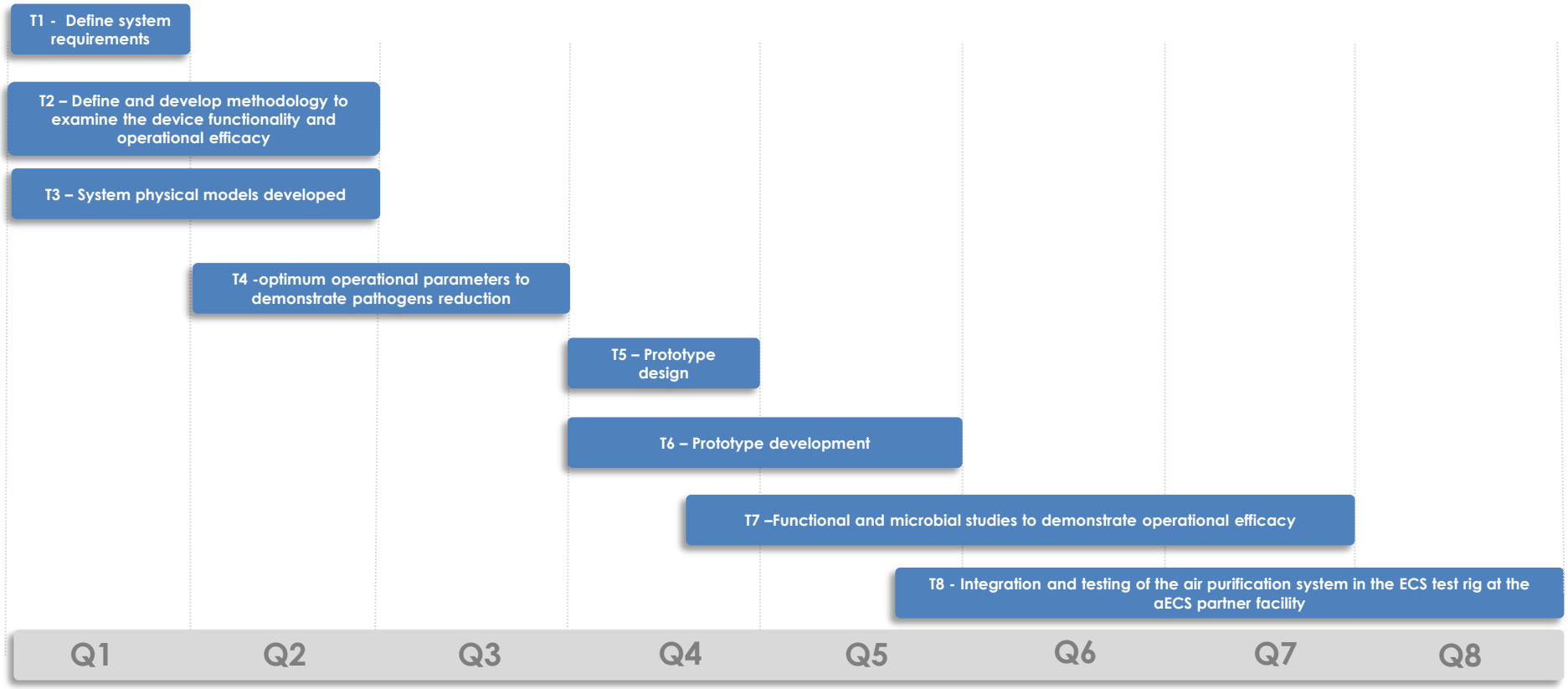
  The applicant shall have demonstrated expertise in:

  - the design and development of biocidal technologies, including, where appropriate, optical, electrical, mechanical engineering.
  - biocidal / microbial technologies modelling, simulation and validation.
  - system prototyping and integration.
  - microbiological testing, data collection and processing capabilities to verify the system performance.

- **The applicant should be able to provide:**

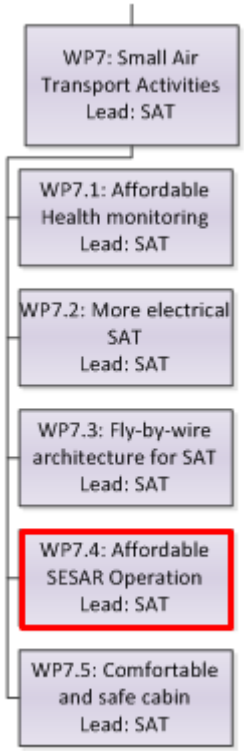
  - the appropriate facilities (test chamber) to perform tests **at relevant operating conditions** for aircraft cabin. Relevant operating conditions should include, at least, a lower ambient pressure and a proper airflow that mimic the conditions found in an aircraft ventilation system.
  - the **appropriate instrumentation** to perform the microbial tests to verify the improvement in the biological quality of the air.

JTI-CS2-2018-CfP08-SYS-02-55



SYSTEM ITD CfP 08 list of topics

Topic	Title	WP	Type of Action	Value	Topic Leader
SYS-03-17	Improved Thermal Properties of Computing Platforms for Next-Generation Avionics	7.4	RIA	0.8	Honeywell International



Systems for Small Air Transport

JTI-CS2-2018-CFP08-SYS-03-17

Improved Thermal Properties of Computing Platforms for Next-Generation Avionics

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CFP08-SYS-03-17

Type of action (RIA/IA/CSA)	RIA		
Programme Area	SYS [SAT]		
(CS2 JTP 2015) WP Ref.	WP 7.4		
Indicative Funding Topic Value (in k€)	800		
Topic Leader	Honeywell International	Type of Agreement	Implementation Agreement
Duration of the action (in Months)	30	Indicative Start Date (at the earliest)134	Q1 2019

Topic Identification Code	Title
JTI-CS2-2018-CFP08-SYS-03-17	Improved Thermal Properties of Computing Platforms for Next-Generation Avionics
Short description	
The proposed activity shall investigate, develop, and validate emerging thermal-aware SW-based techniques that will reduce operational temperature of electronic circuits. The expected impact of the improved thermal performance will both improve computing performance and will reduce size and weight of electronics due to relaxed dissipation requirements.	

Links to the Clean Sky 2 Programme High-level Objectives135	
This topic is located in the demonstration area:	Cockpit & Avionics, Enabling Technologies
The outcome of the project will mainly contribute to the following conceptual aircraft/air transport type as presented in the scene setter	Advanced Short/Medium-range 19-pax Commuter

With expected impacts related to the Programme high-level objectives:				
Reducing CO2 emissions	Reducing NOx emissions	Reducing Noise emissions	Improving EU Competitiveness	Improving Mobility
☒	☒	☒	☒	☒

Clean Sky 2

JTI-CS2-2018-CFP08-SYS-03-17

- **Problem statement**
  - Investigate and validate emerging thermal-aware SW-based techniques for thermal-aware resource management in small-size electronics.
- **Measurable Objectives**
  - increase guaranteed perf by 30% for an equivalent thermal profile
  - reduce operational temp by 20% for an equivalent guaranteed perf
- **Expected Impact**
  - Improved **reliability**:
    - slow-down the aging of HW components as operational temp is lower
    - absence of complex cooling systems reduces probability of system failures.
  - Improved **availability** by streamlined production cycles in LRU packaging.
  - Improved **serviceability**: RT temp monitoring w prediction models facilitate predictive maintenance.
  - Improve **performance** for the same thermal profile.
- **Planning**
  - ~800 k€, ~30 months

JTI-CS2-2018-CFP08-SYS-03-17

- **Skills & Capabilities expected from the Applicant:**
  - Experience in R&D in the aeronautical or space domain.
  - Know-how in benchmarking of avionic platforms.
  - Good knowledge of thermal analysis and/or power-/energy-aware modelling of the HW components.
  - Competence in R&D in embedded systems and heterogeneous computing platforms, with special focus on scheduling optimization.
  - Experience in one of the following domains: GPU-based acceleration, use of co-processing cores, processor resource management, and execution-time analysis.
  - Capability to build functional prototypes and components for an industrial safety-critical system.
- **Major deliverables/ Milestones**

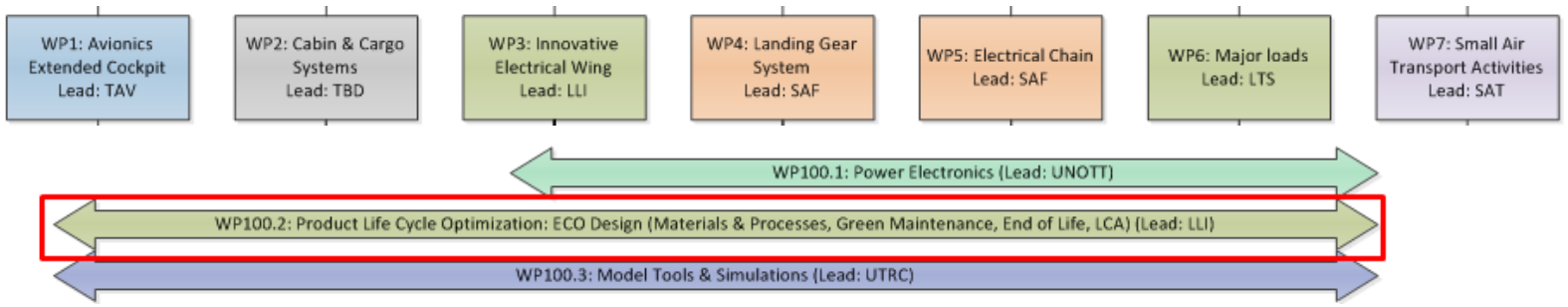
Deliverables			
Ref. No.	Title - Description	Type*	Due Date
D1	Report on technology candidates reducing heat production	R	T0+9m
D2	Report on detailed concept of the selected candidate prototypes	R	T0+12m
D3	Report on detailed design of the selected candidate prototypes	R, D	T0+15m
D4	Report on implemented candidate prototypes	R, D	T0+25m
D5	Final assessment of reduction of produced heat and recommendations.	R, D	T0+30m

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

SYSTEM ITD CfP 08 list of topics

Topic	Title	WP	Type of Action	Value	Topic Leader
SYS-03-18	Development and testing of innovative Cr free anodic layers removal solution	100.2	RIA	0.5	Liebherr

ECO DESIGN



JTI-CS2-2018-CfP08-SYS-03-18

Development and testing of innovative Cr free anodic layers removal solution

Innovation Takes Off

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

Clean Sky 2

JTI-CS2-2018-CfP08-SYS-03-18

Type of action (RIA/IA/CSA)	RIA		
Programme Area	SYS		
(CS2 JTP 2015) WP Ref.	WP 100.2		
Indicative Funding Topic Value (in k€)	**500K€**		
Topic Leader	Liebherr	**Type of Agreement**	Implementation Agreement
Duration of the action (in Months)	**24**	**Indicative Start Date**	> Q3 2019

Topic Identification Code	**Title**
JTI-CS2-2018-CfP08-SYS-03-18	**Development and testing of innovative Cr free anodic layers removal solution**

Short description

In 2024, the use of Chromium VI (Cr^{6+}) substances will be forbidden by the REACH Regulation. Many studies have been focused on the development of alternative solutions to CAA or chemical conversion coatings (Alodine®).

These studies have led to the development of new protective layers (e.g. SAA, TSA, chemical conversions coatings with CrIII) but few were dedicated to the development of processes required to remove these new oxide layers. Indeed, current processes use Cr^{6+}-based components (e.g. phosphochromic etching) and the alternative Cr free process with NaOH can lead to substrate etching if not stopped on time.

The aim of this study is thus to develop a Cr free solution to remove anodic layers obtained with new alternative treatments, without deteriorating the aluminium alloy substrate.

Clean Sky 2

Scope of work

Task 1 : Definition of the requirements, screening & evaluation of existing treatments with / without Cr

Due : T0+12 months

- Definition of test requirements, with determination of test samples' configurations to be retained for the project as well as the test characterisations to be performed
- Identification, characterization and evaluation of existing treatment with and without Cr

Type of Alloys to be studied	Type of oxide layers to be removed	Type of re-treatment after oxide layer removal
•2024 machined (task 1&2) •7075 machined (task 1&2) •2618 machined (task 3) •7010 (task 3) •AS7G06 casting (task 3) •AU5NKZr casting (task 3)	•CAA (less than 5 µm thickness) •Alodine (less than 1µm thickness) •Thin SAA (less than 10µm thickness) •chemical conversion with CrIII (less than 1 µm thickness)	•Thin SAA •chemical conversion with CrIII

→ Minimum of 8 configurations are expected to be characterised and evaluated at each stage

→ Test requirements to be defined considering parameters such as: microstructural observations of cross section, microstructural observations of surface, surface analysis, fatigue testing, salt spray testing (when relevant),…

→ Before any development, the existing treatments should be identified, characterized and evaluated along the define test requirements, for both existing treatments with and without Cr

JTI-CS2-2018-CfP08-SYS-03-18

Task 2 : Development and evaluation of innovative Cr free method on reference alloys
Due : T0+18 months

- Development of an innovative chemical etching process to remove oxide layers formed with / without Cr
- Characterization & evaluation of the developed treatment along the test requirements defined in Task 1

→ REACH compliant (no CrVI)

→ Performances must be equivalent to currently use treatments (no etching of the substrate, uniform etching on complex shapes, low fatigue drop, anodizing or chemical conversion after oxide layer removal still efficient,…)

Task 3 : Identification of the best Cr free solution & implementation on other aluminium alloys & complex parts
Due : T0+24 months

- Identification of the best solution : comparison between existing and developed treatments & ranking according to previous characterization and compliancy with requirements defined in Task 1
- Implementation of the best method on a wider range of aluminum alloys & complex parts

→ Complex parts will be provided by TM (Part 1: ~ 30*30*80 mm / Part 2: ~ 190*120*75 mm / Part 3: ~ 400*300*200 mm)

→ Control of the whole parts and SST after new treatments (SAA and chemical conversion with CrIII) required : check that the attack is uniform even on complex shape and that a new treatment applied on parts after stripping is still efficient

Clean Sky 2

Major Deliverables & Milestones

Deliverables

Ref. No.	Title - Description	Type*	Due Date
D1	Definition of the test requirements	R	M2
D2	Results of screening and evaluation for existing treatments with & without Cr	R	M12
D3	Results of the evaluation for developed innovative Cr free treatment	R	M18
D4	Evaluation of the best solution on other alloys & complex parts	R	M24

Milestones

Ref. No.	Title - Description	Type*	Due Date
M1	Choice of the screening solutions	R	M7
M2	Choice of the best solution to be implemented on other alloys and parts	R	M18

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

Special skills, Capabilities, Certification expected from the Applicant(s)

- Strong experience on surface technologies, especially on chrome free surface treatments (SAA, chemical conversion coating with CrIII)

- Strong experience and knowledge on the surface treatments of the following alloys : cast AS7G06 and AU5NKZr, 7075, 7010, AA2024 and 2618

- Capabilities required to performed the study :
  - Laboratory or pre-industrial baths (able to treat complex parts as referred to in the topic description)
  - Optical microscope, SEM-EDX, FIB, XRD and any other surface analysis methods that will be relevant to detect remanent oxide layer
  - Metallographic preparation for microstructural analysis
  - Fatigue testing (rotative bending is preferred)
  - Salt Spray Test

→ **All samples required for the study will be provided by the TM**

→ **It should be noted that CAA and SAA layers are always sealed with respectively CrVI and CrIII sealing solutions**

Any questions?

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

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