



Clean Sky Smart Fixed Wing Aircraft - ITD

“SFWA Smart Wing Structure Work Package”

Work package description to be subject of a
Call for Associate Members (2nd loop)

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1. Brief description of the Joint Technology Initiative (JTI) “Clean Sky”

“Clean Sky” is the European aeronautics industry's response to citizens' needs for more environmentally friendly aviation in combination with sustained economic growth. This seven-year research programme will combine public and private capacities to rapidly introduce advanced technologies for the next generation of aircraft. The aim of these new technologies will be to radically reduce noise and emissions in air transport, and reduce aircraft fuel consumption.

The Clean Sky programme will speed up the path from research to industrial application of innovative, greener technologies. Large-scale technology demonstrators are planned in order to validate research results both in flight and on the ground, notably in flight test vehicles created expressly for this programme. This will enable a more rapid transition to full-scale flight tests, followed by the application of these new technologies in the next generation of aircraft. Clean Sky will be built upon six different technical areas – from innovative rotor blades and engine installations that reduce noise and fuel consumption, to ecologically friendly designs that help components last longer and use fewer non-renewable resources.

By supporting greener technologies in a growth industry, the Clean Sky JTI will contribute to sustainable growth in Europe. While air transport is currently a relatively small source of the greenhouse gas emissions, its share will increase in line with the expected build-up of air traffic. The environmental challenge requires immediate action to promote the development of clean transport technologies. In addition, the European aeronautics industry is faced with strong competition worldwide, both from traditional competitors and from new competitors in emerging economies. The role of public support is therefore of primary importance; the Clean Sky JTI will therefore contribute Community funds to bring together major stakeholders in the public, private and non-profit sectors, and to bring technological development closer to the market.

Clean Sky will bring public support together with industry funds in a risk-sharing structure that will accelerate the development and introduction of environmentally focussed technologies in next generation air vehicles. The European Commission will invest 800M€ in cash, while industry will invest an additional 800M€ in kind. The CEOs of the major European aeronautics companies signed an MOU in October 2006 agreeing to work together to fund and deliver the Clean Sky programme in addition to their existing technology acquisition programmes.

Clean Sky has been working extensively with the Commission for two years. Agreement has now been reached on the principles of governance of the JTI:



- Openness and transparency necessary for the use of public funds
- Flexibility and efficiency to ensure the JTI deliverables are met
- Influence from national states through the creation of new bodies
- An independent executive director as the legal representative of Clean Sky

It is expected that Clean Sky will trigger the availability of additional public funds from Member States for additional research programmes.

Several flying and full-scale ground demonstrators will be manufactured and operated to fully demonstrate the viability of new system technologies and design concepts. A monitoring process to ensure visibility and control of resource allocation will be set up. This Technology Evaluator, led by independent experts, will continuously measure the progress of Clean Sky towards its objectives.

Clean Sky was launched in February 2008 by the European Commission with an operational start to take place as soon as possible.



2. Objectives of the Smart Fixed Wing Aircraft - Integrated Technology Demonstrator “SFWA-ITD”

Over the last 50 years intensive research to optimise the configuration and aerodynamic profile of aircraft has delivered a steady improvement in aircraft efficiency, resulting in the reduction of fuel consumption and noise emission.

According to the ACARE goals for 2020, out of a target of 50% reduction in CO₂, nearly half of the achievement should come from the airframe.

A major reduction in weight will be achievable by extending the use of composite materials. However, this alone will not be sufficient to reach the 2020 goals.

Step changes in aerodynamics and flight physics performance are also required. In this regard, the concept of active wing and new configuration is a promising and still unexplored field of serious investigation in an operational environment.

As a result of continuous incremental improvements, the shape and configuration of large and small transport aircraft have converged to what has become an almost universal configuration: a highly efficient passive wing with moveable surfaces, underwing high by-pass ratio engines or rear fuselage engines, and rear vertical and horizontal tails.

A step change in the performance can now only be achieved by rethinking the aircraft architecture and its components. The assessment of the benefits of such a radical change can only be validated on a representative flying vehicle via a multidisciplinary approach. This is the goal of the Integrated Technology Demonstrator (ITD) Smart Fixed Wing Aircraft (SFWA).

The purpose of the Smart Fixed Wing Aircraft flying demonstrator is to develop and validate up to Technology Readiness Level (TRL) 6 innovative technologies, concepts and capabilities currently investigated at TRL 3 and showing the potential to demonstrate a step change in the critical areas of fuel consumption and noise emissions. To this end the Smart Fixed Wing Aircraft ITD will integrate an active wing and innovative airframe concept technologies. This integration will be largely based on the results of other European R&T projects (mainly AWIATOR and NACRE) performed within the previous framework programmes.



The merit of the active wing lies in its capacity to control loads and air flow and generate benefits in drag reduction and structural mass leading to a reduction of fuel consumption and gaseous emissions, noise, systems complexity and increasing ride comfort. Whereas a classical wing is passive with an optimised shape and high-lift devices, the active wing will sense the surrounding airflow, analyse and modify it to continuously seek optimum efficiency. This innovative approach and associated technologies will be integrated into a full-scale wing tested in a real operational environment on the flying demonstrator.



3. Smart Fixed Wing Aircraft – Work Break Down Structure

The SFWA work breakdown structure follows the overall logic of the maturing of the innovative technologies for the Smart Wing in work package (WP) 1, integrating the most promising, down selected technologies in a multidisciplinary approach into a realistic concept WP2, and preparing, conducting and exploiting large scale flight tests in WP3 (see figure 1). The project coordination, which is done in co-leadership by Airbus and SAAB is accommodated in WP0.

The innovative propulsion and empennage concept is found in WP2, as a major share of the technology development is part of the Clean Sky Sustainable and Green Engine ITD (SAGE). The assessment of all SFWA technologies developed and selected for integration and large scale demonstration is also made in WP2, providing the interface to the Clean Sky Technology Evaluator (TE) in a combined work package WP2.3.

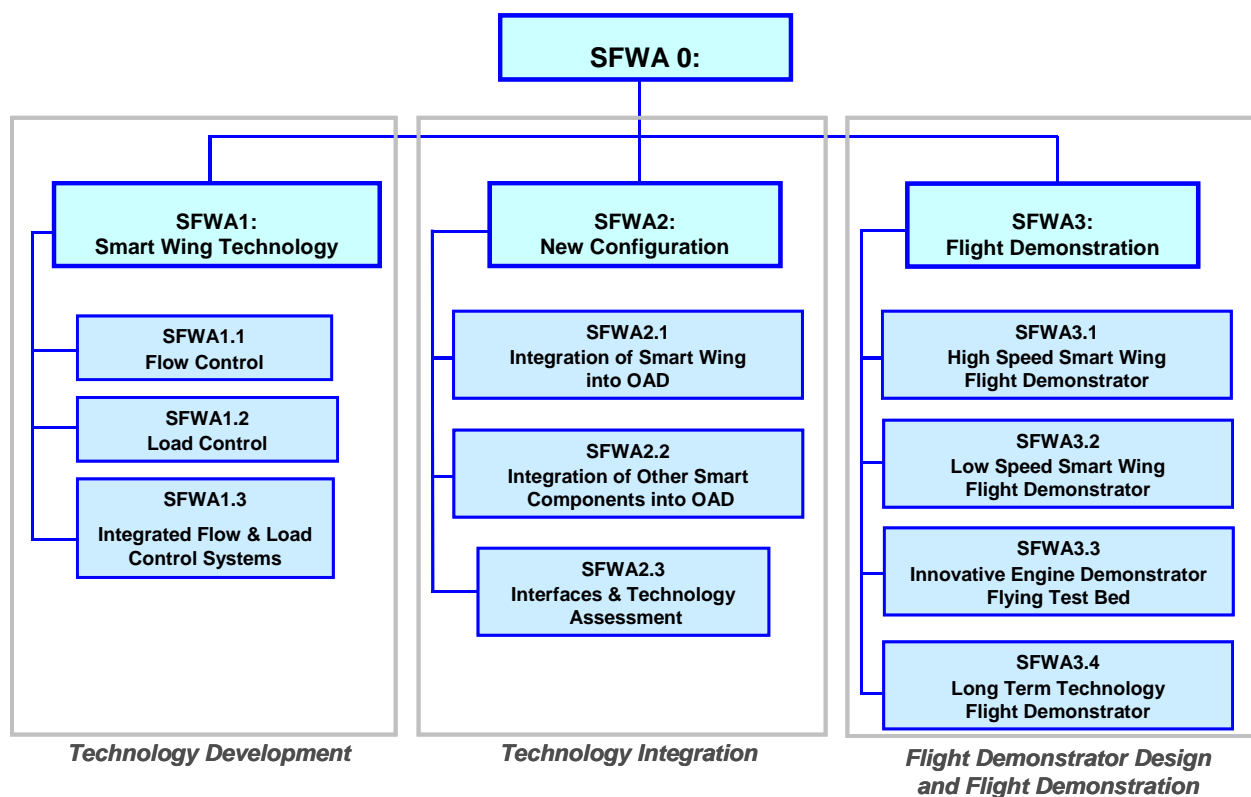


Figure 1: SFWA Work Break down Structure (WBS) at levels 0, 1 and 2



It is planned to accommodate the “Smart Wing Structure Work Package” in two major modules in WP2.1 (Integration of Smart Wing into overall Aircraft Design) and WP3.1 (High Speed Smart Wing Flight Demonstrator).

4. Description of the work package subject of the call

An important element of the *Smart Wing* integration is the embedding of the innovative passive and active flow and loads control solution into an appropriate concept of using advanced materials, design tools and manufacturing methods. A successful combination of all these technology elements will be an essential key to gain the envisaged benefit from the new wing design, with respect to overall performance, weight and cost. An important feature of the large flight demonstration at operational condition is the proof of the *Smart Wing* concept in industrial scale.

The Associate Member to be selected in the present call will be asked to provide an essential part of the design and manufacturing of one set of flight test Smart Wing articles . Please note that the final selection of the flight test vehicle has not been made at this date, but will be part of a careful process in the first year of the SFWA project runtime. Given this condition, a fully detailed description of tasks can therefore not be provided.

The Associate Member that will be appointed as a result of the selection process must agree on a principal commitment to the global objectives of this work package for the 7 year lifetime of Clean Sky SFWA. The Associate Member will also be asked to:

- provide structural solutions to the flight test bed (FTB) demonstrator to achieve the requirements specific to a laminar flow wing;
- develop the proposed structural concept from WP1 that best meets laminar flow surface requirements into a full wing box;
- develop this structural concept in composite materials and with manufacturing processes using proven technologies; and



- apply mature solutions for surface technologies (anti-contamination, anti-ice, etc) as determined in WP1.

It is important to note that the demonstrator articles to be designed and produced are of typical scale for transport aircraft, i.e. the span of the smart wing demonstrator will be in the order of ~10 metres and the depths of cord at the root attachment will be in the order of ~2 metres. The applicant for Associate Membership must be able to provide the appropriate design tools, manufacturing tools and equipment for such articles.

Participating in the work package means contributing to the preparation of the flight test – in particular its definition – and consulting with other partners during the assembly of the test article and the conduct of the flight test. Not included in these tasks are:

- the return of the Flying Test Bed to its original condition;
- the generation of the flight loads and flight envelope required for the sizing of the components(these will be an input); and
- the design and manufacture of any trailing edge and leading edge devices. However, the design must take account of any flight control surfaces and systems needed in the wing/wing section.

Lead times for tooling materials and tooling manufacture need to be accounted for within the planning to ensure the overall schedule can be achieved.



5. Description of Requirements for Application

5.1. General

Candidates applying for selection as Associate Member in the SFWA must comply with and be assessed against the following criteria:

5.1.1. Eligibility criteria

1. Eligibility for funding according to the rules of the EC 7th Framework Programme
2. Commitment to 7 years' continual involvement (to be provided in the form of a letter from an authorised representative of the company/consortium and addressed to the Clean Sky Interim Director – see point 5.4.3)
3. Consistency of budget commitment (annual figures must be provided for the last two years on overall turnover, R&D and R&T investments).

5.1.2. Evaluation criteria

1. Level of technical contribution, innovation and relevance to deliver the ITD objectives
2. Ability in coordination/ management of complex research projects
3. Contribution to increase European competitiveness
4. Capacity to exploit the results in Europe

The applicants will provide material to the European Commission to enable a review of the compliance with the above criteria.



5.2. Technological competences and specific technical capabilities

The candidate for Associate membership in SFWA must have a full certification to design and manufacture Aircraft major components for JAA /FAR 25 transport aircraft. The candidate must also possess all technical capabilities and means for an FAA approved fully computer based 3D design process with the relevant capacities in tooling, as well as a skilled and certified workforce for design and manufacturing and quality control. Candidates must provide assurance that they are able to apply the most recent technology standards in the design and manufacturing of complex and large composite structures for FAR25 aircraft, in particular in carbon fibre reinforced polymer (CFRP).

The selected Associate Member will need to demonstrate capability in design, manufacture, structural testing and assembly – to aerospace standards – for large primary structure in both composites and metal.

The Associate Member will also require its own equipment – or access to other suppliers – for manufacturing, notably for fibre placement and large resin transfer moulding.

Finally, candidates will need to provide proof that they are fully audited companies (according to ISO 14001 standard or equivalent).

5.3 Financial viability

The total budget allocated for the work package to be assigned to the Associate Member is 8M€. Funding provided by the European Commission through the Clean Sky Joint Undertaking will be 50%, i.e. 4M€.

Candidates for Associate membership must provide assurance that they are able to provide deliverables of a financial value of 8M€. Please note that the spending profile by year cannot be predicted or planned at this time.

IMPORTANT NOTE

Applicants are reminded that, in order to become Associate Members of Clean Sky, they will have to accept formally the Clean Sky Regulations and Statutes adopted by the European Council on 20/12/07 and published in the Official Journal of the European



Communities on 4/2/08. Regulations and Statutes can be consulted at the following web address:

<http://register.consilium.europa.eu/pdf/en/07/st15/st15970-re01.en07.pdf>

The Associate Member selected through the process will be required to sign a Grant Agreement with the Clean Sky Joint Undertaking in accordance with the above mentioned regulations and statutes.

5.4 Modalities for application

5.4.1 Proposal Format

In order to submit your application, please fill in the application form provided, which must be signed by a legal representative of the applicant's organisation. The application form is downloadable from the Clean Sky website.

Attach to your completed application form any further supporting documentation to clarify your position with respect to the eligibility and evaluation criteria listed in 5.1.1 and 5.1.2

5.4.2 Deadline

The Call for Associates closes on 16/06/2008 at 5 pm Brussels time.

5.4.3 Submission of proposals

Applications must be placed inside two sealed envelopes. The inner envelope, addressed to "Liam Breslin, CDMA 1/166", should be marked as follows: "Invitation to tender - not to be opened by the internal mail department".

Applicants may choose to submit their proposals either by post or by courier **not later than 16/06/2008**, in which case the evidence of the date of dispatch shall be constituted by the postmark or the date of the deposit slip, to the following address:

European Commission
For the attention of Liam Breslin
DG RTD, Unit H3, CDMA 1/166
B-1049 Brussels
Belgium

Applications may also be hand-delivered to the following address:



European Commission
For the attention of Liam Breslin
DG RTD, Unit H3, CDMA 1/166
Avenue du Bourget 1
B-1140 Brussels (Evere)
Belgium

not later than 5 pm on 16/06/2008. In the case of hand delivery, a receipt must be obtained as proof of submission, signed and dated by the official in the Commission's central mail department who took delivery. The department is open from 08.00 to 17.00 Monday to Thursday, and from 8.00 to 16.00 on Fridays. It is closed on Saturdays, Sundays and Commission holidays.

6. Eligibility check

Eligibility of proposals will be assessed on the basis of the information provided in the application form and in the attached supporting documentation as described in 5.4.1. The European Commission will perform the eligibility analysis.

7. Evaluation

The evaluation of proposals will be carried out by the ITD leaders of the SFWA ITD, on the basis of the criteria set out in 5.1.2. External observers will monitor the evaluation process to ensure openness, transparency and fair and equal treatment. The Commission on behalf of the Clean Sky Joint Undertaking will participate in the evaluation process and provide supporting logistics and the evaluation secretariat.

8. Confirmation of outcome

The ITD Leaders, with the assistance of the external observer(s) and the Commission on behalf of the JU, will draw up a ranked list of selected candidates and will propose the top ranked candidate for final selection. This proposal shall be approved by the Governing Board of the Clean Sky JU before the parties can enter into negotiating a work plan.