



# Smart Fixed Wing Aircraft ITD

## Annual Implementation Plan 2012

Abstract (Web Site Version)



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## Work plan for year 2012

In 2012, the majority of activities in the SFWA-ITD will be related to the detailed design and manufacturing of the major flight test demonstrators. In particular the building of the two laminar wing articles for the so called Airbus A340-300 based “High Speed Demonstrator Passive” will start in the year 2012. To prepare the “Low Speed Demonstrator” the programme was updated due to the different levels at which the principle required technologies are to date. As result, as intermediate step, two ground test demonstrators, one for a so called “smart flap” and one for an active system to attenuate vibration due to flow separation, will be initiated in 2012. The decision for low speed flight tests will be made after year 2012 based on the outcome of these ground tests. As the end of the feasibility study for the integration of the CROR to a “single aisle” short range aircraft is scheduled by mid of 2012, the detailed design of the pylon and the modification of the Airbus A340-600 test aircraft will start in the second semester of 2012. According to the current planning, years 2012 and 2013 do require the highest level of CleanSky “Call for Proposal” -partner engagement in the program.

### Integration of SFWA-ITD technologies

The development, integration and large scale ground and flight testing of the SFWA-ITD technologies are basing upon a structured maturation of the underlying principle technologies. In 2012, the majority of technologies will be advanced at technology readiness levels between TRL3 to TRL4, which means that the majority of activities will be dedicated to the integration and ground testing of principle technologies into components in an integrated environment.

In parallel to experimental ground and wind tunnel testing, the assessment of the yet pre-selected, integrated concepts in the virtual environment of the SFWA aircraft concept will be conducted within the ITD. The assessment of selected technologies matured in SFWA, but also added through the SGO and SAGE ITD will be supported in the CleanSky Technology Evaluator.

### Wind tunnel tests and ground demonstrators

A total number of 15 research and industry type wind tunnel tests are tentatively planned for 2012, the highest figures in a single year in the SFWA-ITD.

Four large tests are planned to cover the testing of preselected aircraft configuration with CROR engines in combination with different blades designs. The tests articles will be at 1/5 respectively 1/7 scale and will address a wide range of noise and aerodynamic measurements. Two large wind tunnel test entries are planned to evaluate a preselected innovative tail design for business jets in combination with advanced turbofan engines.



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A major wind tunnel test entry is planned to provide the required aerodynamic and handling quality data to contribute to the flight clearance process for the “High Speed Demonstrator Passive” flight test demonstration, namely the Airbus A340-300 test aircraft carrying the large smart wing test articles, scheduled to fly in year 2014.

A number of smaller research type wind tunnel tests are planned to mature various concepts of passive and active flow control for the detailed design of the smart wing, new loads control concepts, and the design of riblet surface coatings. At least one wind tunnel test is planned to exploit an advanced active flow control flap design.

For the smart wing, large scale ground “feature” demonstrators will be in the last phases of completion for testing in 2012 including an integrated structural demonstrator with all major system relevant for the leading edge design. Dedicated test articles will be prepared for bird strike and lightning strike tests as well as repair concepts. Many of the preparatory activities of these ground demonstrators will be carried out with strong contribution of Call for proposal partners, on topics being launched in the years 2010 and 2011.

## Preparation of major flight tests

A major share of activities in 2012 will be related to the detailed design for a large number of components and articles required for the large flight test demonstrations in SFWA including the substantial modifications of the test aircraft. For the smart laminar wing and low speed flight tests, the manufacturing and assembly of parts will be continued. The critical design review for the wing is rescheduled to June 2012, the flight test plan, however, did not change and is scheduled to start in September 2014. The activities in 2012 will include the preparation of the flight test instrumentation and measurement equipment.

For the CROR engine demonstrator FTB the detailed design work will start upon passing the preliminary design review. In particular the detailed design of the pylon, the engine related systems including the interfaces to the test aircraft, as well the structural modifications of the Airbus A340-600 test aircraft will start in the second half of 2012. Note that the engine related research and development work is mainly covered in CleanSky SAGE 1 and SAGE 2

## Workshares for partners through CfP-topics

A number of 26 CfP topics will be launched for SFWA related activities during the year 2012, the details of the subjects are being explained in the topic description. The scope of activities will range from the contribution in the design and testing of individual components and systems for the laminar wing, surface coatings and repair methods, contribution to design and manufacturing of laminar wing ground demonstrator parts, as well as the preparation and qualification of new flight test instrumentation.



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## Envisioned major activities, achievements and milestones for 2012

- Completion of detailed design activities for the “High Speed demonstrator Passive” (HSDP)
- Completion of the CROR feasibility study.
- Preliminary Design Review for CROR-engine demonstrator Flying Test Bed (CROR demo-FTB)
- Start of manufacturing for the High Speed Demonstrator Passive
- Conduct of the Critical Design Review for the High Speed Demonstrator Passive
- Conduct of wind tunnel test for low speed handling quality as part of the flight clearance process for the HSDP.
- Conduct of major wind tunnel test to select a CROR engine – blade target design
- Completion of the smart wing leading edge structural feature demonstrator, preparation for testing
- Initiation of two Ground Tests to prepare the “Low Speed Demonstrator”
- Conduct of wind tunnel tests with concepts for the integration of innovative engines in Business Jets.
- Wind tunnel tests with 2.5D active flow control high performance high lift concepts for laminar wings
- In flight testing of surface coatings for laminar wings
- Evaluate, select and contract new partners for work packages published in subsequent CleanSky call for proposals.
- Complete the set of concept aircraft models for evaluation of SFWA technologies

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