ACRONYM AFLOG

Title Advanced Floor Grid for Green Regional Aircraft

State of the art – Background

Please, see slide n.4 "Aflog WP General Overview Status " in PP Presentation.

Objectives

WP1 : activities the configuration for Pax and Cargo Floor Grid is developed; design and sizing activities will match new opportunities arising from the new processes; the configuration will be compliant with installation constrains on the fuselage barrel. The aim is to define a cost and weight saving configuration. Finally some alternative configuration based on technological opportunities will be provided in order to have the possibility to chose accordingly with processing development maturity and capabilities.

WP2: activities will be focused on technological trade off and process specification for PRF set up. Starting from the analysis of basic moulding technologies and using simplified equipment, some preliminary experiment will support the design and the manufacturing of a prototypic line; this will enable the automation of process that represents one of the most important added values in PRF development. In case of technical difficulties, in order to achieve a satisfactory maturity of the PRF process in time, alternative solutions will be anyway investigated. Basic shapes manufacturing can not be realized using general purpose plant and machines: equipment for the manufacturing of the basic shapes (rollers, moulds and actuation devices) will be designed and specifically dedicated to the developed innovative process: after process set up (Task 1) all the equipment can be seen as parts of a new automated processing plant (Task 2) to be dedicated to the new configuration shapes (Task 3).

WP3 : activities are focused in tool design and tool manufacturing. The tools are needed to support PRF prototypic line, part manufacturing and final assembly manufacturing for Pax and Cargo Floor Grid. Each tool will be developed according to the design principles and the technologies selected in WP1 and WP2. Tools for manufacturing and assembly will be designed and specifically dedicated accordingly to the developed innovative configuration of the floor grid.

WP4: activities are focused on part and assembly manufacturing of Pax and Cargo Floor Grid. Some parts will be manufactured using PRF new technology using the equipment and tools designed and realized on previous WPs.

Description of work

Pax Floor and Cargo Floor configuration based on a new manufacturing process here called Progressive Roll Forming (PRF) of ThermoPlastic Carbon Reinforced Polimers (TPCRP) is presented. The process basically applies to seat rails and longerons. Raw material flows into the manufacturing device continuously; one or more plane sheets, are progressively heated, bended and compacted each other by rollers to achieve the desired shape i.e. C-Shape, J-Shape, H-Shape, etc. After floor grid configuration design and sizing, fixtures, jigs and moulds will be designed and manufactured for each component of the floor grid. In order to set up the new process PRF equipment will be manufactured. Tools and fixtures for final assembly will be designed and manufactured, then the technological demonstrator i.e. test article floor grid will be manufactured. Main innovative features are focused on cost saving due to process automation; this enable the use of thermoplastics with consequent weight saving for Pax and Cargo Floor Grid and, at the same time, recycling and maintainability features are improved with a positive impact on environmental and life cycle management of the product.

Results

a) Timeline & main milestones

Please, see slide n.4 "Aflog WP General Overview Status " in PP Presentation.

b) Environmental benefits

Starting from a technical point of view AFLOG project results are expected to introduce some innovative features in Foor Grid design and manufacturing:

1) *Weight Reduction* Introducing TPCRPs (Thermo Plastic Carbon Fiber Reinforced Polymers), a weight reduction is expected; having lighter materials, those polymers have a better mechanical properties and impact resistance compared to thermoset composites. For thermoset composite components it is anyway expected some weight saving, even if in a limited impact.

2) *Cost Reduction* Cost reduction will be the results of different technologies and configuration trade off that will have in common the process automation; this feature allows the desired competitiveness of composite material and their processing: automation and surface treatments cost saving can balance the cost of raw materials.

3) *Maintenance Cost Reduction* The introduction of composite materials and titanium alloys in floor grid configuration represent the most important feature in life cycle management cost of the components; more over TPCRPs offer also additional capability in repairing cycles.

4) *Environmental Impact Reduction* The introduction of TPCRP represents a very effective environmental solution in part decommissioning and during the life cycle of the aircraft. As mentioned before those materials offer a wider possibility of repair in service, avoiding substitution; more over at the end of service the materials can be fully recycled in the way of chop fibres or some similar approach. It is import to point out that also the whole life cycle of the TPCRP components in PRF automatic processing takes the advantage of energy saving, including for storage .Once PRF Process has been set up in AFLOG project, first an industrialization activity will be performed both in floor grid configuration optimization and in PRF equipment reliability and effectiveness. After that a process/product certification is expected as a typical step in airframe technological development. The scenario expected in the future allow the AFLOG project to be embedded in. The world market of Regional Aircraft in the next decade shows some increasing request of new aircraft and also some transformation of civil aircraft in special mission versions (cargo, patrol, etc.), even if the request is mainly linked larger aircraft. Regional, low-fare carriers, and even major airlines can be expected to acquire 90-125 seat regional aircraft in quantity where an operational cost reduction and the passenger number allow a certain revenue soundness. The expected results of AFLOG project can represent one f technological solutions for direct and indirect operational cost reduction, facing the overcharging oil cost and the environmental impact.

c) Maturity of works performed

Like deliverables dates in Periodic Report 1 uploaded on Participant Portal.

Picture, Illustration

Please see short PP Presentation.

Project Summary

Acronym : AFLOG

Name of proposal: **A**dvanced **Flo**or **G**rid for Green Regional Aircraft

Technical domain:

Involved ITD: Description in short PP Presentation

Grant Agreement: n. 323422

Instrument: Europa Cordis F7Q Clean Sky JTI-CS-2012-01-GRA-01-042

Total Cost: € 2.184.000,00

Clean Sky contribution: € 1.466.000,00

Call: 11

Starting date: 05/11/2012

Ending date: 04/04/2014

Duration: 17 months

Coordinator contact details: Michelangelo Giuliani

mgiuliani@omi-mf.it

Project Officer: Andrzej Podsadowski

Andrzej.Podsadowski@cleansky.eu

Participating members: O.M.I. srl Officine Meccaniche Irpine srl

Area Ind. le Calaggio snc Lacedonia AV

Italy cap 83046 P. IVA 015170644