Sensors for Oil COoling SYStem

Rendicontazione

Informazioni relative al progetto

SOCOSYS

ID dell'accordo di sovvenzione: 738087

DOI
10.3030/738087

Progetto chiuso

Data della firma CE
23 Gennaio 2017

Data di avvio
1 Febbraio 2017

Data di completamento
31 Gennaio 2019

Finanziato da
SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

Costo totale
€ 481 025,00

Contributo UE
€ 336 717,50

Coordinato da
AUXITROL SA
France

Periodic Reporting for period 2 - SOCOSYS (Sensors for Oil COoling SYStem)

Periodo di rendicontazione: 2018-08-01 al 2019-01-31

Sintesi del contesto e degli obiettivi generali del progetto

Oil cooling machines are the preferred solution in the aeronautic field to cool electrical rotating machines as they allow more compact equipment and more efficient and stable heating transfer. However they suffer some limitations: they provide only binary information, lack some health monitoring functions and demonstrate poor reliability/performance at high temperature. The purpose of the project SOCOSYS was then to develop at TRL 5 two smart pressure sensors (gage and

differential) for oil cooled starters and generators. The final objective was to replace the current mean of threshold detection, generally a mechanical switch, with a smart sensor and consequently to improve the health monitoring of the global oil cooling system.
The innovative characteristics of the sensors focused on the capacity to operate in ambient temperature range from -50°C to +180°C, on providing pressure measurement enabling health monitoring functionalities at the oil cooling system level, while matching all other operating requirements (size, accuracy, environmental constraints like EMC susceptibility and vibration …) and on meeting the reliability constraints expected from the Topic Manager.

At the end of the project, the following key challenges have been reached:
- Development, manufacturing and qualification of oil inlet pressure sensors and clogged filter pressure sensors in accordance with the specification defined conjunctly with the Topic Manager,
- Supply of 4 pressure sensors with a TRL5 maturity to the Topic Manager who will further implement and test them on their test bench.

SOCOSYS allowed working on the development of a new generation of oil cooled starter generators that will contribute to more electrical, safe but also cost efficient future small aircraft as the SOCOSYS's output will lead to the extension of the mean time between maintenance 'MTBM'.

Lavoro eseguito dall'inizio del progetto fino alla fine del periodo coperto dalla relazione e principali risultati finora ottenuti

The health monitoring function requested by the Topic Manager being new for the starter/generator application, the 1st and challenging task was the definition of the requirements (measurement, location, environmental constraints…), and the set-up of a complete specification.
Once the specification issued, the major functions of the sensors have been defined and a detailed design has been issued.
A specific focus had to be made on reliability and environmental temperature performances, as they are not complementary. Indeed, increase the surrounding ambient temperature has a direct impact on the reliability.
Several demonstrators have been manufactured. They successfully passed the qualification tests and were fully compliant at the final checking.
The reliability of the sensors has been also validated, by performing temperature aging test on 70 samples during several weeks.
At the end of the project, 4 sensors have been provided to the Topic Manager who will further implement and test them on their test bench. This step will allow validating the maturity of the sensors, for a future integration on an aircraft.

Above technical activities, a project objective was also to initiate the dissemination and exploitation of the results obtained. The market demand for smart sensors is increasing regularly in particular to enable health monitoring functionalities that are required to reduce maintenance costs and prevent equipment failures, a continuous trend of the aerospace industry. The expected impact of the SOCOSYS project is consequently important for several reasons:

- Mastering technology: the availability of a technology able to operate at high temperatures will allow to develop smarter sensors providing detailed information on the parameters that condition good operations of a system operating in harsh conditions.
- Potential markets to be addressed: the potential market for SOCOSYS's sensors covers all types of aircraft or helicopters using Electrical Power General Distribution System (EPGDS) under harsh conditions. In particular small or medium size aircraft and all helicopters as well as drones are potential users and customers. Additionally to EPGDS system, the technical solution developed in SOCOSYS can further be adapted to potential new aircraft applications like oil, tyre, bleed air and core mounted P3 pressure measurements.
SOCOSYS results have been capitalised and are promoted to our relationships working in the domain of small and medium size aircrafts (SAT, regional and business aircraft) and of helicopters.

Progressi oltre lo stato dell'arte e potenziale impatto previsto (incluso l'impatto socioeconomico e le implicazioni sociali più ampie del progetto fino ad ora)

The main objective of the project was the assessment of the reliability of pressure sensors in harsh environment.
This achieved aim allows an installation of this kind of sensors in an oil cooled starter or generator, enabling a pressure measurement instead of threshold detection, and then contributing to the development of health monitoring function for future more electrical aircraft.
Next step is the test of the sensors in real environment to reach TRL7 maturity, and further deploy the technology for other high temperature – high reliability applications (on starter/generator but also on hot parts of an engine).
As the sensors provide a real time measurement of the pressure, it will allow a monitoring of the pressure and consequently the possibility to predict the behaviour of the system, to prepare maintenance operations and to detect some potential failure.

The sensors and the health monitoring function of a starter/generator will contribute to the development of aircrafts more electrical, safe and cost efficient, relying the Clean Sky and the H2020 challenges in term of greenhouse gas emissions reduction, secure transport and cost reduction.

Ultimo aggiornamento: 21 Ottobre 2021

Permalink: https://cordis.europa.eu/project/id/738087/reporting/it