

PROJECT

## TWINECS

### Toward a Digital Twin ECS and thermal management architecture models: Improvement of MODELICA libraries and usage of Deep Learning technics

**Funding:** European (Horizon 2020)

**Duration:** Sep 2020 - Aug 2023

**Status:** Ongoing

**Total project cost:** €589,945

**EU contribution:** €589,945



**Call for proposal:** H2020-CS2-CFP10-2019-01

[CORDIS RCN : 230490](#)

#### Objectives:

The project global goal is to develop an efficient, robust, and accurate model to simulate e-ECS under the Dymola/Modelica framework based on libraries provided by the Topic Manager. The central focus is placed on the major challenges underlined in the Clean Sky 2 MALET project which include the efficient simulation of the Vapor Compression System (VCS), the VCS heat exchangers, and the electrical components.

The project modelling approach is twofold as both physical and surrogate models must be developed and integrated into the Dymola/Modelica framework. The TwinECS specific objectives are summarized as follows:

- Development of thermo-fluid models: VCS heat exchangers and their successful integration in assembled VCS models.
- Development of electrical models for: motor, power inverter, ATRU, IGBT and MOSFET.
- Development of surrogate models of the aforementioned thermo-fluid and electrical components based on data analytics technics.
- Simulation of a complete thermo-fluid-electrical VCS model using both the standard and the surrogate models.

#### Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

**Other programmes:** JTI-CS2-2019-CfP10-SYS-02-60 Toward a Digital Twin ECS and thermal management architecture models : Improvement of MODELICA libraries and usage of Deep Learning technics

#### Lead Organisation:

**Universitat Politecnica De Catalunya**

**Address:**

Calle Jordi Girona 31  
8034 Barcelona  
Spain

**Organisation Website:**

<http://www.upc.edu>

**EU Contribution:** €265,750

## Partner Organisations:

### Rheinisch-Westfaelische Technische Hochschule Aachen

**Address:**

Templergraben  
52062 Aachen  
Germany

**Organisation Website:**

<http://www.rwth-aachen.de>

**EU Contribution:** €137,500

### Interuniversitair Micro-Electronica Centrum

**Address:**

Gaston Crommenlaan 8/102  
9050 Gent  
Belgium

**Organisation Website:**

<http://www.imec.be>

**EU Contribution:** €186,695

## Technologies:

Aircraft design and manufacturing  
Thermal aircraft architecture

**Development phase:** Research/Invention

**STRIA Roadmaps:** Vehicle design and manufacturing

**Transport mode:** Air transport

**Transport sectors:** Passenger transport, Freight transport  
Societal/Economic issues, Environmental/Emissions aspects,

**Transport policies:** Safety/Security

**Geo-spatial type:** Other