

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)  
Commercial Human Spaceflight Programmes (2)

Author: Mr. Stefano Coco

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
s319175@studenti.polito.it

Mr. Antonio Abruscato

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
abruscatony15@gmail.com

Mr. Alessandro Peluso

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
alessandropeluso16@yahoo.it

Mr. Davide Marampon

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
davide.marampon@gmail.com

Ms. Ariane Mansard

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, France, ariane.mansard@sfr.fr

Mr. Alessandro Breda

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
s319159@studenti.polito.it

Mr. Alberto Milan

Politecnico di Torino, Italy, albert.m965@gmail.com

Mr. Andrea Paternoster

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
s319150@studenti.polito.it

Mr. Giovanni Antonio Cossu

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
s319128@studenti.polito.it

Ms. Serena Pipolo

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy,  
s319174@studenti.polito.it

Mr. Simone Ambrosino

Politecnico di Torino, Italy, simone.ambrosino@live.it

Mr. Francesco Laudadio

Politecnico di Torino - Thales Alenia Space Italia - ISAE Supaero Toulouse, Italy, fralauda21@gmail.com

Mr. Matteo Paschero

Politecnico di Torino, Italy, s319155@studenti.polito.it

Mr. Evan SENERET

SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, France,  
evan.seneret@student.isae-supero.fr

Mr. Robert Tute

University of Leicester, United Kingdom, robtute11@gmail.com

Ms. Megha Chandrashekar

University of Leicester, United Kingdom, megha.cuk99@gmail.com

Mr. Bastien Chassagnoux  
SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, France,  
bastien.chassagnoux@student.isae-superaero.fr

Mr. Cameron Norman  
University of Leicester, United Kingdom, CameronA.Norman@gmail.com

Mr. Jed White  
University of Leicester, United Kingdom, jedwhite360@gmail.com

Ms. Hannah Dawe  
University of Leicester, United Kingdom, hannahdawe129@gmail.com

Mr. Henry Wilson  
University of Leicester, United Kingdom, hwilson310@googlemail.com

Mr. Benjamin AURY  
ISAE - Institut Supérieur de l'Aéronautique et de l'Espace, France, benjamin.aury@student.isae-superaero.fr

Mr. Yann Sadou  
ISAE - Institut Supérieur de l'Aéronautique et de l'Espace, France, yann.sadou@student.isae-superaero.fr

Mr. Maximilien SALINAS  
SUPAERO- Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, France,  
maximilien.salinas@student.isae-superaero.fr

Ms. Lisa Wong  
ISAE-Superaero University of Toulouse, France, lisabox19@gmail.com

Mr. Nathan Lahens  
ISAE-Superaero University of Toulouse, France, nathan.lahens@student.isae-superaero.fr

Mr. Julien TERRISSON  
ISAE - Institut Supérieur de l'Aéronautique et de l'Espace, France, julien.terrisson@outlook.com

Mr. Nathan Costantini-Baziz  
Politecnico di Torino - Thales Alenia Space Italia - ISAE Superaero Toulouse, France,  
nathan.baziz.costantini@gmail.com

Mr. Hemanth Hemanth  
University of Leicester, United Kingdom, hemand1803@gmail.com

Ms. Shaivali Shinde  
University of Leicester, United Kingdom, shaivshinde73@gmail.com

## FEASABILITY STUDY OF A EUROPEAN COMMERCIAL SPACE STATION IN LOW EARTH ORBIT

### Abstract

The design of a European commercial space station in Low Earth Orbit (LEO) is a topic of growing interest in the space community. Considering the future retirement of the ISS and the exponential growth of commercial interests, human establishment in the Low Earth Orbit will involve new actors. In particular, private companies are expected to play a leading role in this area because of the many potential business opportunities, such as space tourism and in-orbit manufacturing. In this scenario, the realization of an orbital space station will represent an opportunity to increase the technology readiness level and lay the basis for the future development of Space Science.

A potential architecture has been investigated within the framework of the 15th edition of the Second Level Specializing Master's Program in SpacE Exploration and Development Systems (SEEDS XV), which involved a group of students from Politecnico di Torino, ISAE-SUPAERO, and the University of Leicester, supported by experts from Thales Alenia Space Italy, ALTEC, the Italian Space Agency (ASI), and the European Space Agency (ESA).

This paper summarises the key concepts for the preliminary design of a European commercial space station in the Low Earth Orbit (LEO). Starting from the identification of mission requirements and design drivers, different technical solutions were investigated and traded off. A first sizing of the various

subsystems is then provided, along with a thorough search for pioneering technologies that can be applied to the most critical systems, such as Life Support, MMOD protection, and radiation shielding. The referred space station would serve as a hub for various commercial activities in LEO, such as tourism, R&D and manufacturing, providing also the opportunity to implement advanced and innovative on-orbit operations, namely refuelling and maintenance services. Furthermore, the realization of this outpost would enable more opportunities for international cooperation, empowering the role of Europe in the global space industry.