

Group 05 - Hydrogen Powered VTOL Aircraft

The world is progressing towards a more sustainable future. In all industries, emissions and production processes are carefully monitored to validate their level of sustainability. One industry that is traditionally held accountable for the hindrance of this progression, is the aviation industry. Therefore, the team of H2-VTOO decided to take on the challenge of designing a hydrogen powered VTOL aircraft, capable of transporting 10 passengers for over 2000km in under 4.5 hours by the year 2040. This resulted in the design depicted below. The aircraft covers more than 90% of the travel in Europe alone, while being fully climate neutral. It is capable of operating in both urban environments, e.g. from office building rooftops, and from conventional airports, while taking off horizontally. This will all come at an estimated, inflation-adjusted, price card of 17.5 million EUR.

Apart from the design itself, this project contributes to enabling the use of hydrogen as a sustainable energy carrier for aviation. Furthermore, it has provided the team with valuable contributions to their technical and managerial skills.

At the time of writing, the team has been able to successfully design most of the aircraft subsystems, namely the hydrogen tank, empennage and fuselage structures, landing gears, control surfaces, fuel cell configuration, battery, engine, and the complete electrical system. Apart from this, the flight performance in normal flight, aerodynamics, thermodynamics of the cooling of the fuel cells, and stability and controllability characteristics have been analysed. Furthermore, several non-technical studies have been performed, in order to guarantee safety, smooth operation, sustainability, and compliance with the customer's demands. These include the risk assessment, functional analysis, operations and logistics plan, Life Cycle Assessment, RAMS analysis, manufacturing plan, and a cost analysis. The team is planning on finishing several more topics in the coming weeks. These range from finishing the wingbox structure, flight performance during VTOL, and market analysis, to performing a feasibility analysis, noise analysis, and most importantly, a sustainability analysis. This will be done in parallel with implementing the tutor's and coaches' feedback.

