

04 - Restomod Catalina

The PBY Catalina holds an esteemed place in aviation history as one of the most iconic aircraft ever built. Its timeless flying boat design, characterized by a large wing span and iconic observation platforms, grants it a distinct and easily recognizable identity. Throughout its extensive lifespan, the Catalina has undertaken diverse missions with varying objectives. Originally conceived as a military aircraft, it has since evolved to serve as a reliable platform for safety and rescue operations, firefighting efforts, and even as a means of providing memorable tourist experiences. This project seeks to re-envision the Catalina by harnessing cutting-edge technology and implementing emission-free operations, thus paving the way for a new chapter in its illustrious legacy.

Mission Objective

As visionary aircraft designers, our objective is to breathe new life into the iconic PBY Catalina aircraft, transforming it into the epitome of luxury and adventure for private or chartering purposes. We are driven by the desire to combine the luxury and exclusivity of yacht charters with the freedom and mobility of flying, redefining the chartering experience with the redesigned PBY Catalina. It opens a world of possibilities, allowing passengers to effortlessly explore remote island groups and coasts in unparalleled style. With its extraordinary views, emissions free propulsion, and impeccable interior, the PBY Catalina sets a new benchmark for luxury chartering, offering a transformative and unforgettable journey for the affluent and adventurous. This summary aims to convey the aim of this project, the work done so far and the expected work for the last 5 days.

System Design

One of the main tasks in the last 7 weeks was the redesign of the propulsion system. The new aircraft requires emissions free propulsion thus the team has meticulously performed a trade-off considering different systems. This resulted in a hydrogen fuel cell powered aircraft with hydrogen fuel cells at ambient temperature and 700 bar. Other options were battery powered, hybrid hydrogen battery powered and the hydrogen options with cryogenic storage. For the trade-off, the mass, sustainability, risk, cost, volume, emissions and end-of-life were considered. For the battery concepts, the risk that the batteries would have too little power density made the concepts unfeasible.

The tanks will be mounted inside the wing of the aircraft. Potential new materials were considered, finally deciding on thermoplastic carbon fibre composites for the entire struc-

ture and fuselage of the aircraft. This is a new and promising material suitable for critical structural parts and recyclability to achieve an even more sustainable aircraft design. The wing structure has been analysed and designed to withstand all load cases during flight. A new wing profile has been designed for better aerodynamic efficiency to achieve a range of 500 km.

The work for the last week will centre round the finalisation of the structural analysis, writing the report, modelling in CATIA and the design of the interior layout in CATIA.

