

# Aeronautical Engineering

## Group Design Project Presentations

Joint event with the Loughborough Branch of the  
Royal Aeronautical Society

**Tuesday 15 June, 7–9 pm**

**Online via Teams or Room EHB110**

### **“Herman” Offshore Windfarm Maintenance System**

Team OWMS presents a hydrogen-electric VTOL UAV concept for performing visual, thermal and acoustic monitoring of the wind turbine blades, nacelles and monopoles in offshore windfarms. The design uses a tilt-rotor mechanism to transition seamlessly between fixed-wing and hover. Aerial inspections are supported by an autonomous unmanned surface vehicle (USV) that transports an autonomous underwater inspection vehicle (AUV) to perform sub-surface inspections of the turbine foundations. The three vehicles are united at an offshore Base Station that is configured to store, refuel, and maintain the system during normal operation.



### **“Hygeia” Pandemic-Proof Plane**

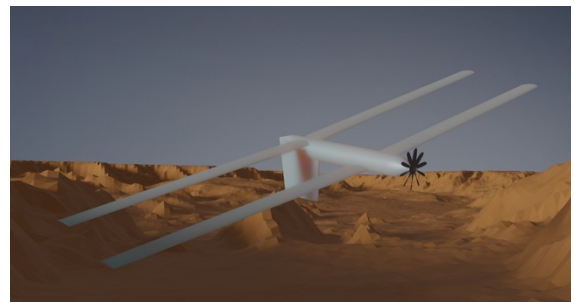


The Hygeia is the first aircraft designed from conception to thrive in a post-pandemic world. The aircraft has multiple configurations to enable adaptation to global situations, allowing a variety of passenger and cargo transport states. Inside, the cabin boasts a range of pandemic proof features that not only ensure passenger safety but also contribute towards a reduced boarding time. Powering the aircraft, two open rotor

engines fuelled, by an SAF kerosene blend, bridge the gap to Flightpath 2050 targets.

### **“Theia” Mars Flyer**

The Theia mission aims to send four flyers to survey Mars' Valles Marineris, a 4000 km long system of canyons. The flyer is a battery-electric autonomous aircraft propelled by a single tractor propeller, with a range of 2000 km. The mission will study geological history of Mars in greater detail than possible for orbital observations of the canyon walls. The range of the mission far exceeds the range surveyed of Ingenuity and all Rover missions to Mars combined. The surveyed regions can inform future mission planning for Rover, Lander and possible manned missions.

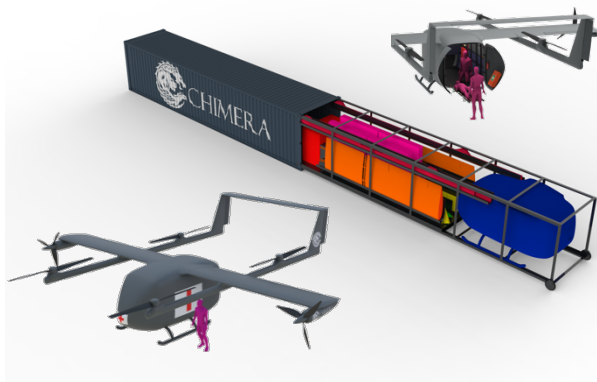


## “Yellowfin” Maldives Transport Aircraft

The Maldives is widely considered to be a luxury tourist destination, but the transport systems in place leave much to be desired. The Yellowfin is a small, all-electric aircraft designed to abate these concerns by offering a more personal, comfortable experience for tourists, whilst also aligning with the global push for increased sustainability and reduced emissions. The Yellowfin is also convertible to a medical transport aircraft. This enables it to solve issues related to the distribution of medical equipment and care, which have been highlighted and exacerbated by the COVID-19 pandemic.



## “Chimera” Combat Recovery

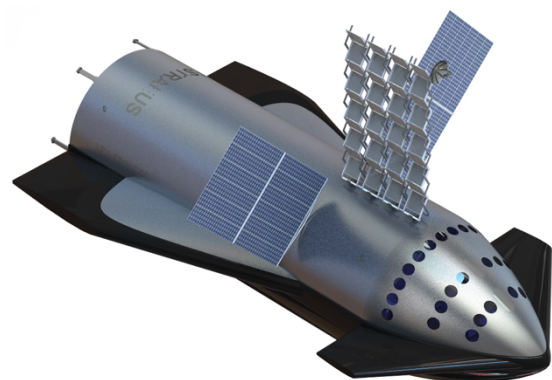


The Chimera team presents a novel autonomous Combat Recovery aircraft. The small 2,000kg aircraft utilises a combined 4-engine VTOL and 2-engine propeller design to conduct MEDEVAC operations in urban environments. With independent VTOL and forward flight phases, the aircraft can cruise at a speed of 70m/s while taking off in any area larger than 14m<sup>2</sup>. With 500kg of Lithium-Sulphur batteries, the aircraft can operate across the world, covering over 80% of the 80<sup>th</sup> percentile city. The aircraft's armoured cabin can carry up to one medic and one casualty. At the same

time, its sophisticated sensor suite navigates and flies the aircraft fully autonomously, forming a human-machine team, reducing the need to put any crew at risk. Its compact design allows it to be stored and transported inside a 40ft ISO container. Thus, the system is forward deployable to almost any location worldwide, thereby reducing MEDEVAC times by almost a third.

## “Astraeus” Lunar Tourism

Astraeus is New Frontier's proposed lunar tourism transport vehicle, a fully re-usable spacecraft capable of carrying up to 16 passengers and 4 crew. The spacecraft is launched on the SpaceX Super Heavy booster and follows a 6-day free-return trajectory around the Moon achieving a lunar fly-by at around 100 km altitude. The five internal decks are designed to enhance passenger comfort compared to traditional spacecraft, with dedicated sleeping pods, seating areas and large windows, providing customers with an unprecedented experience. The unique re-entry profile, fin and canard configuration and novel heat shielding design enable the spacecraft to land vertically, allowing for a launch turnaround within six weeks. A ticket price of £850 000 places New Frontier in a market gap for low-cost commercial space travel.



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