The Peregrine

Blended Wing Body UAV
Department of Mechanical and Aerospace Engineering

*The Peregrine* is a clean sheet UAV with *BWB* configuration, designed and optimized utilizing *multiscale hierarchical* approach employing functionally graded micro-structured *lattice materials* manufactured by the state of the art *additive manufacturing* technology. BWB designates an alternative configuration where the wing and the fuselage are integrated resulting in a hybrid flying wing. Compared to traditional aircraft, BWB configuration is an *eco-efficient* design that offers increased *efficiency* and *payload capacity* as well as decreased *acoustic* and *environmental* footprint.

**Aerodynamic Analysis**
High Fidelity 3D CFD analysis is conducted to determine aerodynamic characteristics of the UAV including conceptual aerodynamic loads, stability margins and performance metrics.

**Dynamic Analysis**
Modal and flutter analyses are performed to validate, respectively, the structural integrity and flutter free design.

**Power plant**
The Power Plant system is sized to provide up to 90 N of thrust at a speed of 140 km/h.

**Loads Analysis**
Incremental dynamic and static maneuver loads analyses are performed to determine critical design loads used for sizing and optimization of the airframe.

**Internal Layout**
Multi-spar configuration is adopted which with minimal number of ribs provides the main support for the wings and the centre fuselage.

**Lattice Optimization**
Multiscale design optimization is performed at two length scales, first on a macroscale in the form of topology optimization and then on a mesoscale in the form of lattice size optimization.

**Stress Analysis**
Linear static analysis supported by experimental material testing data is conducted to size different parts of the airframe.