**Project Report**

**TASK1: Sketch of a conic and Ogive shaped Radom**

* This task required pre-requisite knowledge about SOLIDWORKS. Therefore, learnt about various commands and basic techniques using the in-built tutorial.
* Drafted a sketch of conic and ogive shaped Radom using commands such as sketch relations, equations in a pattern revolve, line, arc, trim and shell.

**TASK2: MATLAB program for weight estimation for SU-30 ASPJ RH-Pod of 12 BH configurations**

Weight estimation of the pod required total mass of the component, distance of its centre of mass from the nose tip, type of distribution of mass on bulkhead, bulkhead number to which component is connected, bulkhead distance from the nose tip, distance of isolators and masses to which they are connected to, load factor for different cases, aerodynamic loads (in N), External moment for different cases & reaction forces, distance and moment due to pins were required as input for calculation.

* Gained knowledge about the structure of the pod such as Bulkheads and Isolators
* Imported excel sheets of the required data to MATLAB using xlsread function.
* Calculated weight distribution of the pod on bulkheads and isolators in x-z plane giving mass of the individual component, distance of centre of mass of component and distance of bulkhead as input and using for function, conditional statement and input function.
* Calculated inertia giving load factors and distributed mass as input and using for function
* Calculated effect of Aerodynamic loads on Inertia giving Inertia and aerodynamic load of different cases as input and using for function and conditional statement.
* Calculated location of centre of mass of the pod calculating sum of net moment and mass of pod.
* Calculated difference between bulkhead and centre of mass of pod.
* Calculated inertia and inertia ratio using mass distribution and difference between bulkhead and centre of mass.
* Calculated moment contribution of each case in y & z direction giving inertia ratio and difference between bulkhead and centre of mass as input.
* Calculated force contribution of each case in y & z direction giving moment contribution and difference between bulkhead and centre of mass as input.
* Calculated effect of external moment on inertia and force for plotting SFD & BMD diagram giving force contribution and net inertia as input and using for function and conditional statements.
* Calculated force and bending moment in xy and xz plane for a particular case giving reaction forces, inertia, fixed moment and distance as input.
* Plotted SFD and BMD diagram for xy and xz plane using subplot & plot function, title function and hold on/off function giving force, bending moment and distance as input for the corresponding plane.
* Exported the required data to excel sheets using xlswrite function.

**TASK3: Wax based valve design**

* Selected suitable PCM material of the required density and melting temperature.
* Selected suitable spring using LEE catalogue with required force, outer diameter and required length.
* Re-designed the wax-based valve in SOLIDWORKS according to the measurements of the spring selected.
* Studied comparative report on PCM40 and Plusice A43 for experimental purpose and calculated the stroke length based on the findings of the report.

**TASK4: MATLAB program for calculating load factors, total inertia loads and external moment as per Mil std 8591**

This required distance of centre of mass of the pod and aircraft from the nose tip, linear acceleration, angular acceleration and angular velocity for different cases as input for calculation.

* Imported excel sheets of the required data to MATLAB using xlsread function.
* Calculated difference between distance of centre of mass of pod and aircraft giving distance of centre of mass of the pod and aircraft from the nose tip as input.
* Calculated load factor for different cases with the formula used for calculating load factors giving linear acceleration, angular velocity, angular acceleration and difference between distance of centre of mass of pod and aircraft as input.
* Calculated total inertia loads giving load factor and weight of the aircraft as input.
* Calculated External moment for different cases with the formula used for calculating external moment giving moment of inertia in different direction, angular acceleration and angular velocity as input.
* Exported the required data to excel sheets using xlswrite function.