TEAM MEDEXTROUS

NIMBUS NITH

# Multi-Use Hexacopter


Constructed And Proposed By

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Volunteers

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# Abstract

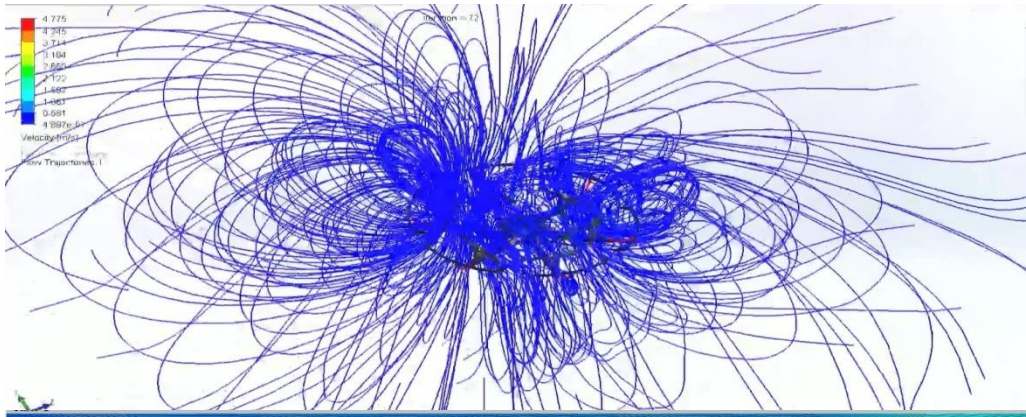
Now a days we use drones for many purposes like for surveillance, delivery purposes, photography, window cleaning, as fire extinguisher, agriculture use. But we have to use a particular Drone for a particular work at a time. To overcome this, in our project, we made a multi use Hexacopter. This Hexacopter has all the specification all at a time. It has Pi cam for surveillance, gripper for delivery purposes, nozzle for window cleaning and fire extinguisher also have thermal sensor for surveillance and Agriculture usage and have GPS module also.

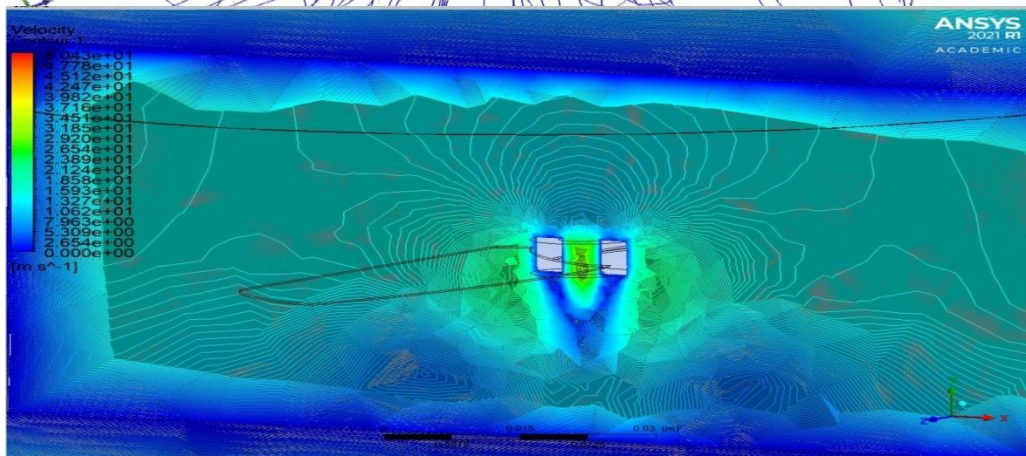
# Construction

The Hexacopter is designed and assembled in CAD software, CFD analysis, structural analysis, and Animations are designed in CAD and Analysis softwares . Rolling, Pitching and Yawing analysis, controller architecture and Battery Management systems are designed in Simulink.

➢**THE MAIN COMPONENTS OF HEXACOPTER:-**

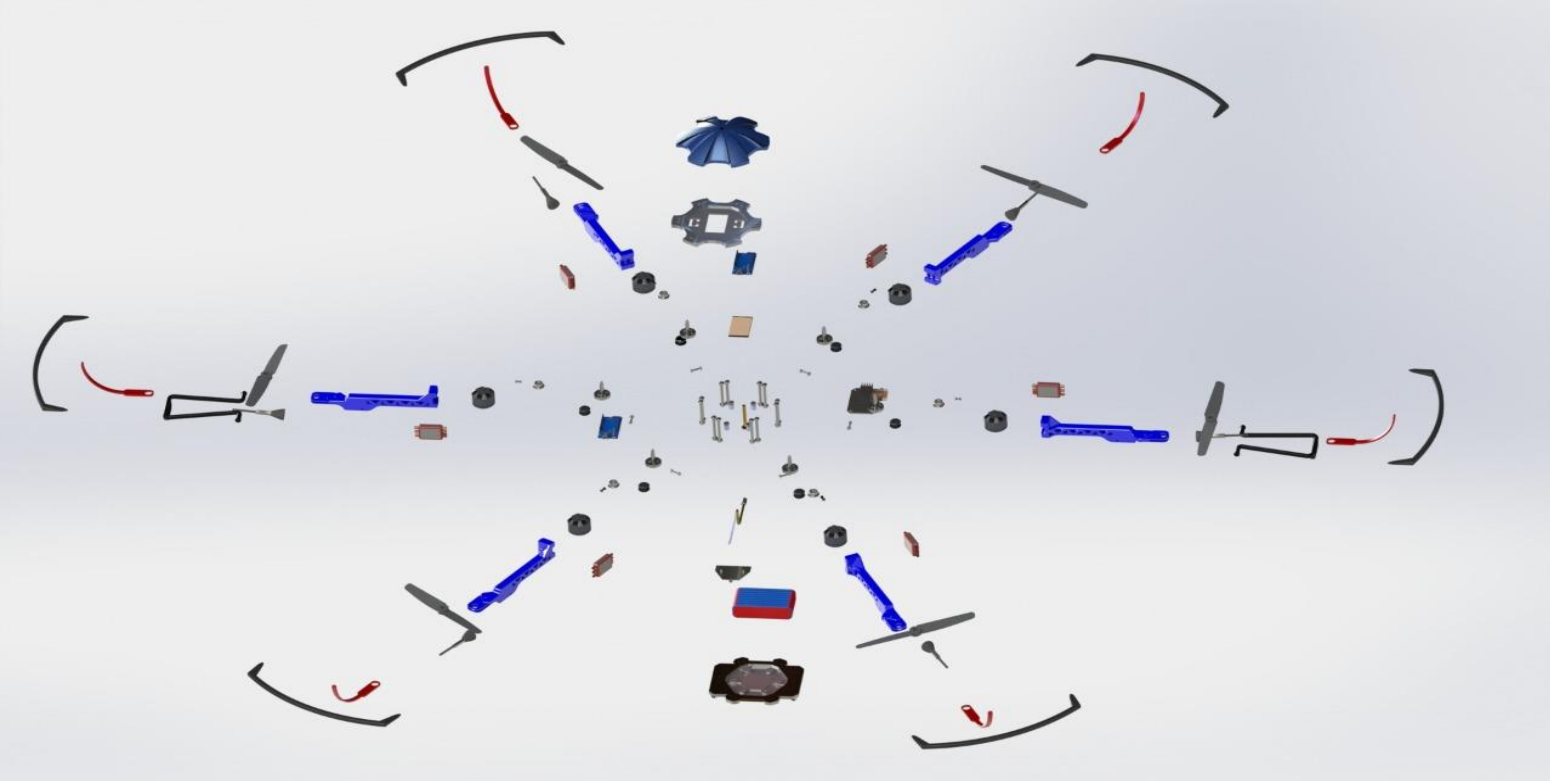
- **BLDC Motors**
- **Aerofoil Shaped Propellers**
- **Electronic Speed Controller**
- **Arduino and Raspberry pi**
- **Pi Cam**
- **GPS Modules**
- **Thermal Sensors**
- **Pressure Sensor**
- **Wi-Fi Module**
- **Lithium Polymer Battery**





# Design

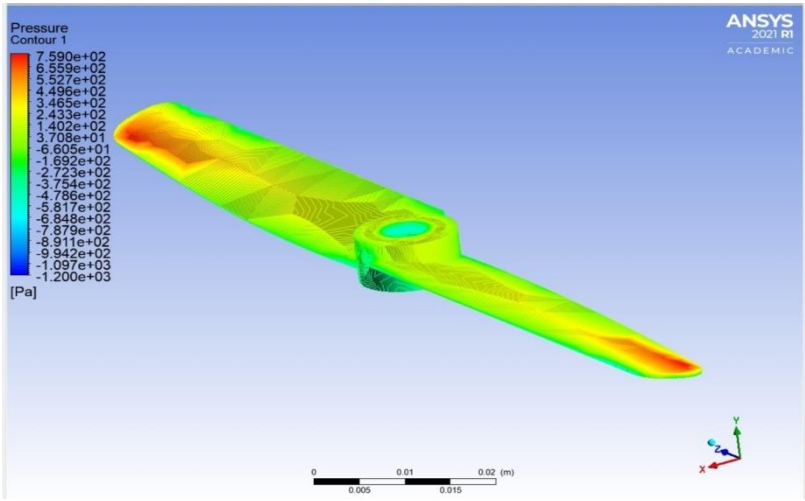
## Exploded View

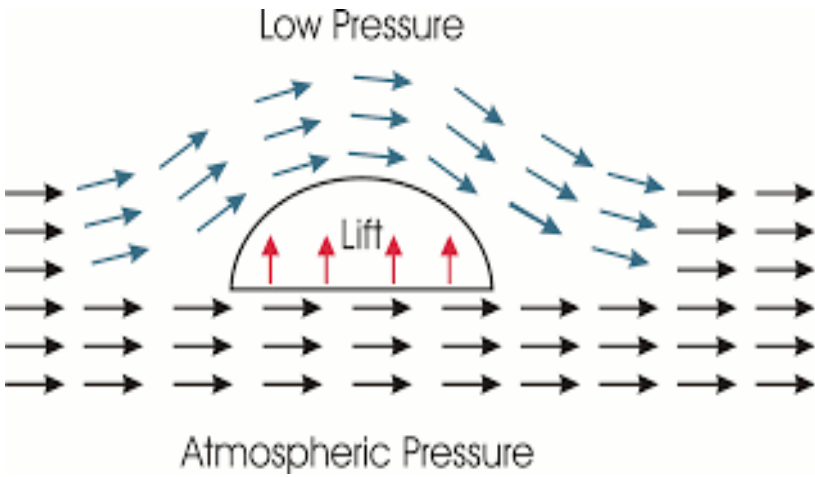


# Working

## Working Principle of Drones - Multi rotor

Multi-Rotor works on relative nature of force, that means when the rotor pushes the air, the air also pushes the rotor back. This is the basic principle that the Multi-Rotor can go up and down. Furthermore, the faster the rotor rotates, the greater the lift, and vice versa.




Propeller Shaft

# Existing Technologies

The existing Drones (Tricopters , Quadcopters) are used in Photography, Navigation purposes only.They are easily available and cheap.They are easy to build up.They are less stable due to less number of motors.They cannot fly to much height.If one of their motor fails they will crash leading to damage of the machinary.They cannot carry much load and weight . Minor disturbances during their flights can lead to crash.

# Our Advancement

## HEXACOPTER

The Hexacopter has six Propellers. The propellers are arranged in a circle around the main body of the Hexacopter. A pair of leg-like appendages at the bottom allow the machine to land on the ground in a stable manner. The Hexacopter is a more powerful flyer because of its six propellers than the Quadcopter, and is also capable of carrying heavier loads. The Hexacopter offers a significant advantage due to its six propellers. Even if one of those propellers fail, the other five can keep the machine flying. This means motor failure in one of the propellers does not mean the drone will come crashing down, damaging the equipment attached to it. If two propellers fail, the device won't be able to fly, but it will remain stable enough to reach the ground safely. A Hexacopter can reach higher altitudes and also travels faster. Since Hexacopters are more expensive, they are usually used for transporting more precious cargo which cannot survive a crash.

# Advantages and Disadvantages

## Advantages

- Helpful in military Operations
- Useful in Fire extinguishing
- Useful in Agricultural Purposes
- Pick and Place Usages
- More Stability

## Disadvantages

- Due to Large Size, Hexacopter drones can be difficult to fly in narrow spaces.

# Calculations

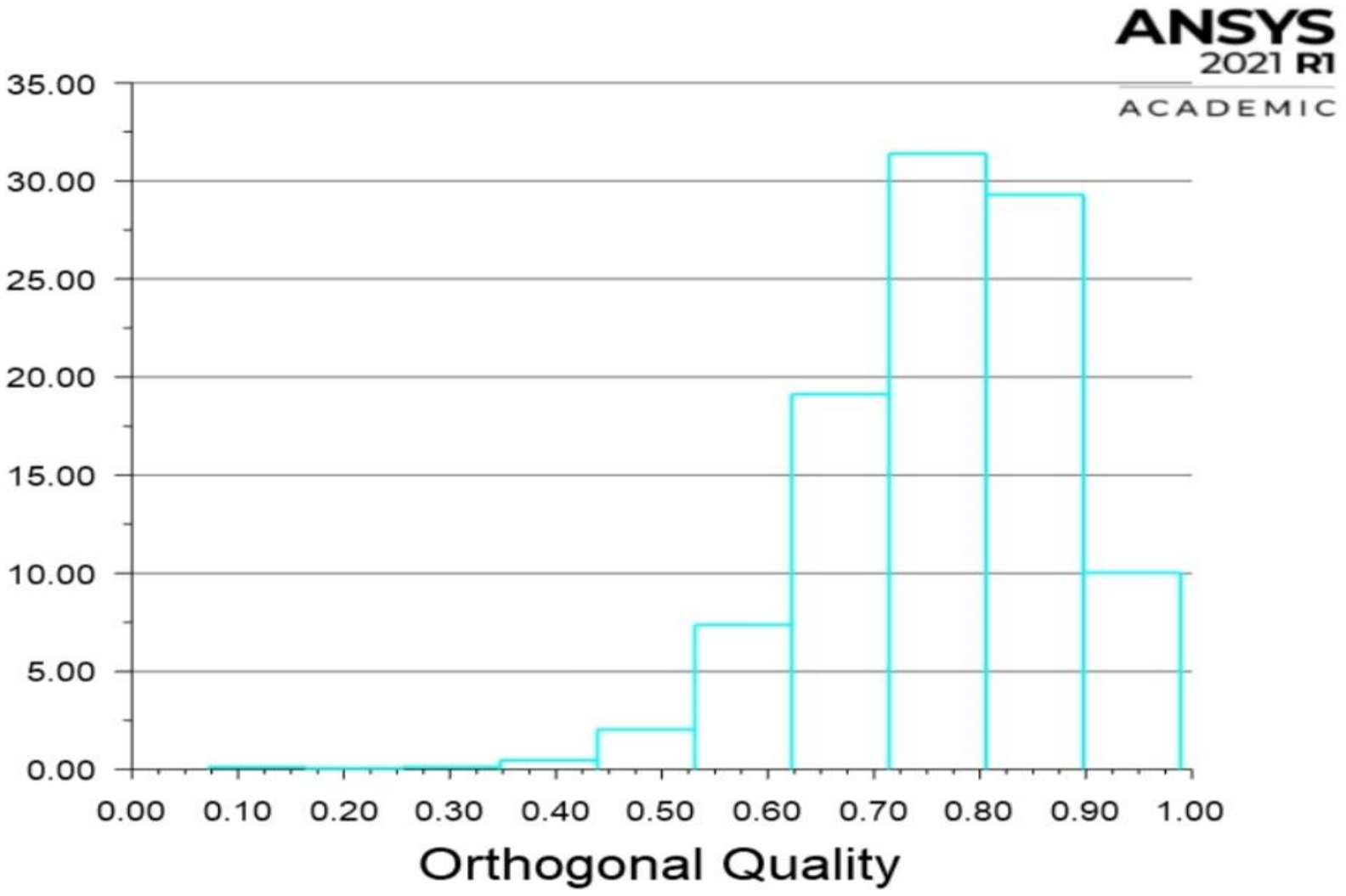
## Mesh Size

| Cells | Faces | Nodes |
|---|---|---|
| 113434 | 235968 | 21548 |

## Mesh Quality

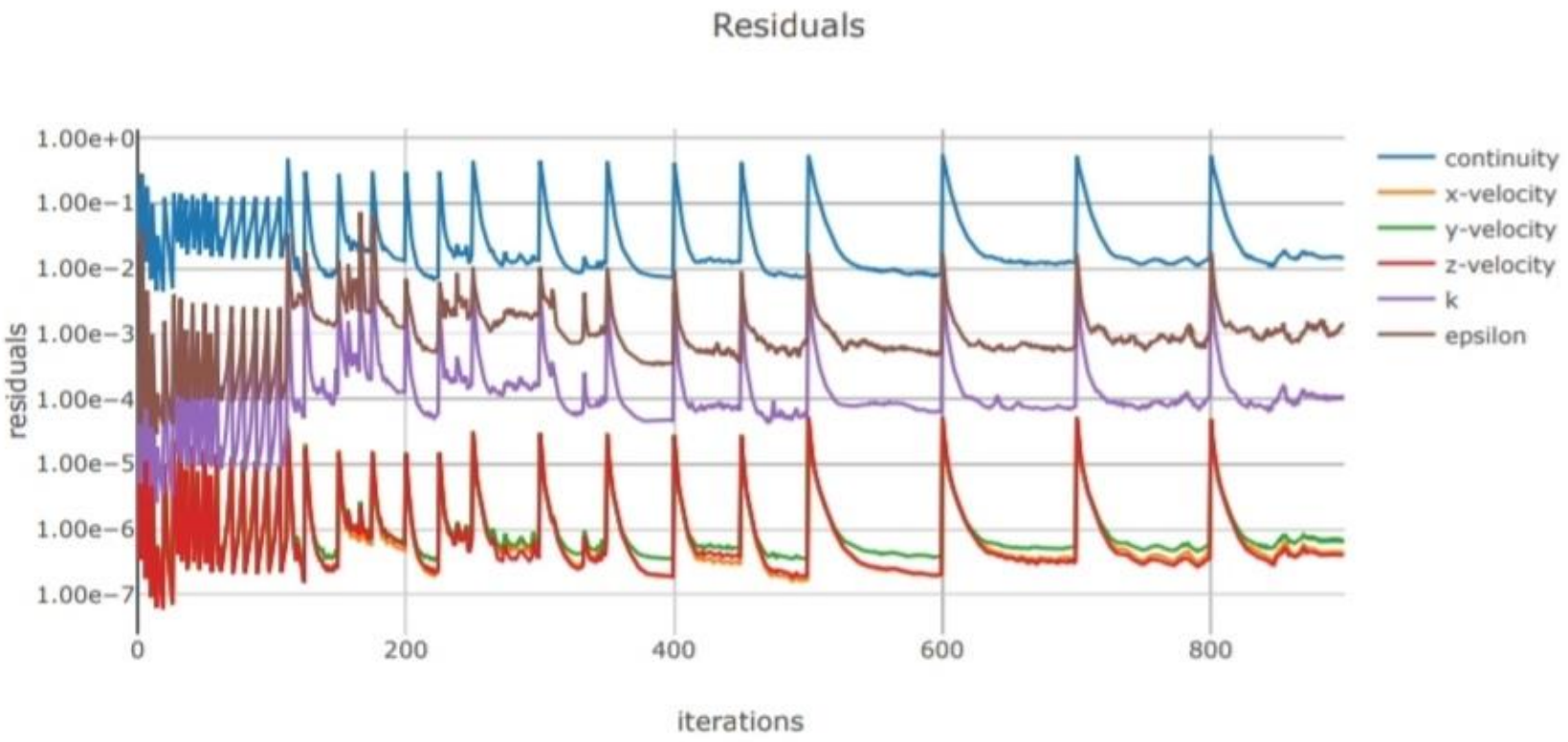
| Name | Type | Min Orthogonal Quality | Max Aspect Ratio |
|---|---|---|---|
| rotating_domain | Tet Cell | 0.072395283 | 54.98886 |
| static_domain | Tet Cell | 0.16153009 | 14.294711 |

# Execution Report

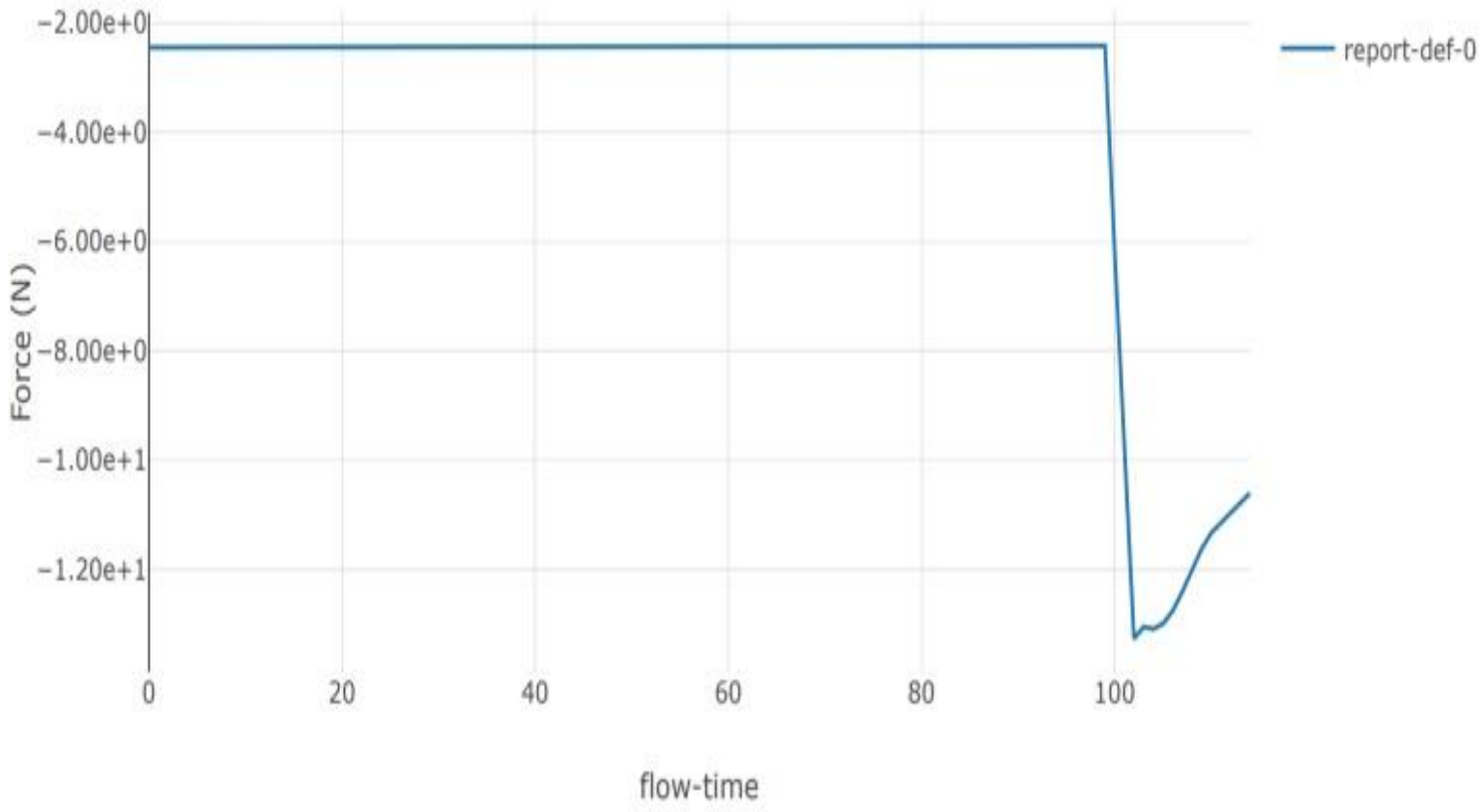


# Execution Report

## THRUST REPORT



# PROPELLER REPORT PLOTS



# CONCLUSION

Multi – Use Hexa-Copter is an all purpose drone with 6 powerful motors that can lift weight up to 9 kg's . These specifications make it suitable for use at emergency conditions like fire extinguishing, military operations inclusion. It can be further modified according to various needs like agricultural needs, window wiping systems. It can be fitted with thermal sensors and GPS modules for navigation purposes like detecting terrorists hidden in the forest and dark by military which cannot be done using normal drones. With the help of pick and place capabilities it can be used for parcel and medicine deliveries. Hexacopter offers more stability and can perform all these tasks with much of ease. These all applications give Hexacopter an upper hand from the normal drones.

# THANK YOU