AME 308 Presentation

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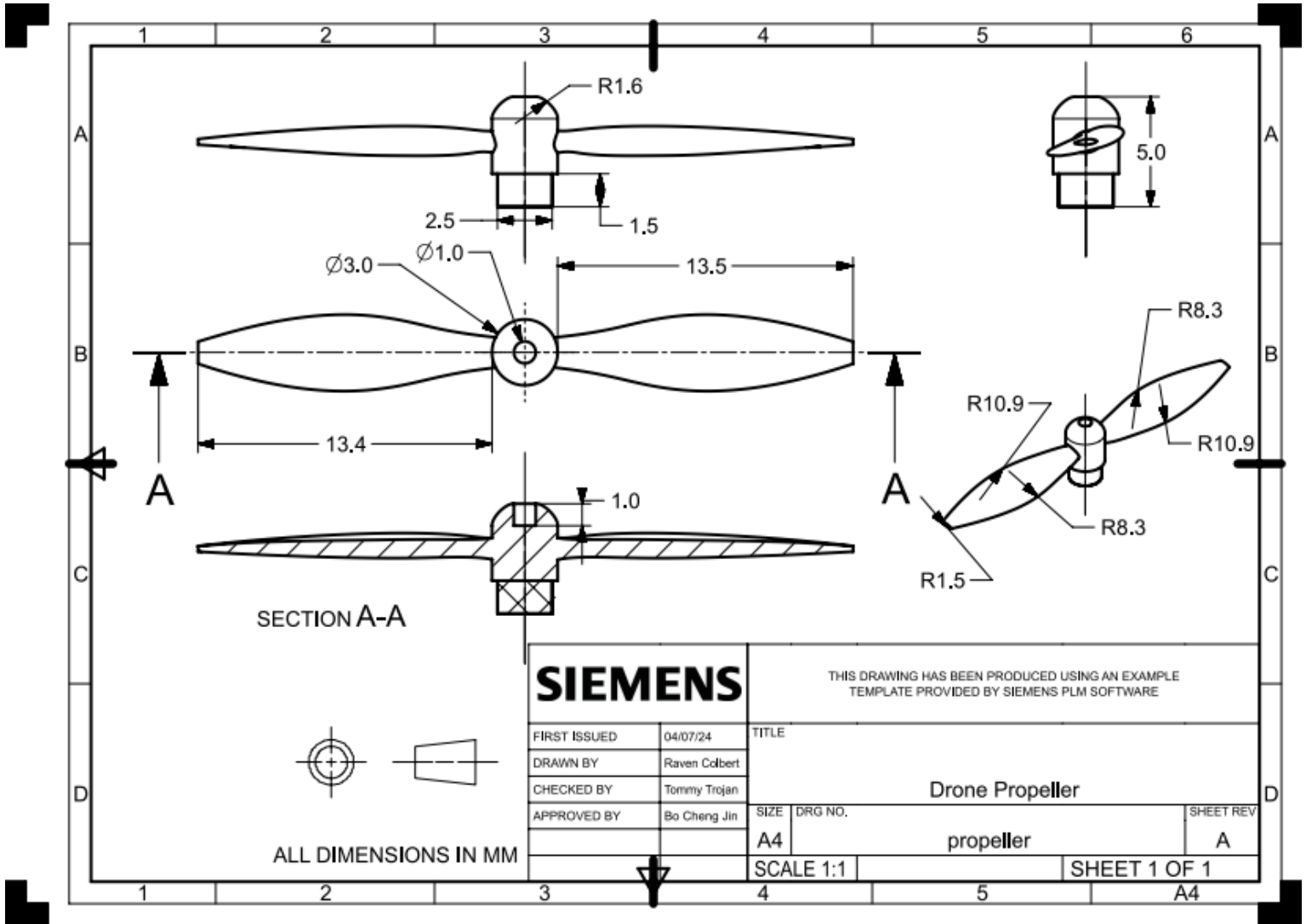
Introduction

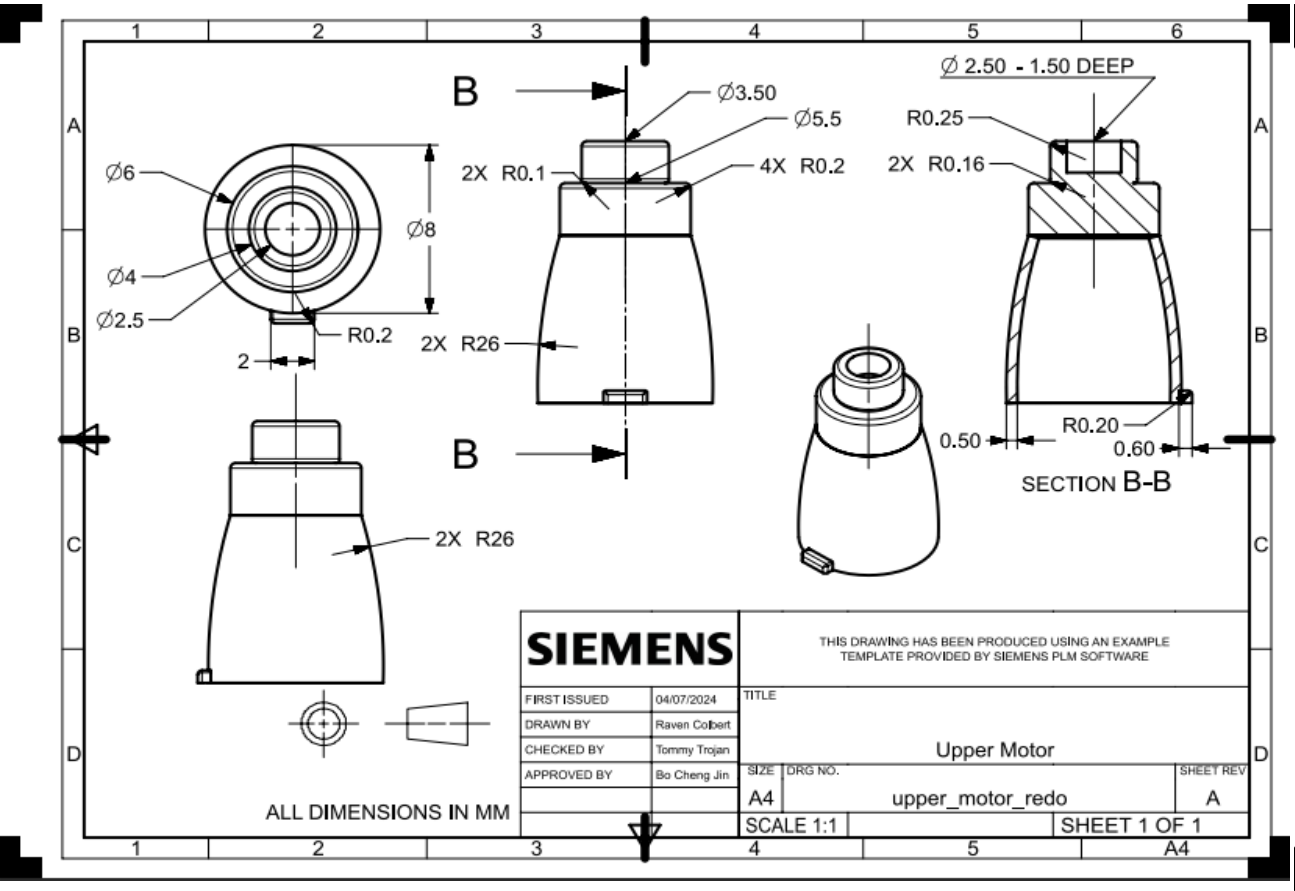
- The material selection was polyethylene
- Color coordinated to resemble this product
  - Black = bottom motor, battery, propellers
  - Red = top motor, curved surface body
- The project was broken down into 4 main parts:
  - Motors, Battery, curved surface body
- With a sub-assembly of the motor that was broken down into 2 parts:
  - Bottom and Top Motor with Propellers
- The specifications of the designed drone:

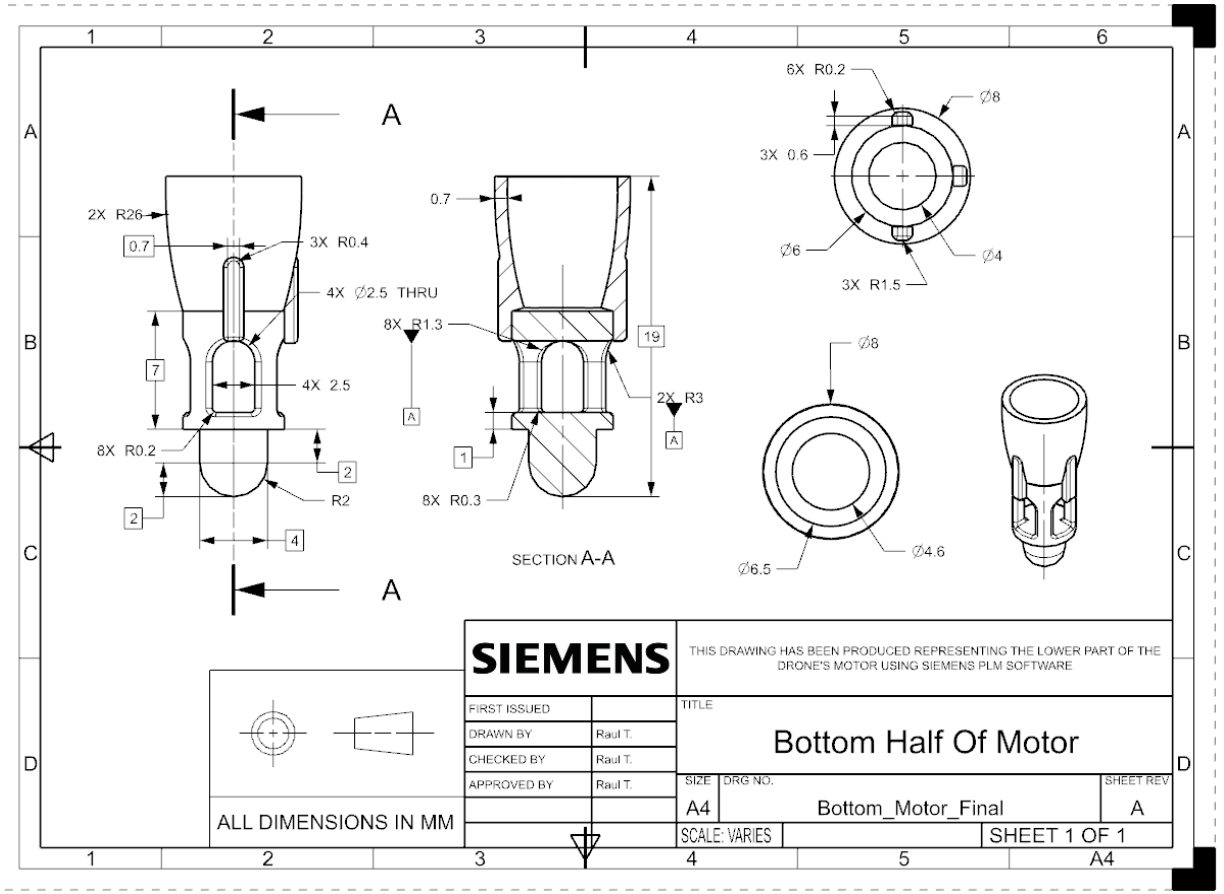
- With Guard
  - L = 82.88 [mm]
  - W = 82.88 [mm]
  - H = 40.41 [mm]
- Without Guard
  - L = 57.00 [mm]
  - W = 57.00 [mm]
  - H = 31.50 [mm]

Engineering Drawing and Assembly: Propeller

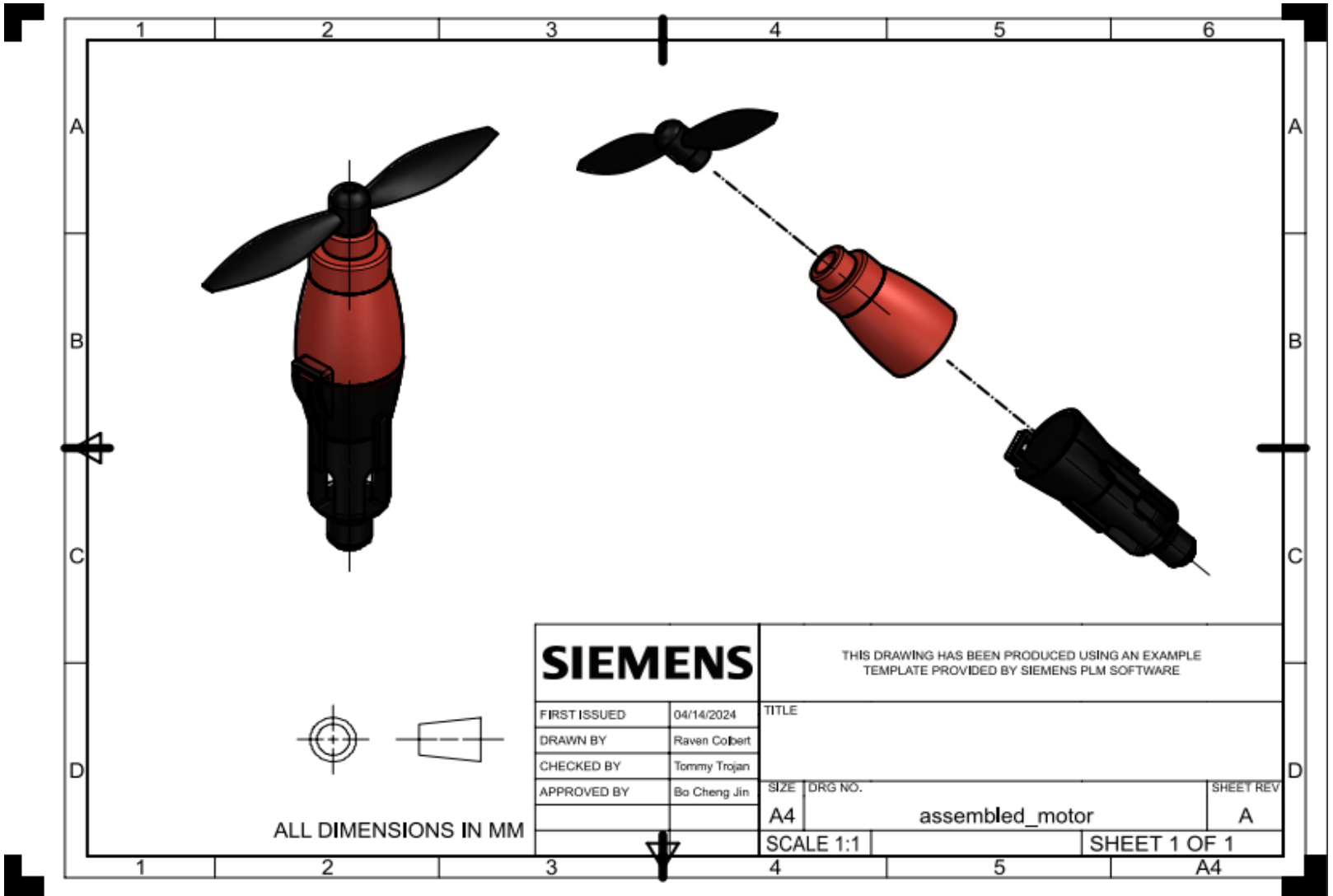


Engineering Drawing and Assembly: Motor

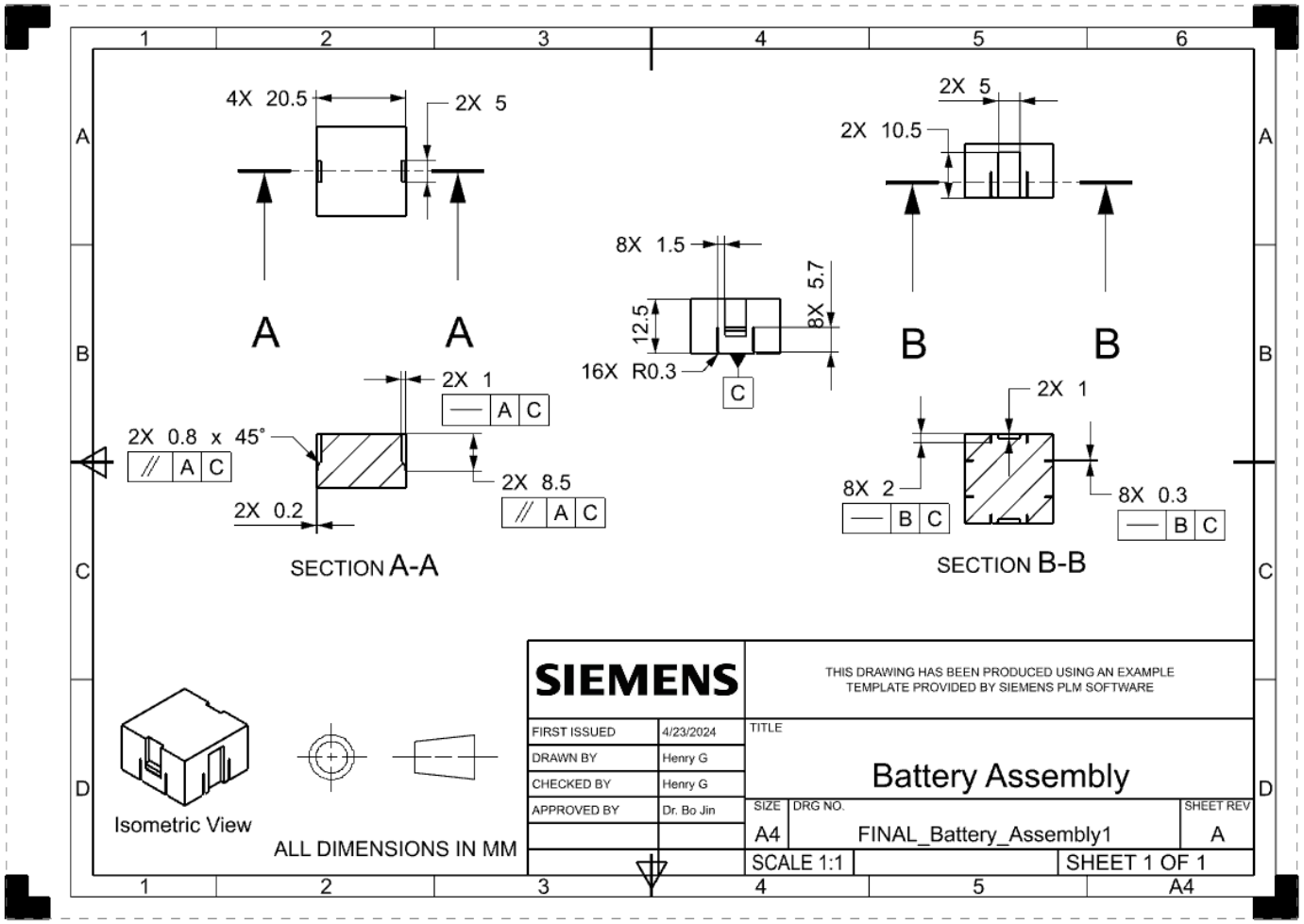




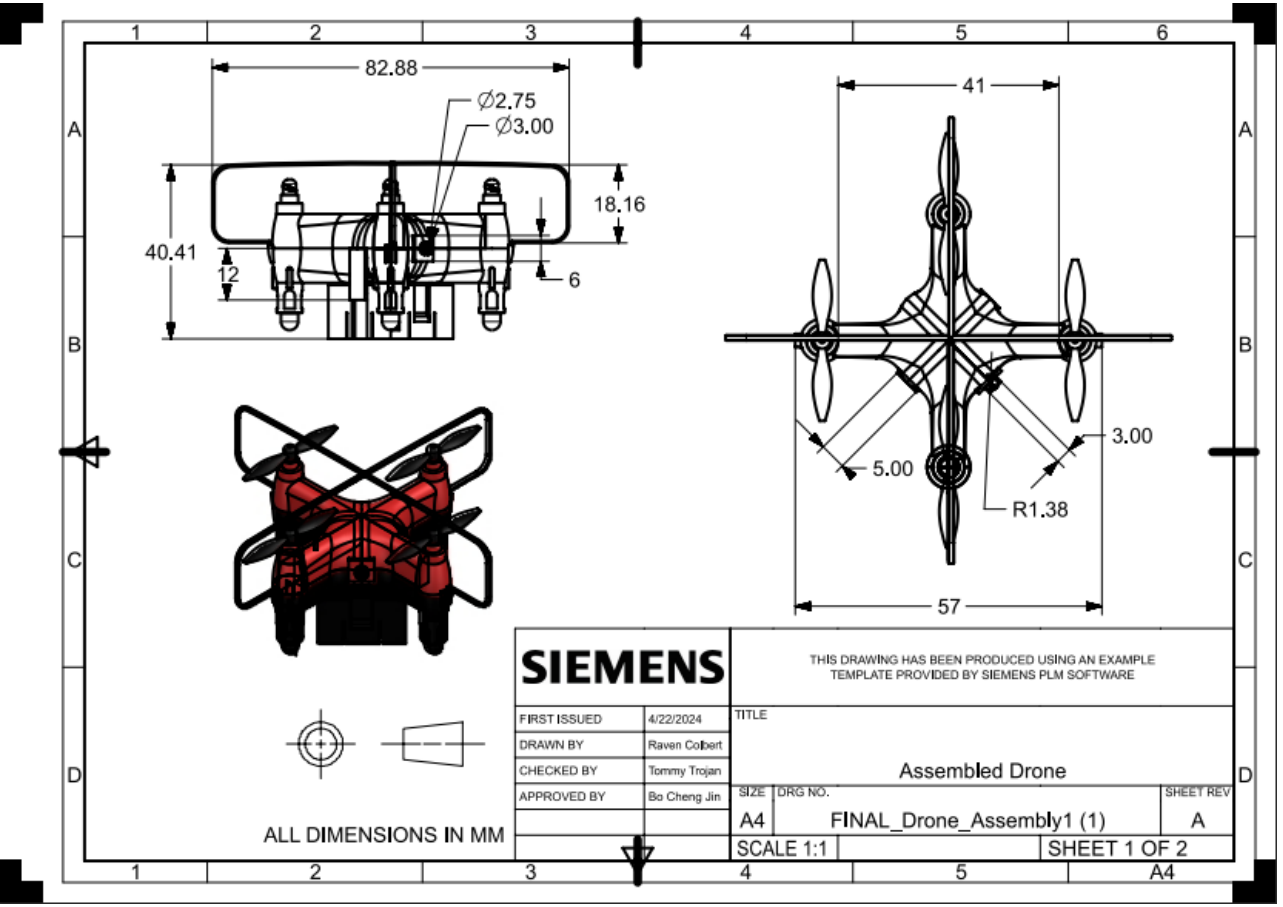
Engineering Drawing and Assembly: Assembled Motor

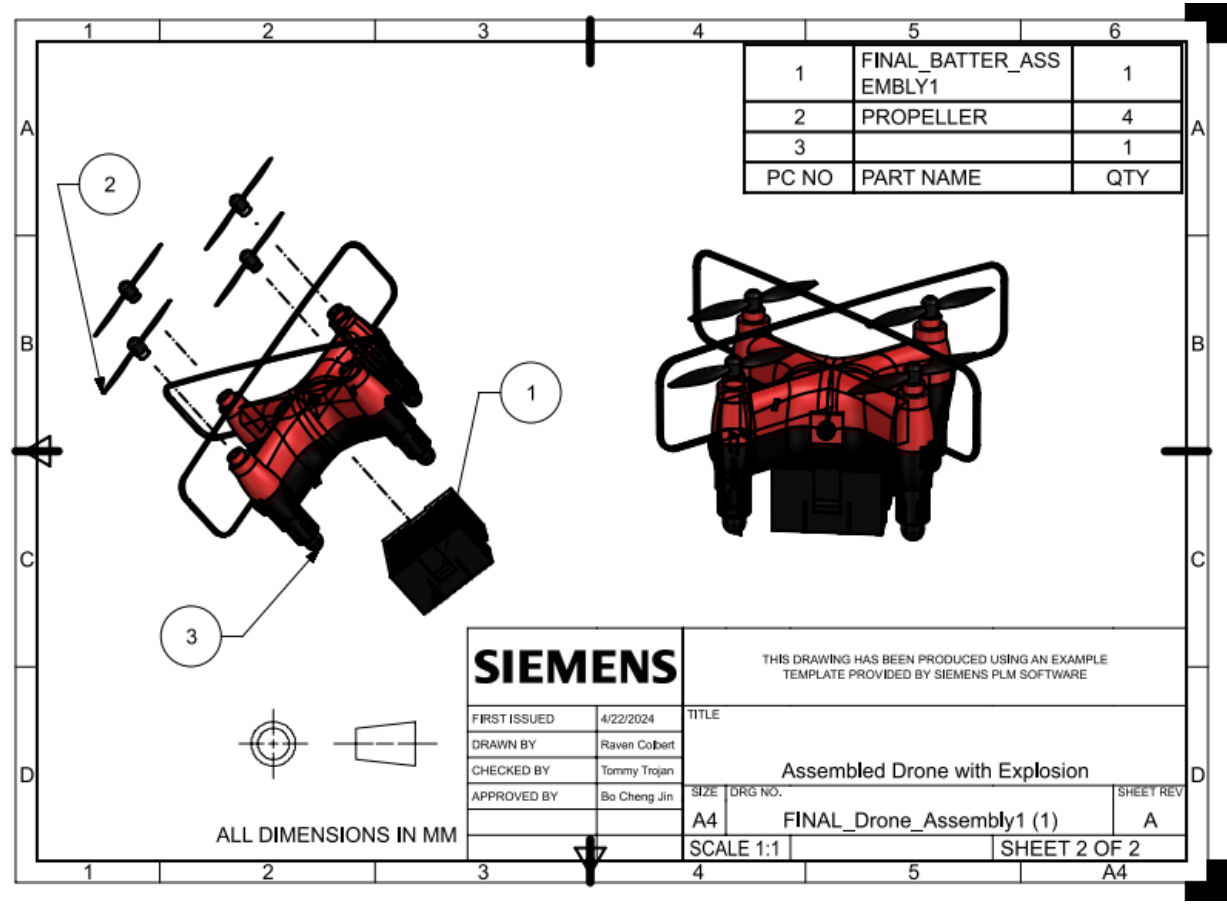


Engineering Drawing and Assembly: Battery

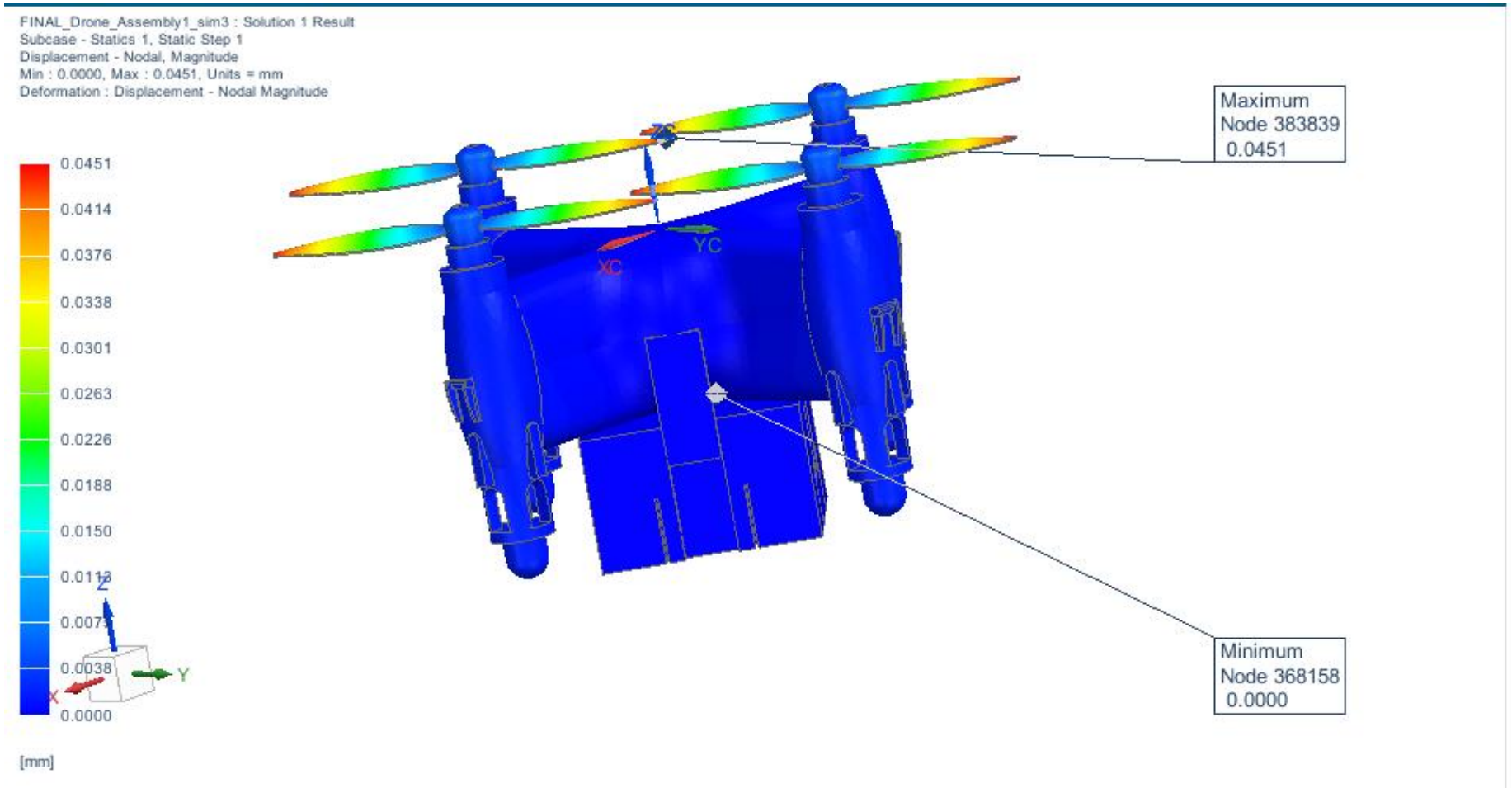


Engineering Drawing and Assembly: Assembled Drone

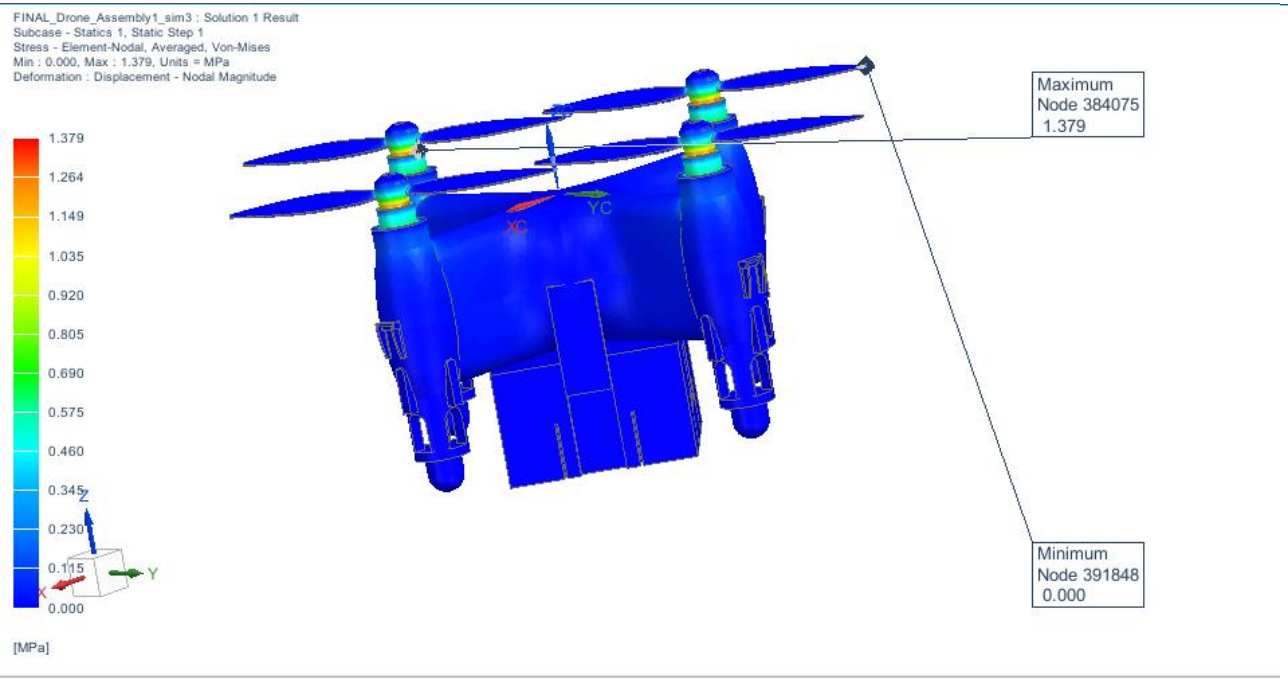


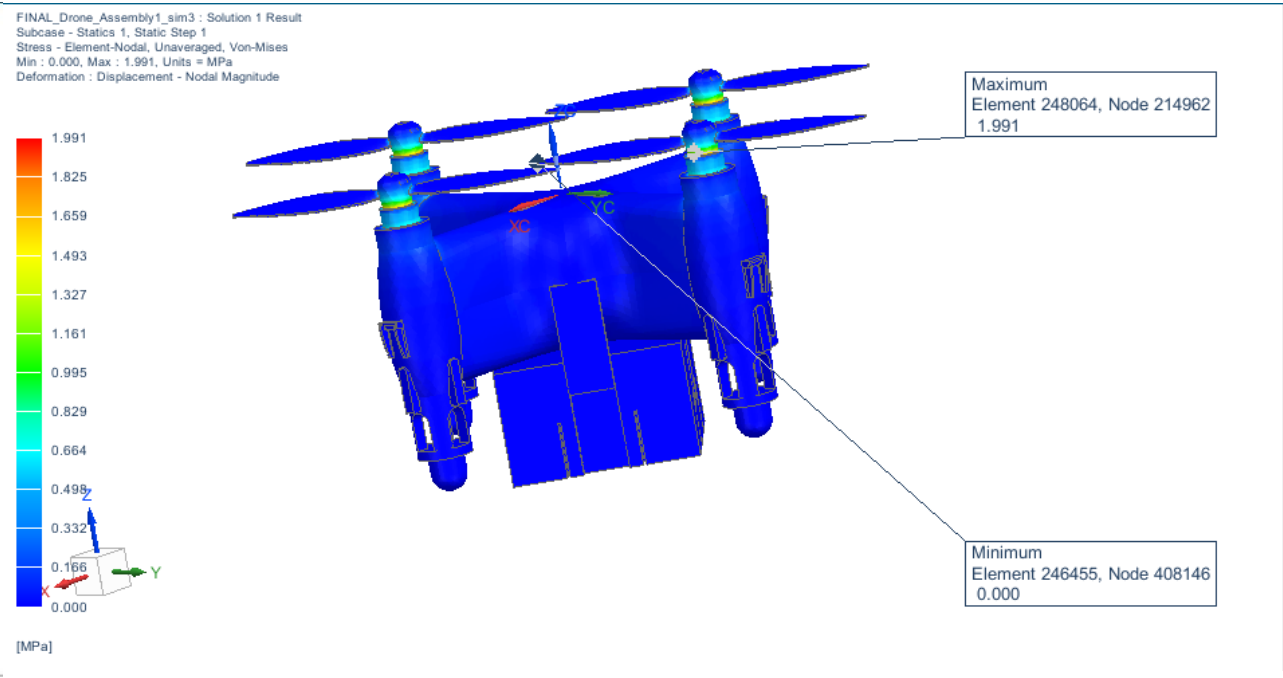


FEA: Displacement

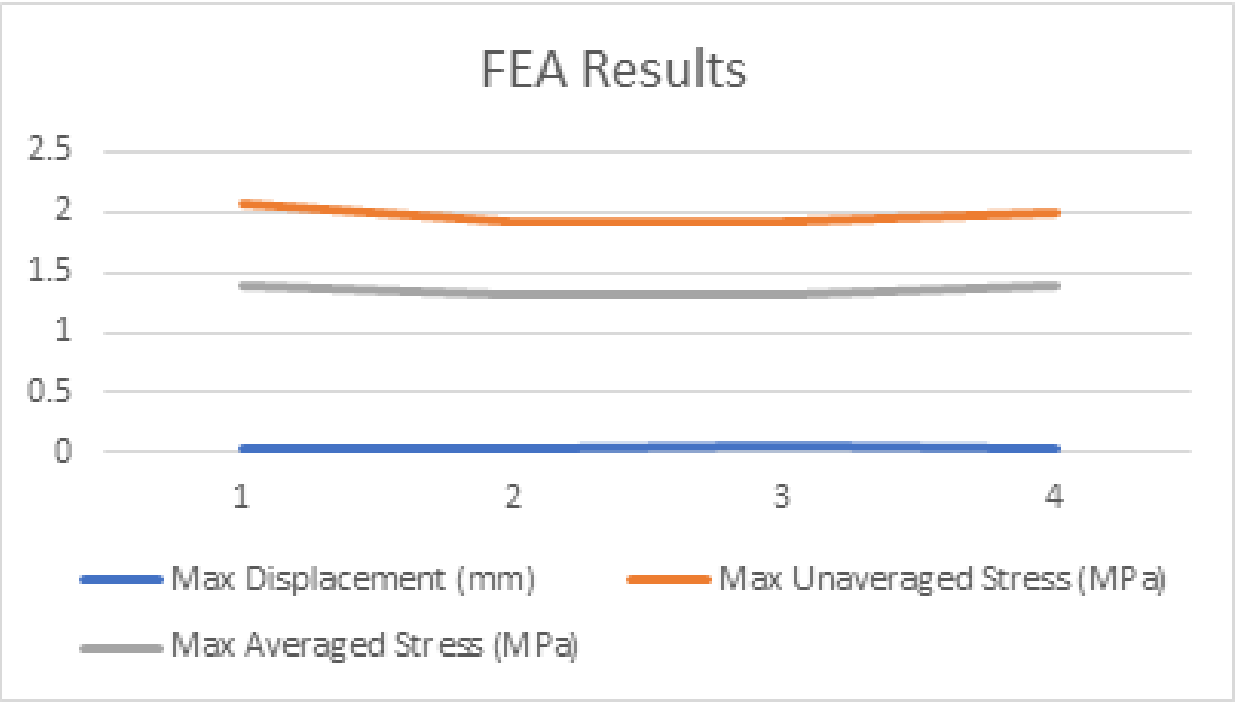


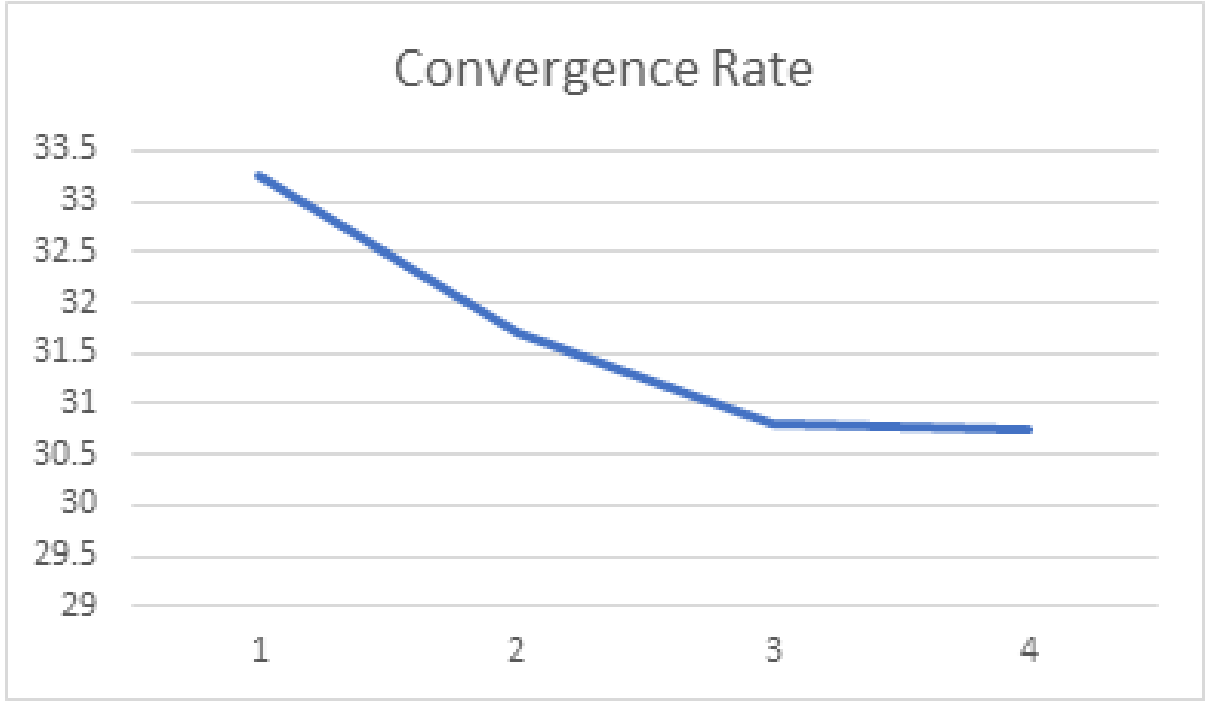
FEA: Stress – Von Mises





FEA: Results

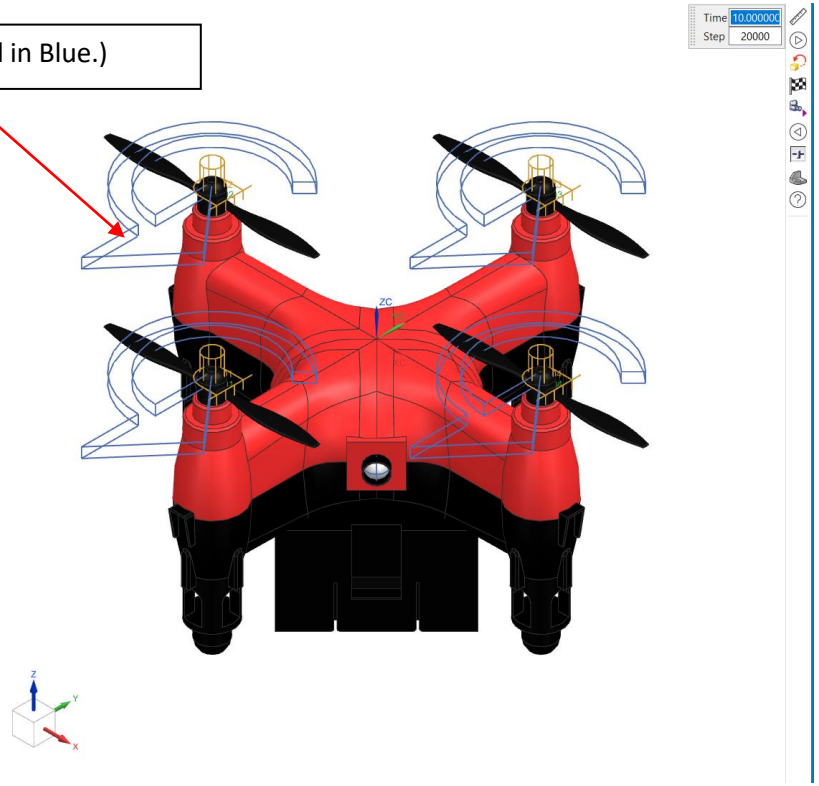




Version	Element Size	Element #	Node #	Max Disp. (mm)	Max Stress Unavg. (MPa)	Max Stress Avg. (MPa)	Convergence
1	0.4	150131	252676	0.0451	2.083	1.39	33.26932309
2	0.6	133958	223865	0.0451	1.921	1.312	31.70223842
3	0.55	136252	228053	0.0452	1.913	1.324	30.78933612
4	0.5	139142	233177	0.0451	1.991	1.379	30.73832245

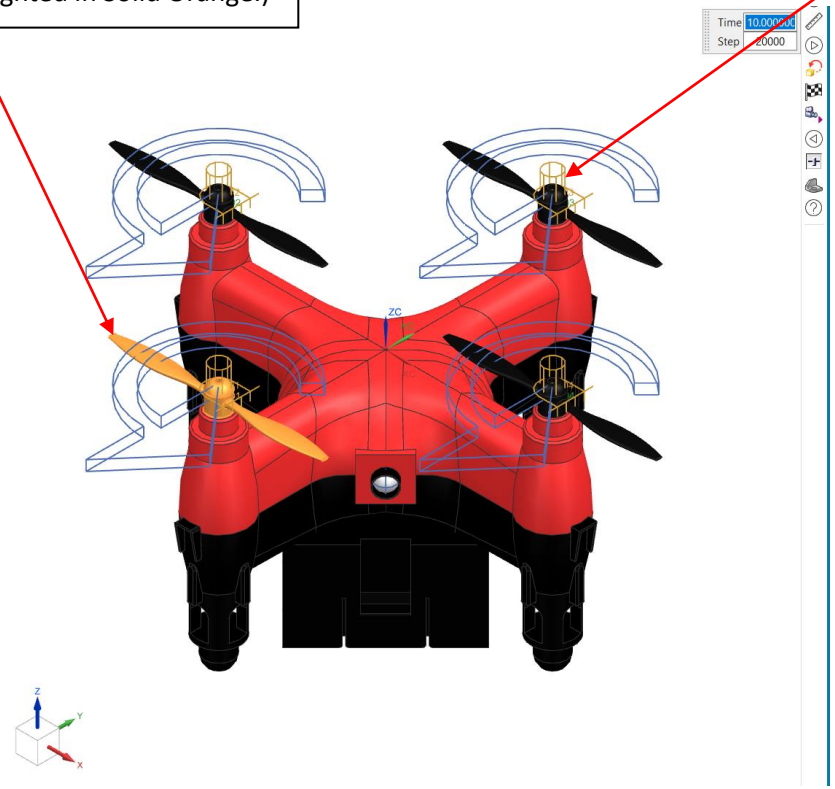
Motion Analysis: Joints, drivers, and motion Bodies

Drivers (Highlighted in Blue.)

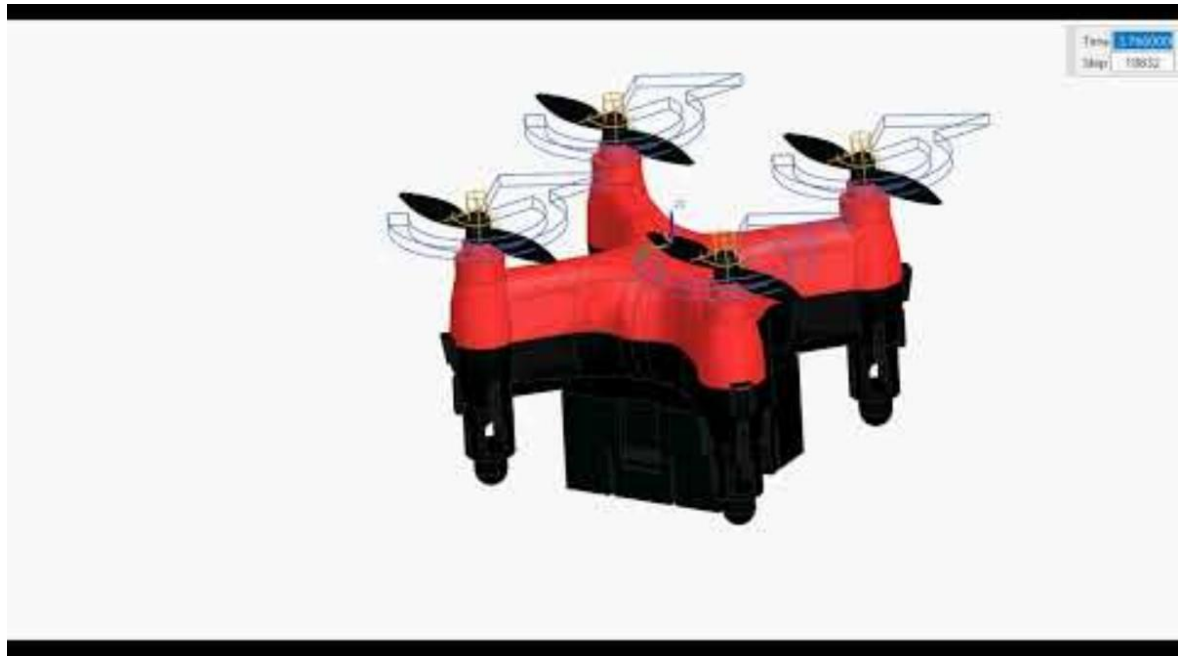


Motion Bodies (Highlighted in Solid Orange.)

Joints (Highlighted in Orange Wireframe.)



Motion Analysis Without Friction



- Velocity = 20 °/s
- Acceleration = 5 °/s^2
- For Solution:
  - 50,000 steps for 10 seconds

Motion Analysis with Friction

- Static friction = 0.355
- Coefficient of Dynamic friction = 0.19
- Velocity = 10 °/s
- Acceleration = 0.5 °/s^2
- Stiction Transition Velocity = 5 °/s
- For Solution:
  - 20,000 Steps for 10 seconds

Motion: Friction vs. Without Friction

Thank You!!

References

- PolyAlto, Groupe. “5 Plastics with Low Coefficient of Friction.” *Blogue*, blogue.polyalto.com/en/5-plastics-with-low-coefficient-of-friction#:~:text=Dynamic%20coefficient%20of%20friction%3A%200.19,to%20high%20loads%20and%20friction. Accessed 23 Apr. 2024.
- MatWeb.com. *Overview of Materials for Polyethylene Terephthalate (PET), Unreinforced*, www.matweb.com/search/DataSheet.aspx?MatGUID=a696bdcdff6f41dd98f8eec3599eaa20. Accessed 23 Apr. 2024.