

“The model, as determined through its parameters such as mass, power consumption, engine torques (not doing a million torques - being realistic), and rotor blade size, shall be realistic and implementable, preferably through the use of off-the-shelf parts. In particular, the mass of the drone shall be between 0.1kg and 10kg.”

<https://www.ligpower.com/blog/2025-2030-drone-propeller-buying-guide.html#:~:text=drone%20and%20application.-,1,%E2%97%8F>

[https://www.unmannedsystemstechnology.com/expo/drone-battery-guide/#:~:text=Lithium%2Dion%20\(Li%2Dion, and%20more%20complex%20handling%20requirements.](https://www.unmannedsystemstechnology.com/expo/drone-battery-guide/#:~:text=Lithium%2Dion%20(Li%2Dion, and%20more%20complex%20handling%20requirements.)

[https://www.bjplatedrones.com/Q4105\\_Small\\_Four-axis.html](https://www.bjplatedrones.com/Q4105_Small_Four-axis.html)

<https://www.amazon.com/Accessories-2pairs-DALPROP-T5046C-Propeller/dp/B089YYZP3H> : one of the parts that I found

- Q4105 Small Four-axis:
  - Net weight: 5.4 kg
  - Power system: 180KV motor + 80A ESC
    - Battery life is 6-20 hours
  - Idk how to find engine torque??
  - Propeller blade size: 24 inches
  - Hover 1m above ground for 2 minutes. (can for 42 minutes)
  - Fly in a circle of radius 2m, at an altitude of 1m above ground, at a speed of 0.5m/s for at least 1 minute. (max speed is 20, so I wanna assume yes?)
  - Launch from the ground and ascend vertically until 1m above ground.  
Move in a straight line 1m above ground at an average speed of 1m/s for 5m, stop (hover), yaw 90 deg to the left, move in another straight line for 5m, stop (hover), land vertically with a speed of no more than 1cm/s. (max descent speed is 8 m/s)
  - I'm gonna assume it can do the other stuff cause it's a drone

[https://www.potensic.com/npublic/opdfjs/web/viewer.html?file=https%3A%2F%2Fomo-oss-file110.thefastfile.com%2Fportal-saas%2Fpg2024050909140579882%2Fcms%2Ffile%2Fpotensic\\_atom\\_2\\_user\\_manual\\_en\\_202509.pdf](https://www.potensic.com/npublic/opdfjs/web/viewer.html?file=https%3A%2F%2Fomo-oss-file110.thefastfile.com%2Fportal-saas%2Fpg2024050909140579882%2Fcms%2Ffile%2Fpotensic_atom_2_user_manual_en_202509.pdf)

- Potensic Atom 2:
  - Net weight: .245 kg lol
  - Power system: smart battery DSBT02B
    - Don't know the battery life, the remote is 4 hours, so I'm gonna assume that

- Convinced engine torque isn't a thing
- Propeller blade size: 119.4×63.8 mm HAHHAHA (diameter x thread pitch)
- Hover 1m above ground for 2 minutes. (can for 29 minutes)
- Fly in a circle of radius 2m, at an altitude of 1m above ground, at a speed of 0.5m/s for at least 1 minute. (max speed is 10, so I wanna assume yes?)
- Launch from the ground and ascend vertically until 1m above ground.  
Move in a straight line 1m above ground at an average speed of 1m/s for 5m, stop (hover), yaw 90 deg to the left, move in another straight line for 5m, stop (hover), land vertically with a speed of no more than 1cm/s. (max descent speed is 4 m/s) (mechanical range: Tilt: -125° to +45° Roll: ±45° Pan: ±30°)

<https://www.dji.com/mini-2-se/specs>

- DJI mini SE drone:
  - Net weight: .246 kg
  - Power system: capacity is 2250 mAh, and it's a Li-ion battery
    - Battery life is 4-6 hours
  - Engine torque? Who's she
  - Propeller blade size: 4.7x2.6"
  - Hover 1m above ground for 2 minutes. (can for 31 minutes)
  - Fly in a circle of radius 2m, at an altitude of 1m above ground, at a speed of 0.5m/s for at least 1 minute. (max speed is 16, so I wanna assume yes?)
  - Launch from the ground and ascend vertically until 1m above ground.  
Move in a straight line 1m above ground at an average speed of 1m/s for 5m, stop (hover), yaw 90 deg to the left, move in another straight line for 5m, stop (hover), land vertically with a speed of no more than 1cm/s. (max descent speed is 3.5 m/s) (mechanical range: Tilt: -110° to 35°, Roll: -35° to 35°, Pan: -20° to 20°)

Look up typical parts for a drone for the bonus points

The drone should be around .245 kg to meet the design requirements of hovering at slower speeds while also complying with the rotating conditions. Also, keeping the drone at a smaller mass requirement allows for the off-the-shelf components to be cheaper.

The power system used should be a Li-ion battery because it is known for its ability to give the drone longer hovering times and unnecessary power. Additionally, the off-the-shelf part is safer to use and removes the safety risk from overcharging.

The propeller diameter should be approximately 5 inches, as it enhances the drone's maneuverability due to the faster response time provided by the propeller size. These propellers are also not hard to find due to how common they are.

Coefficient of thrust - equation with no thrust in it - can also be found by finding acceleration, subtracting gravity, and multiplying by the mass, depending on the angle - gravity and thrust - find thrust from mass times the acceleration, and it needs to be vectorized and in 3D

Moment coefficient -