



Drone Delivery: Medical Supplies & Organs

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Introduction

Late deliveries can have life-threatening consequences, with each minute of delay reducing the viability of vaccines, blood samples and organ's viability.

Problem Statement

Traditional medical supplies and organ transportation faces many significant issues that lead to late surgeries for patients that could result in complications for the patients, or it could result in fatality. These issues include traffic jams in urban cities, long delivery time between hospitals and other significant issues.

Proposed Solution

The delivery drone provides a completely new method of transporting medical supplies and organs, it is stored in a cooled environment and capable of traveling in high speeds with high maneuverability, ensuring that they are delivered in good condition and faster than other transportation methods

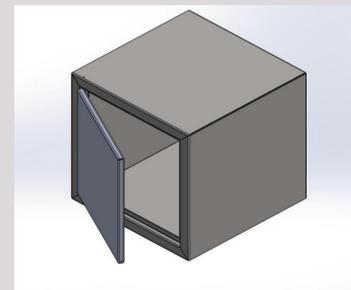
Constraints

- ❑ Privacy: To keep no records of people homes and not to take picture of them.
- ❑ Regulations: To adhere to the government instructions that drones are not allowed in airports and military airspace.
- ❑ Temperature control: To keep the temperature of the cooled storage between 3-8 C° preserve the medical supplies and organs from failure.
- ❑ Safety: To adhere to the safety regulations set by the authorities (such as, takeoff and landing).

Specifications

Drone Speed	30 – 50 km/h
Thrust per Motor	58.86
Drone Material	Carbon Fiber
Battery Life	45-60 min
Battery type	Lithium-Polymer
Travel Distance	20 – 30 km
Payload Weight	5 – 15 kg
Cooled Storage Temperature	3 – 8 C°
Navigation	Semi-automated, GPS

Main Components Models



Cooled Storage Compartment

The container must maintain a temperature of 3-8°C as this temperature is optimal for preserving most medical supplies and organs.

Meeting the requirements:-

- ❑ **Using insulated containers:** These containers help maintain a consistent temperature and protect the medical supplies from external fluctuations, we used the following material to achieve this.
 - ❑ **Closed cell polyurethane Foam:** This foam has a high insulation value and will perform in hot weather as well as cold temperatures.
 - ❑ Thermal conductivity K-value: 0.018-0.024 W/m.k
 - ❑ Density: 30-50 kg/m³
 - ❑ Operating temperature range: -100 - 80 C°.
- ❑ **Type of cooling method:**
 - ❑ **Small Phase Change Material (PCM) Packs:** PCM packs designed for smaller applications can maintain a specific temperature range for a limited time.
 - ❑ Heat storage capacity: 150-250 kJ/kg.
 - ❑ Operating temperature range: 0 - 7) C°.
 - ❑ Cooling duration: 20-24 hours.
 - ❑ Reusability: 10,000 cycles of freezing.

Conclusion

The delivery drone reimagines the way life-saving medical supplies and organs are transported, blending technology and medical needs into a seamless solution. By implementing efficient cooling method which is PCM packs, as it ensures meeting the required range of temperature while being cost effective. Additionally, in emergency situations like tsunamis and earthquakes, medical supplies and organs can be delivered faster via the rescue drone.