

12 - Wings For Aid

Natural and humanitarian disasters lead to the forced displacements of large groups of humans. Destruction of infrastructure, supply chains and access to essential goods forces these displaced individuals to seek out necessary aid to survive. Typical large distribution centers present challenges with regards to health, safety and logistics. Therefore the organisation, Wings For Aid, has produced a concept for the "last mile" aid distribution. Group 12 has produced a full system design to fulfil the needs and requirement of the client Wings For Aid and their aid delivery concept. The aircraft is an unmanned aerial vehicle fully capable of tackling the logistical and distribution issues surrounding the last mile delivery of aid. When a nations infrastructure is not sufficient to allow for adequate distribution using conventional methods, government organisations can request Wings For Aid to perform the operation utilising our system. The aircraft specialises in the pinpoint delivery of ten 20 kg aid packages within an effective operational radius of 250 km from the ground station.

Mission Objective

Large unmanned aerial vehicles and their civil applications are relatively underdeveloped. Therefore this project looked to utilise conventional aircraft design in the application of an entirely new system. The mission objective of this project was to design a low-cost, easily transportable, unmanned aircraft that can deliver a total payload of 200 kg of aid packages within an effective range of 250 km, by 10 students in 10 weeks.

System Design

Utilising a proprietary Wings For Aid package dropping system, an accuracy within a 25 m by 25 m drop zone is achieved when distributing aid. Aid is stored within 70 liter cardboard containers. These containers are highly sustainable, utilising a unique geometry to ensure ease of manufacture and assembly. Once the aircraft reaches the desired drop location, a command is sent from the ground control center confirming safety within the drop area. Once dropped, large airbrakes deploy outward, ensuring drop accuracy and low impact velocities. The current system has been validated by the Wings For Aid organisation and is capable of safely delivering a carton of eggs from a height of 100 m completely undamaged. In order to achieve the goal of rapid system deployment into locations of natural and humanitarian disasters, a compact and modular design approach was taken. The system is capable of being disassembled and transported in industry standard 20 ft containers. Modularity within the system allows crucial components such as the wing, empennage, landing gear and avionics to have increased repairability. Not only does modular-

ity account for the repairability of the design, but it also allows for the testing of upgrades in technology or design without the production of new airframe units. The system design is robust and allows for the implementation in a wide range of environments and locations. Within 72 hours, the system can be shipped and deployed in areas of disaster or conflict. With the advantage of requiring no physical presence of a onboard pilot to control the UAV, the design and certification processes are made relatively simpler, thus enabling the possibility of designing a cheaper and more efficient system to deliver aid. Not only does the system have potential to greatly improve the distribution of aid, it also has the ability to help revolutionise the commercial distribution of goods.

