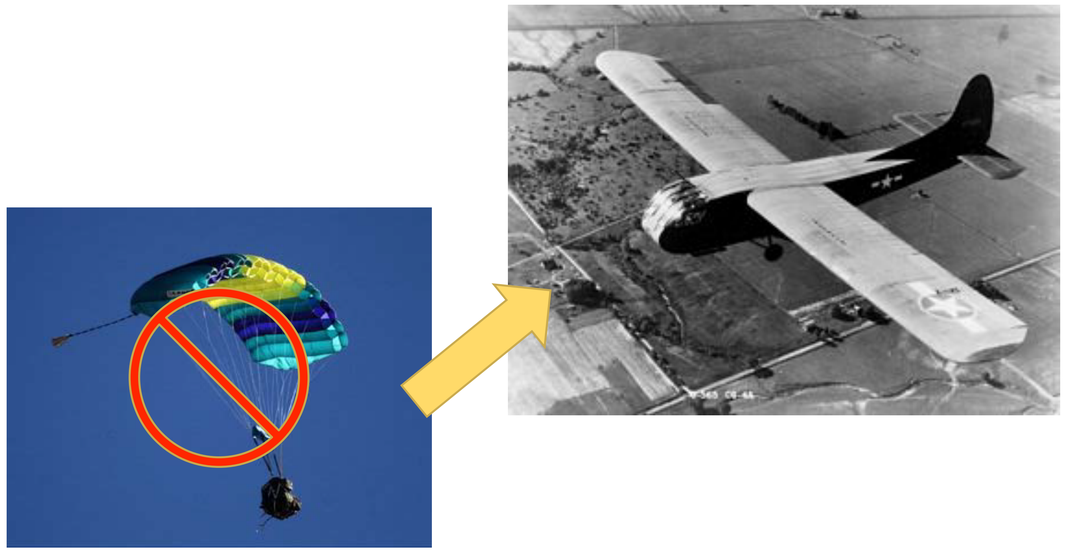
Tactical Aerial Resupply with Extended Standoff Range

Naval Postgraduate School



Novel Approach to Aerial Payload Delivery

We will carry out a conceptual and then detailed design of a carbon fiber-shell with retractable high-aspect-ratio wings that can be attached to a Pelican 1200 size payload container, so that the entire system can be attached to a Tier II UAS, like Arcturus T-20, or released from a manned aircraft. For this reconfigurable UAS deployed from a larger UAV or manned aerial vehicle we will be aiming for at least 5:1 glide ratio to meet the objectives set forward by USMCWL. We will develop control algorithms to navigate a UAV glider to the intended point of impact and utilize CoT autopilot to program them at. A series of computer simulations and flight tests will be conducted at Camp Roberts to verify mechanical design, tune control algorithms and assure safe landing (either via stalling a glider close to the ground or deploying a drogue chute).

The USMC envisions a future operating force where small elements of Marines will operate in multiple, dispersed locations along the littorals. The lines of communication required to sustain these maneuvering forces, whether by land or air, are vulnerable to enemy disruption. The US Army / Air Force JPADS program conducted in 2001-2013 resulted in fielding several different-weight systems capable of precise delivery of supplies to distributed forces. However touchdown accuracy heavily depends on the payload weight, ranging from ~70m to 250m CEP, winds aloft, surface-layer winds and terrain. The standoff range is limited by the performance of ram-air parafoils these system employ, usually exhibiting 2:1 to 3:1 glide ratio (with respect to air). Ram-air canopies are expensive (on the order of $60,000), and therefore the JPADS delivery systems cannot be expendable.

The proposed work intends to elaborate on the previous experience and through the use of inexpensive, commercial technologies, develop a prototype of a tactical resupply delivery system for USMC that will increase military utility and drastically reduce costs. The system will be able to provide a Marine rifle squad with one-day sustainment without broadcasting the squad's position, and will be disposable.

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