

REUSABLE GUIDED AERIAL SYSTEM FOR PRECISION DELIVERY OF LIQUID PAYLOADS

Main Technological Area → Autonomous Aerial Systems, Firefighting Technologies, UAV

Keyword → Precision payload delivery | Autonomous drone | Reusable aerial system | Swarm intelligence | Fire suppression | Aerial firefighting | Emergency response | UAV operations

The invention provides an aircraft-deployable system capable of transporting large quantities of fire extinguishing liquid, or other liquid payload, and autonomously guiding itself to a target area after release. After release, electric propulsion units are activated and the system transforms into an autonomous drone able to reach a safe recovery area, enabling retrieval and reuse. During descent, onboard sensors and movable aerodynamic surfaces continuously optimize the trajectory, enabling accurate payload delivery.

The invention is intended for use in firefighting operations that require the aerial deployment of extinguishing liquids and can be employed either as a standalone solution or as part of coordinated multi-vehicle systems, including for the release of other types of liquids.

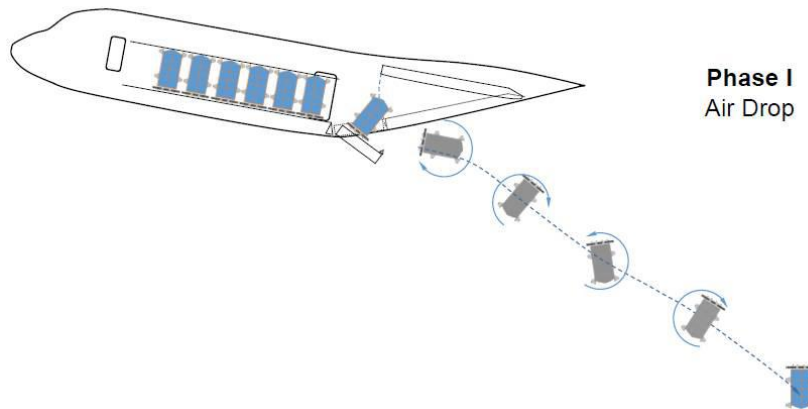


Figure 1 – Air dropping phase

TECHNICAL SPECIFICATIONS

The invention consists of an aircraft-deployable container designed to transport liquid payloads and equipped with autonomous navigation and post-mission recovery capabilities.

The system features:

- an aerodynamic exoskeleton designed to withstand deployment and flight loads;
- a flexible internal tank capable of carrying large quantities of , or other liquid payload;
- an onboard electronic control unit;
- navigation and guidance subsystems;
- electrically actuated aerodynamic control surfaces;
- an electric propulsion and recovery module.

Following release from the carrier aircraft, the system enters a guided gliding phase during which multiple movable aerodynamic surfaces actively control direction. Navigation is supported by GPS positioning, inertial measurement systems and additional sensing technologies, including thermal and optical sensors capable of identifying target areas and supporting mission optimization in real time.

The onboard control unit continuously evaluates flight parameters and determines the optimal payload release conditions according to altitude, position and operational objectives.

After payload deployment, the significant reduction in system weight enables activation of the electric propulsion module. The vehicle subsequently performs an autonomous recovery flight toward a predefined landing site, allowing retrieval and reuse of the platform.

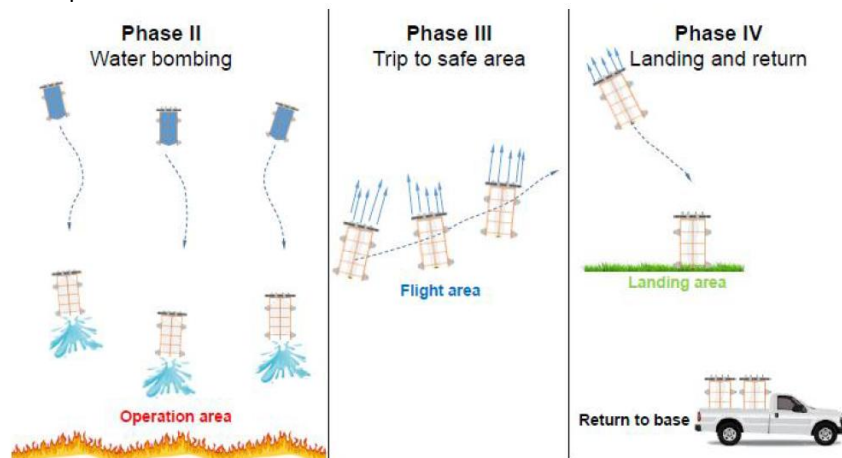


Figure 2 – Water bombing to return phases.

The architecture can also support coordinated operations involving multiple units.

INNOVATION/ADVANTAGES

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| <ul style="list-style-type: none"> • High precision release • Release from a safe altitude • Recoverable and reusable platform • Integration of multiple functions into a single solution | <ul style="list-style-type: none"> • High degree of operational autonomy • Platform modularity • Operational scalability • Compatibility with multi-vehicle operations |
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FIELDS OF APPLICATION

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|---|---|
| <ul style="list-style-type: none"> • Wildfire suppression • Civil protection • Industrial firefighting • Critical infrastructure protection • Maritime and offshore operations | <ul style="list-style-type: none"> • Defence and security • Environmental remediation • Humanitarian logistics • Agriculture and land management • Swarm autonomous missions |
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PATENT INFORMATION

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CPC Codes – B64D 1/16

Active worldwide applications

Italy - IT102022000013687; **filing date:** 2022/06/28; **grant date:** 2024/07/04
 EPO - EP4359302C0; **filing date:** 2023/03/20; **grant date:** 2025/02/12
 Unitary – Spain – United Kingdom – Switzerland – Morocco
 Australia - AU2023298305A; **filing date:** 2023/03/20; **grant date:** *pending*

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