

# A “SPECIFIC” DRONE FOR NIGHT TIME AERIAL WILDFIRE FIGHTING: THE NITROFIREX PROJECT

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## ABSTRACT

### Introduction:

The maturity of the technologies for the guidance and control of UAVs allows for innovative operational options such as the ability to spray (a liquid) or spread (a powder) a significant amount of an agent of any sort at a pre-established point in the atmosphere.

This is the case of NitroFirex, an innovative project that integrates already available defense and UAVs technologies in order to attain an operative capability that can be applied, at night, in the battle against wildfires and fumigation of drugs plantations.

Due to the human and ecological harm caused, the social alarm generated as well as the economic losses that they bring forth, the project that NitroFirex is developing with maximum priority is the one to combat these two modern plagues that whip our society such as forest fires and drugs. For that very reason NitroFirex is concentrating on its nighttime operations as an indispensable and necessary complement to aerial means already in use during daytime.

NitroFirex at last offers the long awaited night-time operations capability that allows direct support to the ground crews in their relentless fight against forest fire fighting and avoid shot down risk for crew of drugs plantation fumigation.

### The NitroFirex Concept:

This capability only can be accomplished developing a specifically designed manned / unmanned aerial system, able to take advantage of both aviation, from manned aviation the capability of transport big quantity of useful pay load in few time to the operation area and from unmanned aviation a “specific drone” able to spaying this pay load in environments that are difficult, dangerous or impossible to execute with a manned aircraft.

The ability to transport a large amount of payload in the minimum time to the area of operations is performed by medium/heavy helicopter or transport aircraft, Launcher Aircraft (LA), designed to do this in minimum time and, if compared with the actual aerial fire fighting means, in the most efficient, economical and safer way.

What NitroFirex does is transport this payload from the LA to the programmed release point. This is achieved by using the innovative UAV patented by NitroFirex, the Autonomous Glider Containers (AGCs) that are released from the rear ramp of a transport aircraft in a programmed sequence or one by one hanged like a bucket-bamby from a helicopter.

The AGCs fly gliding autonomously to the programmed release point in the source of the fire realizing their contents with utmost precision and then returning to base powered by a jet engine for quick reuse.

Equipped with an autonomous navigation and guidance systems the AGCs glide for one to two minutes from the LA to the point of release over the fire. In this phase its aerodynamic

behavior is comparable to that of a guided-glided bomb but with a higher payload, more wing surface and the same glide and guidance capabilities.

For safety, but also economical reasons, the NitroFirex's AGC are recoverable. Once the drop of extinguishing agent on the fire takes place, the NitroFirex AGC performs an "escape" maneuver from the danger zone. Taking advantage of the great and sudden loss of weight as well as the surplus speed, the empty AGC transformed, thanks to the jet engine that propels it, into an UAV. It returns autonomously to the operation base of the LA where it can be swiftly reused. The base of operations is an airport close to the fire to which the LAs with the NitroFirex system is deployed when called for.

The return to base is at night and at 500 ft. or below, autonomously, just like any UAV. It is routed over non populated areas and equipped with a parachute and an airbag to be deployed just in case of an engine flame out or any other malfunction in order to always ensure a soft and safe out of runway landing.

The AGCs, having a useful capacity of about 2.500 liters of extinguishing agent, are released depending on the operation area at about 6000 feet above fire and at a distance of around 6 NM.

The LAs used can be chosen out of a big range of medium/heavy helicopter such as Eurocopter models H-225, H-215 H-175, Bell models B-412, B-214, B-212, or Sikorsky models S-61, S-65, S-70 between others, or from any medium/heavy transport planes such as the C-295, C-27J, C-130 Hercules, AN-12, KC-390, A-400M, IL-76, C-17 or even aircraft with greater cargo capacity.

Please watch the next links in order you get a proper idea of the project:

<https://www.youtube.com/watch?v=MTOjTWSHR64&feature=youtu.be>

or

[www.NitroFirex.com](http://www.NitroFirex.com)

The NitroFirex project offers the following advantages over the actual aerial means:

#### **Operational:**

- . - Night Operations.
- . - No flight crews at risk.
- . - In Aerial Fire Fighting reduced reaction times.
- . - Higher agent drop capability per operations hour as compared to current means.
- . - In Aerial Fire Fighting maximum extinguishing efficiency by overlapping the AGC drops.
- . - Maximum precision of the agent drop.
- . - Unaffected by wind, turbulence clouds and smoke.
- . - Unaffected by geographical barriers.
- . - In Aerial Fire Fighting, possibility of attending more than one fire simultaneously.
- . - Big deployment capacity: heavy transport LA provides the long range and high speed.
- . - In Aerial Fire Fighting, give direct support to ground fire fighting brigades at night.

#### **Economical:**

- . - Much higher agent drops capability per flight hour as compared to current means.
- . - Lower cost per dropped litter.
- . - AGC can be launched from many kinds of transport aircraft.
- . - In Aerial Fire Fighting: Minimum deployment of the L.A.
- . - Non-exclusive LA - one aircraft two missions.
- . - Big savings in: amortizations, personnel, maintenance and supplies.

- . - Great availability of heavy transport aircraft worldwide to be used as LA.
- . - LA requires no modification.
- . - Technologies used are already developed and available.

### **NitroFirex Applications:**

Beside the already mentioned (night forest fire fighting and drugs plantation spraying), the same operational concept can be apply to:

- . - Nuclear emergencies (cooling down the reactor).
- . - Chemical or bacteriological emergency (antidote spreading).
- . - Meteorological phenomena (clouds seeding or clouds producing).
- . - Fires at high buildings or big structures (no accessible with standard tubes).
- . - Fires at chemical and/or industrial factories (with toxic fumes and wind calm).
- . - Pests spraying or seeding (remote and/or inaccessible areas).
- . - Deliver humanitarian relief supplies (in conflicts areas).
- . - Military applications (low level gravity bombs delivery).

### **NitroFirex versus main Aeronautical Companies:**

As a confirmation of the viability of the operational concept patented by NitroFirex years ago, you can watch the following comparative video: [https://youtu.be/rx2CP\\_6E9Y](https://youtu.be/rx2CP_6E9Y). This video is made with the key sequences of the previous NitroFirex video, published in 2012 and the videos published by *Airbus* in 2017 (<youtu.be/qCL1e1MjtSw>) and by *DARPA* 2015 ([www.youtube.com/watch?v=df\\_CjHECws](http://www.youtube.com/watch?v=df_CjHECws)).

As you can see *Airbus*, with its *Future Air Power* program, and *DARPA* with its *Gremlins* program, assigned to be developed by *Boeing* and *General Atomics*, are both developing the operational concept patented by NitroFirex but only for military applications.

If the NitroFirex patent concept can be developed for military porpoises (dropping armament), why can not it be developed for all those very real and very necessary civilian applications as they are night aerial forest fire fighting, drugs plantations fumigations (dropping extinguish/defoliant agent) or quick emergencies reactions and perform it in a safer and cheaper way than actual aerial means?

The development of "dual technologies" that can be developed indistinctly for military and civil applications is a social, political and business demand and our project is a clear exponent of these technologies.

Our lawyers have been in contact with *Airbus* and *DARPA* for a long time in order to defend our intellectual property and with the purpose of joining efforts and objectives, without any results so far. All this is particularly incoherent considering that the above-mentioned aeronautical companies can contribute with the military transport aircraft and medium/heavy helicopters needed for the innovative operation proposed by NitroFirex, being this contribution the main economic amount of the project.

Therefore, considering the technological power that those companies/agency represents, it is difficult to justify within the society, the media and the decision makers that the idea patented by NitroFirex years ago for civil applications, only its development for strictly military purposes is projected.

### **Operational Considerations:**

Therefore forest fire fighting aircraft and drugs plantation fumigation are an important line of business within the sector of aerial work that moves billions globally. Paradoxically no modern aeronautic technologies have been implemented up to now, especially if we compare

it to all other sectors of aviation where the innovations have been really significant.

Nowadays, and for the last 70 years, the operational approach is to use airplanes or helicopters that are slow moving and perform a risky operation per se, due to the conditions they have to work in; very low altitude, winds, turbulence, and even shot down risk in the case of fumigation. All of it being an exclusively daytime procedure.

Almost fifty years ago the man went to moon, for more than six of years ago the unmanned vehicle Curiosity scouts on Mars' surface, the module Philae of the Rosetta mission landed on the 67P comet surface years ago, but here on earth our forests burn away and the drugs plantation can not be sprayed, at night just because we did not integrate already available technologies to achieve it.

Because of all the mentioned above the NitroFirex project fosters the application of modern technology in the aviation sector with the goal to improve the operative and economical efficiency and above all to offer night-time operation, which is the main shortcoming of current aerial means for fire fighting and for drugs plantation spraying.

It is time for the unmanned aviation innovativeness to offer to the worldwide hardworking and risky fire fighters airmen, drugs plantations fumigation pilots and emergency quick reaction equipment, a "specific drone" able to extinguish forest fires and fumigate drugs plantations at night, in order make all this "aerial works" safer, easier, cheaper and operationally more efficient.

Watching the disastrous fires that devastated worldwide forests every year and the impotence of fire fighters to combat them and as well as the increase in the production and consumption of plant-based drugs (mainly cocaine and heroin) and its harmful effects on western societies, it is necessary to emphasize that we should assume that we are employing obsolete weapons against those two every day stronger enemies and unfortunately it is necessary to accept that we are losing the battle.

Or we integrate modern available technologies to develop the operational capability of discharge more quantity of extinguish / defoliant agents in less time over de forest fire / drugs plantations, be able to make it at night and make it at safer and cheaper way than current aerial means or, all around the world, the forest will burn away irretrievably and the consumption of cocaine and heroin will go on increasing. This capability only can be accomplished developing a specifically designed drone.

That it is worth operating forest fires with **LAT** (Large Air Tanker) or a **VLAT** (Very Large Air Tanker) during the day if at night the fire will go on progressing without control? Does it make sense in the 21st century to risk the lives of fumigation pilots who can be shot down in their daytime flights at very low altitude and speed over drugs plantations?

The great lack of forest fire fighting /drugs plantations fumigations aerial means is the night operation capability and its development is where must concentrate the efforts of the responsible agencies as well as of the operators and aeronautical companies.

The big fires, the destructive ones are those that last one-day, one-night and at next morning are out of control, we firmly believe that the priority should be to develop the first night aerial forest fire fighting operational capability and this is the 's main NitroFirex objective.

**NitroFirex Autonomous Glider Containers (AGC) released from the rear ramp of a transport aircraft (LA) in a programmed sequence.**



**NitroFirex Autonomous Glider Containers (AGC) released from a helicopter, one by one, hanged like a bucket-bamby.**



**NitroFirex Autonomous Glider Containers (AGC) dropping their contents with utmost precision in the source of the fire.**



**NitroFirex Autonomous Glider Containers (AGC) returning autonomously to the operation base of the LA.**

