Water Bombing Helicopter, Eurocopter Solutions

Benoit Terral
Eurocopter
Water Bombing Helicopter

*Eurocopter solutions*

thinking without limits
Water Bombing Helicopter?

What ever the system, what ever the area, what ever the fire …

Helicopter plays an essential role among means available for fire brigade:

- fire fighting in inaccessible area
- fast transport of fire men
- fast transport of specific equipment
- rescue
- preventive surveillance
- observation and guidance during the disaster
Specific helicopters’ Advantages

Possibility to position some helicopters on strategic spots located as close as possible to high risk areas.

= less time to reach the scene.

“For fires that have just started, it is more important to arrive five minutes earlier with less water than five minutes later with additional liters of water”

A Fire Officer responsible for a high risk area.
Water Bombing Helicopter range
AS350 B3, Powerful and proven tool

Fire Fighting with Belly tank

For example: Simplex Kit 310

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank weight</td>
<td>302 lb</td>
</tr>
<tr>
<td>Water capacity</td>
<td>321 US gallons</td>
</tr>
<tr>
<td>Foam capacity</td>
<td>22 US gallons</td>
</tr>
<tr>
<td>Hover refill pump rate</td>
<td>315 GPM</td>
</tr>
</tbody>
</table>

EUROCOPTER
AS350 B3, Powerful and proven tool

Fire Fighting with **Bambi Bucket**

For example: BB 2024
EC130 T2, Versatility and Volume

Fire Fighting with Bambi Bucket For example: BB 2024
EC130 T2, Versatility and Volume

Fire Fighting coordination,
On scene commander…

Smoke Patrol…..
Water Bombing Helicopter (EC135 – EC 145)

EC 135 CARGO HOOK CAPACITY : 1300 Kg

EC 145 CARGO HOOK CAPACITY : 1500 Kg
Water Bombing Helicopter (AS365 – EC 155)

**AS 365 Belly tank**
900, 1000, and 1200 l

**EC 155 CARGO HOOK CAPACITY:**
1600 Kg

**AS 365 CARGO HOOK CAPACITY:**
1600 Kg
Need a new solution?

New EC 225 Water Bombing Helicopter
EC225 New fire fighting installation

The most flexible solution for Fire fighting

- Max 4000 liters / 1057 US gallons
- Easily removable internal soft tank to maintain multi-role capacity

Eurocopter patent with 3 World Suppliers:

- Aérazur, France
- Simplex, Oregon, USA
- Rafaut, France

EASA Certified (2009)
System overview

OVERFILL SYSTEM

CABIN TANK

MIRRORS

RETRACTABLE PUMPING SYSTEM

DOOR SYSTEM

EASA Certified (2009)
A Eurocopter patent

Fig. 30: The representative slice of the water tank was considered for dynamic studies © Eurocopter

Fig. 31: 50% filled tank
Glass vessel simulates the container only
Free water surface

Fig. 32 & 33: 50% filled tank.
Left: soft tank / Right: soft tank + top plate © Eurocopter

Same studies than super-tankers dynamic stability
Cabin tank assembly
Doors and pump system assembly

- Doors frame
- Drop door
- Hydraulic electro-valve
- Main refill port
- Main water transfer box
- Funnel
- Front fairing
- Retractable = Safety
Ground test
Pumping operation

Up to 4000 liters in only 80 seconds

( Max 90 seconds)
Dropping operation

Dropping time = 4 seconds
(minimum of 90% dropped)
Completely different ground impact

VS
A question of flow and pressure

Low pressure

High pressure
  +
  Big flow
  =
  Blow out effect
### EC225 Water Bomber performance

<table>
<thead>
<tr>
<th></th>
<th>Bambi bucket</th>
<th>EC WBH Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4000 l</td>
<td>4000 l</td>
</tr>
<tr>
<td>EC225 standard version Empty Weight</td>
<td>5,460 kg</td>
<td></td>
</tr>
<tr>
<td>+ 1 hour fuel + reserve + 3 crew + optional</td>
<td>6,730 kg</td>
<td>6,789 kg</td>
</tr>
<tr>
<td>MTOW at 900 m/3000 ft ISA+20°C</td>
<td>11,000 kg (4000 l)</td>
<td></td>
</tr>
<tr>
<td>Cruise speed</td>
<td>80 kt</td>
<td>140 kt</td>
</tr>
<tr>
<td>Number of rotations at 1.8 km (1 nm) in 1 hour with 1.5 min pumping + Arr/Dep</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Number of rotations at 5.5 km (3 nm) in 1 hour with 1.5 min pumping + Arr/Dep</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Number of rotations at 18 km (10 nm) in 1 hour with 1.5 min pumping + Arr/Dep</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Maximum water quantity at 1.8 km in 1 hour (900 m ISA+20°C)</td>
<td>80,000 l</td>
<td>104,000 l (\Delta +30%)</td>
</tr>
<tr>
<td>Maximum water quantity at 18 km in 1 hour (900 m ISA+20°C)</td>
<td>12,000 l</td>
<td>24,000 l (\Delta +100%)</td>
</tr>
</tbody>
</table>
Footprint studies

High fire-extinguishing level (≥ 1.6 l/m²)

Wet surface

Liter / m²
Footprint studies

Drop n°3:
4000 l, 45 kt
Efficiency: 87%

Drop n°4:
4000 l, 35 kt
Efficiency: 81%
Conclusion of research center

\[ \text{TRACKER} \leq \text{EC 225} \leq \text{CANADAIR} \]

- TRACKER (3400 liters)
- EC 225 (4000 liters)
- CANADAIR (6000 liters)
Pump everywhere!
And drop where fixed-wing can’t!
Emergency extraction capable!

No need to remove the tank in case of emergency.

No certification planned in this configuration.
When fire season is over?

1. Removal of internal water tank: 15 min (1 man)
2. Removal of external water pump: 3 min (1 man)
3. Removal of Funnel and Doors: 2 hours (2 men)

Only 2h20min for configuration change
Men and material transportation, Aerial Work
Rescue mission

A proven MEDEVAC helicopter

In operation

91 People Saved in 20 Hours

Air Ambulance installation up 6 stretchers + 5 seats
or up to 11 NATO stretchers + 5 seats
Police of Canton and Korean 119 choice
Issue for the next decade: Night Fight

California 2009 / 2012

Marseille 2010
Yes, we can!

With the right Aircraft

- With a *proven* helicopter in night operation
- With *modern* avionic suite including 4 axis auto pilot
- With the *full flight envelope* available (nothing hanging)

Exactly same condition of dropping!
100 ft, 0 to 140 kts
Yes, we can!

With the right equipment

With an innovative night vision system

No light intensification technology

A better use of infra-red spectrum

Thermal image
Yes, we can!

With the right procedures:

- To avoid the main threat in this kind of night flight: “Electrical power lines”
- To be sure of ground forces position
- For dropping zone accurate designation

Eurocopter is working on this issue for 2 years.
Thank you for your attention ...