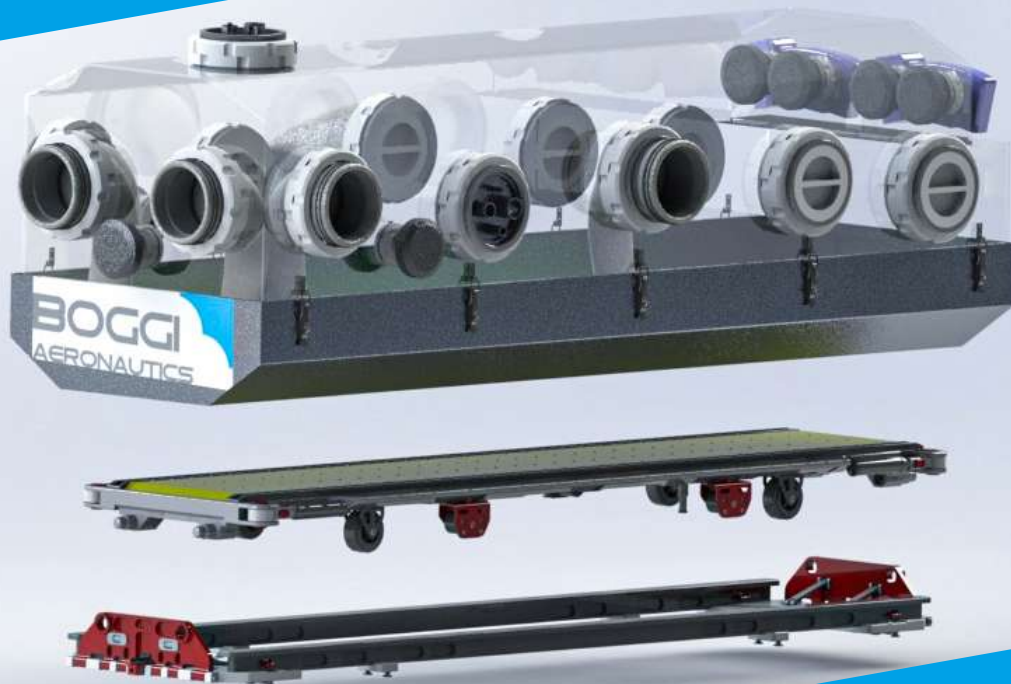


AvioCocoon

Aviation single-patient isolation system designed to be loaded on helicopters and airplanes for the transportation of infectious patients

Product Information



BOGGI
AERONAUTICS

AvioCocoon



BOGGI
AERONAUTICS

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Introduction

AvioCocoon: the first aviation single-patient isolation system designed to be loaded on helicopters and airplanes for the transportation of infectious patients

About Boggi Aeronautics

Boggi Aeronautics is an Italian aeronautical company established in 1999. Boggi Aeronautics is a certified EASA Part 21 DOA and POA (Design and Production Approvals) specialized in high end aeronautical equipment and solutions for different kind of operations.

The team employs experienced aerospace, mechanical, and electrical engineers and technicians that apply creative conceptual approaches to tackle complicated integration challenges.

Boggi Aeronautics is active as an equipment integration development center for special missions with STC approval capability. The company boasts many projects related to medical equipment development and installation that have been appreciated by air medical fleets all over the world.

Introduction: COVID-19 emergency

The recent COVID-19 emergency highlights the need for critical equipment to be managed in a safe way, from both patient and health operator perspectives, where persons are affected by COVID-19 or other infectious diseases.

To date, the transport of COVID-19 patients in helicopters and airplanes is extremely difficult because:

- 1** The cabin contamination risk is high; medical personnel must use bulky Personal Safety Equipment (PSE) which interfere with their ability to operate on the patient in an effective way; a separator in the cabin must be mounted to isolate the pilots from patient cabin, but even so the pilots must still wear uncomfortable SPD with an increase in load that could decrease their attention in critical situations.
- 2** Whilst transport containment systems for ground use already exist and some have been adapted to be carried on board helicopters or aircraft, nevertheless these systems aren't designed for aircraft and their adaptation to small cabins typical of helicopters is problematic.
- 3** Moreover, key issues are not well addressed, such as the aeronautical certification process that requires withstanding high impact loads, or possible detriments to device functionality and patient comfort due to high vibrations and other unique aspects of the helicopter and aircraft environment.

Assumptions / Why AvioCocoon?

The AvioCocoon bio-containment system is born from Boggi Aeronautics' feedbacks received during the COVID-19 epidemic from medical aeronautical worldwide operators.

The bio-containment systems currently available for helicopters or aircraft are devices designed for on-ground operations that are then adapted to aeronautics. This leads to several incompatibility issues and problems of installation on fixed and rotary wing vehicles, because a unique new certification process has to be carried out for each installation.

Moreover, some products already developed show problems of installation in helicopters. Filters installed in adapted products manage a quantity of air change adequate at low altitudes but not sufficient

for a patient in critical condition flying at 3000 m or in humid/hot weather. Other issues arise when only a single respirator is installed in bio-containment systems; in case of failure the patient could not continue to receive air.

The transportation of infectious diseases patients is critical on helicopters and aeroplanes because it imposes protective devices on the medical staff that make operations on the patient challenging.

It joins Boggi Aeronautics' medical COVID-19 solutions together with the partitioning devices to separate the cockpit area from the cabin (crew divider) and the medical isolation kit.

AvioCocoon General

AvioCocoon is the first single-patient isolation system specifically designed to be loaded on helicopters and aeroplanes for the transportation of infectious diseases patients.

The AvioCocoon system is designed thanks to the useful suggestions provided by helicopter operators taking into consideration aeronautical requirements and the necessities of the medical staff that is fighting the COVID-19 outbreak. The equipment is developed by clinical experts with first-

hand experience in intensive care, treatment and transportation of patients with infectious diseases.

Boggi Aeronautics' aim is to provide aviation equipment for patient transport that meets all requirements for full environmental protection from cross-contamination. The equipment is intended for the use in aviation high-risk scenarios and in everyday practice dealing with multi-resistant infections.

NOTE: Definitive AvioCocoon specifications and layout may slightly differ due to system development feedbacks and aircraft cabin needs and dimensions.

AvioCocoon

The isolation system designed especially for aero operations

System Description

AvioCocoon optimizes the containment, shifting the focus from protecting pilots and medical staff against infection spread throughout the cabin environment, to containing infection at the source and keeping the cabin clean. This advance should be considered not only as a response to the ongoing COVID-19 pandemic but also as preparation for equipping medical services for effective and safer interventions in the future.

AvioCocoon has been developed by aerospace engineers and air medical clinicians with many years of experience within the aviation and medical fields. The system is aligned to aviation and medical needs and meets the EASA requirement for aeronautical use.

AvioCocoon guarantee full environmental protection from cross-contamination and it is intended for the use in aviation high-risk scenarios and in every-day practice dealing with multi-resistant infections.

AvioCocoon is designed to be adopted (but not limited) in the fields that follow:



Transportation of infected COVID-19 patients



Transportation of highly burned patients



Transportation of infected diseases patients (such as Ebola)



Transportation of patients to less crowded hospitals



Oil and gas rigs emergency operations

AvioCocoon – Starter Pack

The AvioCocoon starter pack is the complete and ready to use system to be loaded on helicopters or aeroplanes.

AvioCocoon system starter pack includes:

- Boggi Aeronautics EASA Approved aviation interface that installs the system to aircraft seat tracks
- Two (2) CleanAIR® MedicaER® powered air purifying respirators (each respirator includes QuickLOCK® light flexi hose, exchangeable battery, charger (EURO - plug), comfort padded belt and flow indicator)
- Seven (7) P3 Filters
- Starter Pack Kit (includes 1 mattress with restraint straps, 3 gloves kits, 2 waste bags, 2 wireports, 1 sluice bag, 1 storage box, 13 hatches + 2 extra hatches)

Features



Designed for EMS

AvioCocoon has been developed by aerospace engineers and air medical clinicians to adapt to the aviation medical operations needs.



Fast installation

The isolation system attaches to the floor level through quick releases pins to be removable and switch configurations in a few minutes.



Approved for aeronautical operations

AvioCocoon is approved for aeronautical operations and directly adjustable to be installed on a wide range of aircraft thanks to the aeronautical kit that restrains the isolation platform from conducting complicated medical flights.



No need to integrate it for aeronautical use

AvioCocoon is ready to be installed in your helicopter or airplane; there is no need to apply for specific authorization from National and International Aviation Authorities.



Cost effective

With AvioCocoon, the operators buy a complete integrated aviation solution. This permits the system to have a competitive unit list price if compared to other market solutions.



Reusable

The isolation system platform is simple to clean and disinfect. The device can be easily disassembled and assembled.



Safety and intensive care

AvioCocoon is equipped with medical port for connecting IV lines, external lung ventilators and intravenous medication treatment cables. The intensive care system allows the medical staff to medicate and give treatment to the patient without direct exposure.



Patient comfort

Transparent structure and large internal volumes to reduce the sense of closure. The mattress is designed for maximum comfort. The 3 filters close to the patient head assure recirculation of oxygen.



Medical staff friendly

With AvioCocoon, medical staff can wear light personal protective equipment that makes complex maneuvers possible. AvioCocoon is fully isolated and guarantee full environmental protection from cross-contamination. The 13 hatches on the capsule allow to intervene easily at any patient area.



Failure safe

The use of two air blower does not lead to problems in case of one failure (as per other market solutions)

How AvioCocoon can improve the state-of-the-art situation?

State of the Art

The bio-containment systems currently available for helicopters or aircraft are devices **designed for on-ground operations** that are then **adapted to aeronautics**. This leads to several incompatibility issues and problems of installation on fixed and rotary wing vehicles, because a unique new certification process has to be carried out for each installation.

There are **high costs for installation adaptation** and for **aeronautical certification**.

Getting the NAA certification and authorization to install bio-containment systems in an aeronautical environment may **require time** and the needs to contact a **third-party Company**.

Many bio-containment systems have **few entry ports** allocated near the head of the patient. This affects the operations that can be performed by medical staff on the patient's airways.

Many bio-containment systems have attractive design that are **not functional** to accommodate overweight people. Early studies from the US, Italy and China also suggest that being overweight is an important risk factor to get COVID-19 disease.

The filtering unit of many products is located **outside the containment**, thus requiring attention during transportation in order to **avoid hazardous entanglement or damage** to the filtering units itself.

The sealing of some products is via zippers, which are difficult to manipulate and **do not guarantee a hermetic seal**.

In the event of a **ventilator failure** the patients could not continue to receive air.

The adaptation of containment systems to small cabins typical of helicopters / aircraft is problematic.

AvioCocoon improvements

AvioCocoon is **designed for** transporting infectious patients on **air vehicles such as helicopters and small jets** without exposing health personnel and pilots to the dangers of infection.

AvioCocoon features an **aviation medical isolation installation interface** designed and developed by Boggi Aeronautics that restrains the patients and the isolation platform from conducting complicated medical operation flights or during emergency landing conditions that the aircraft may encounter.

The aviation installation interface provides a **cost/effective solution** for the bio-containment system installation on aircraft used for medical services missions.

AvioCocoon is **designed for aeronautical operations** and directly adjustable to be installed on a wide range of aircraft such as: AW109, AW119, AW139, AW169, EC145, B/AB 412, Cessna Citation, Learjet 35A, Beechcraft King Air, Challenger 650.

AvioCocoon permits to perform sanitary maneuvers on the patient's airways by two resuscitators and/or medical staff simultaneously thanks to the **5 entry ports near the patient's head**.

AvioCocoon is designed to safely accommodate people up to 120 kg thanks to the **broad rigid capsule and to the aluminum base**. Integrated support handles permit to carry the AvioCocoon distributing the weights effectively.

AvioCocoon hosts two ventilators **inside a rigid case** and positioned close to the patient's feet, with a **separation shell** to avoid kicking the filtering units.

AvioCocoon is sealed thanks to **aeronautical latch locking system**.

AvioCocoon hosts **two ventilators**. The use of two air blower does not lead to problems in case of a failure of one unit.

AvioCocoon is designed for transporting infectious patients on a aviation environment taking into account air vehicles cabin dimensions.

System Composition

Aviation medical rack

When developing an air medical device, Boggi Aeronautics knows that the main focus is related to the safety of patients and aircrew.

The Boggi Aeronautics' designed Aviation medical rack kit safely restrains the patients and the isolation platform from con-

ducting complicated medical operation flights or during emergency landing conditions that the helicopter/airplane may encounter. The system attaches to the floor level through quick releases pins to be removable and switch configurations in a few minutes.

Main structure; Hardtop Capsule and Base

The structure is made of certified bio-compatible and non-toxic materials as per medical requirements.

The hardtop capsule permits to perform sanitary maneuvers on the patient's airways by two resuscitators and/or medical staff simultaneously thanks to the 5 entry ports near the patient's head. A total of 13 hatches on the capsule allow to intervene easily at any patient area.

The base is specifically designed with aviation standards to comply with aeronautical regulations and to provide a resistant structure to the system.

The base and the hardtop are both rigid so that they can resist to any impact.

The locking system features aeronautical lever hooks for quick release in case of emergency.

Hatches and Consumables

AvioCocoon has a total of 13 hatches that allow to intervene easily at any patient area.

The consumables include:

- Gloves: made from flame-resistant CSM/Hypalon.
- Sluice bag: used to transfer equipment or medicine to the patient during transport
- Waste bag: is used as a closed space for waste generated during patient transportation
- Wireport: permits a secure passage of IV lines, monitoring cables, or oxygen lines
- Storage box: practical storage box for tools, gauzes, medicines and consumables

The intensive care system allows the medical staff to medicate and give treatment to the patient without direct exposure.

Mattress and Patient Accommodation

AvioCocoon is designed to safely accommodate people up to 195 cm, and 120 Kg thanks to the broad structure.

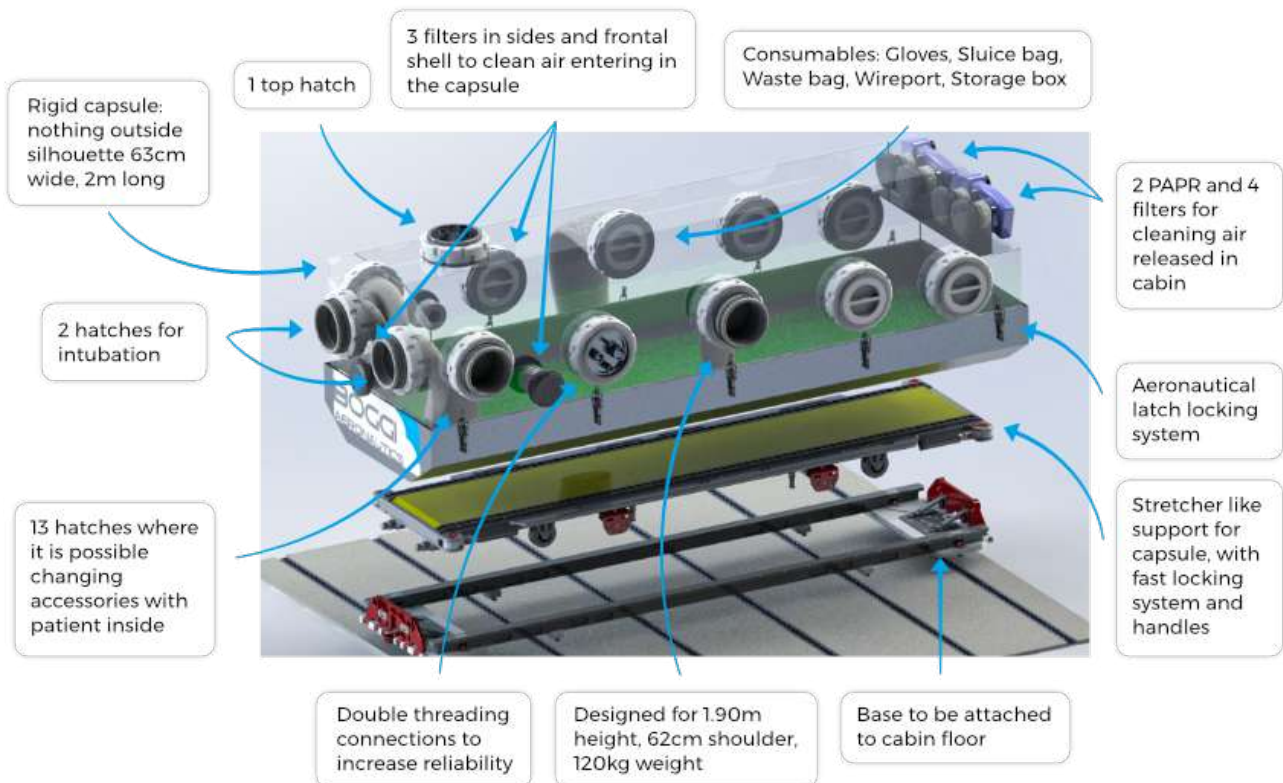
The integrated mattress assures an ideal comfort for the patient and better conditions for clinical procedures. It includes re-strait straps.

Air ventilation and filters

AvioCocoon installs two (2) CleanAIR® MedicAER® powered air purifying respirators and seven (7) P3 filters.

The air ventilation system filters the air from the isolation chamber and ensures optimal patient comfort with more than 35 complete internal air exchanges per hour.

AvioCocoon allows intensive operations at uninterrupted power for a minimum of 4 hours. The batteries can be replaced during transport, keeping the patient and environment safe from contamination.



Spare parts and decontamination

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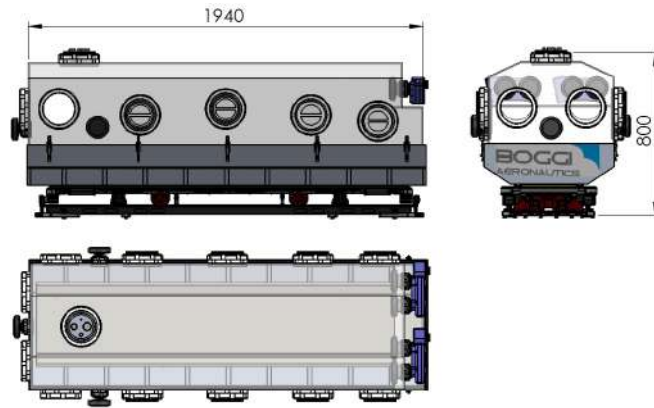
AvioCocoon allows intensive operations at uninterrupted power for a minimum of 4 hours. The batteries can be replaced during transport, keeping the patient and environment safe from contamination.

Specifications

Technical data

L = 2035 (max, filter included); 1940 biocontainment capsule
 W = 700 (between hatches); 640 biocontainment capsule
 H (capsule + stretcher for handling) = 730
 H (from cabin floor) = 800

Dimensions:



Patient weight (max):	120 kg
Patient length (laying):	190 cm
Internal volume:	0.55 m ³ , 550 litres
Hatches:	13 total, 2 near to the patient's head for intubation actions, 1 top hatch
Patient retention/safety belts:	Quick release torso restraint, chest strap, and legs strap

Air system and filters

Blower unit:	2 x CleanAIR® MedicAER®
Blower unit certifications:	EN 12941 (TH3 level) EN 12942 (TM3 / 2000 level)
Operating temperature between:	0°C to + 60°C, humidity 20 - 95 % Rh
Power source:	Rechargeable Li-ion battery 2,6 Ah @ 14,4V, CE1024
Battery charge time:	<3 hours
Battery autonomy	4 hours at maximum operational capability
Battery charger:	Input: 100 - 240 V (50/60 Hz) Output: 18 V (max. 1.500 mA)
Air exchange:	320 l/min max, 35 complete internal air changes per hour
Operating Negative pressure:	>20 Pa, depending on installation and altitude
Filters:	3 + 4 P3 Filters
Filters certifications:	EN 14387 ; EN 143 ; EN 12941 ; EN 12942 ; EN 148-1

AvioCocoon test specification EN 60601-1 ; EN 60601-1-2 ; EN 60601-1-8 ; EN 60601-1-6 ; EN 62304

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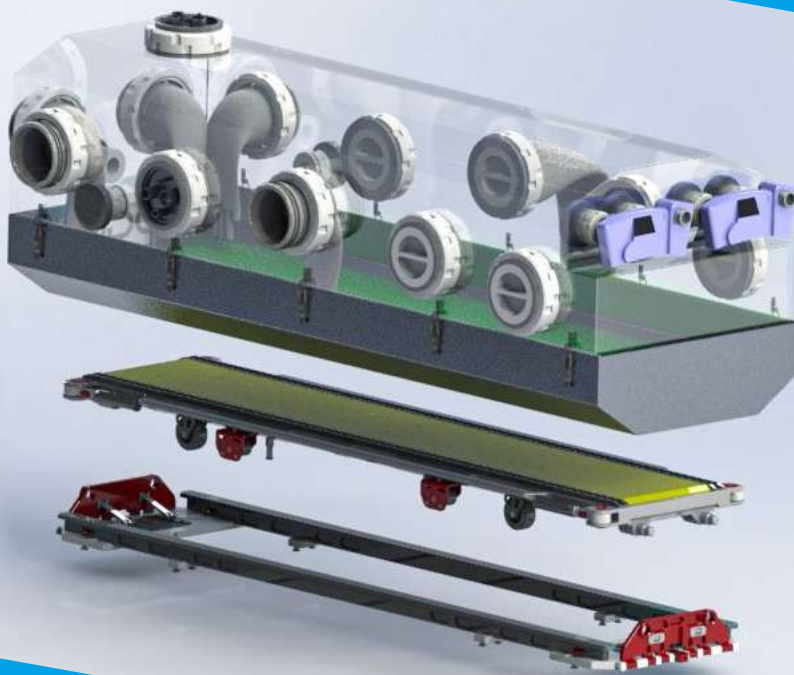
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