Health is in the air

SANITIZING TECHNOLOGIES AND EQUIPMENTS

CSA SYSTEM S-TRAIN

JUST BECAUSE YOU DON'T SEE THE PROBLEM, DOESN'T MEAN IT ISN'T THERE.

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We are an innovative start-up and **spin-off** of the **University of Urbino Carlo Bo**. We arose from the merging between university researchers and experts in the aeraulic systems and aerobiology fields. We design, produce and sell the latest generation air sanitizers suitable for indoor environments.

PRODUCTION PROCESS

Research → **Planning** → **Production** → **Validation and certification**

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OUR MISSION

The aim of STE is offering eco-friendly technological solutions able to reduce the spread of airborne diseases. To achieve this goal, we have patented an innovative technology called **CSA SYSTEM**, thanks to which it is possible to sanitize and purify the air, inactivating microorganisms with high efficiency, as well as reducing atmospheric particulate matter.

OUR PRODUCTS

Based on scientific research, we developed several devices that combine continuous air sanitization and purification.
A great example is the **CSA SYSTEM S-TRAIN**, a device designed as a solution to be integrated into trains' air conditioning system, to make the indoor air safe and healthy for the occupants.

CSA System Technology

Our patented technology combines continuous air sanitization and purification in presence of people, to achieve maximum health benefits. Moreover, the **CSA SYSTEM** technology is **chemical-free** and **safe** for people.

The **CSA SYSTEM** technology has a **low environmental impact**, being perfectly in line with the ecological transition.
In fact, thanks to the use of the latest generation components, our technology is able to achieve high levels of microbiological inactivation and abatement of the airborne particulate matter, with **minimal energy consumption**.

Our patent is valid in more than 10 Countries on 3 Continents

CSA SYSTEM S-TRAIN

The **CSA SYSTEM S-TRAIN** is a continuous air sanitizer to be integrated into the Heating, Ventilation and Air Conditioning (HVAC) systems of trains, to ensure protection against airborne pathogens for passengers and staff; our device inactivates viruses, bacteria and moulds, most commonly found in public transports.

Our patented technology reduces the presence of airborne microorganisms, achieving inactivation rates higher than 93%*. In addition, to ensure indoor sanitization, the **CSA SYSTEM S-TRAIN** **purifies the air with percentages exceeding 92%**. It removes air pollutants such as particulate matter, dust, allergens and volatile organic compounds (e.g. formaldehyde). As result, the air is sanitized, purified and **odor-free**. The **CSA SYSTEM S-TRAIN** is environmentally friendly: the eco-friendly components can be disposed of in a sustainable way and the use of UV-C LED technology allows significant **energy savings**.

Moreover, the continuous control and regulation provided by an **Artificial Intelligence** (AI) guarantee performance optimization.

*tests performed by the University of Urbino Carlo Bo

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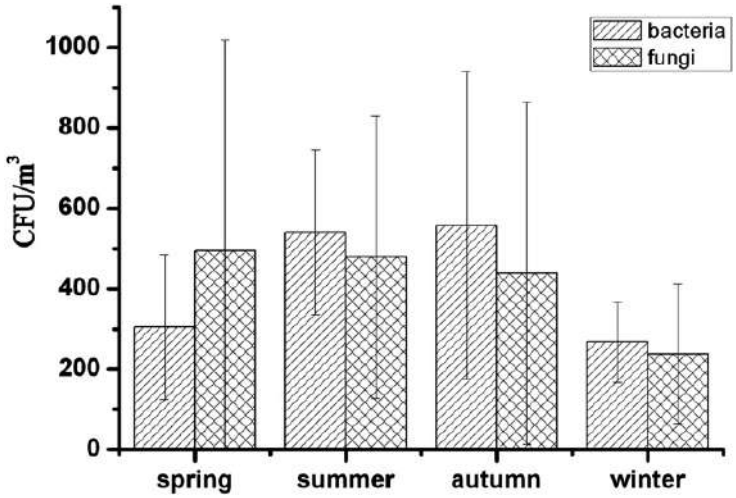
- SANITIZES AND PURIFIES THE AIR
- INACTIVATES AIRBORNE PATHOGENS >93%.
- REDUCES PARTICULATE MATTER (PM 2.5 and PM 10), VOCs AND ALLERGENS
- ECO - FRIENDLY
- SAFE IN PRESENCE OF PEOPLE
- LOW ENERGY CONSUMPTION
- INTEGRATED ARTIFICIAL INTELLIGENCE
- MONITORS INDOOR AIR PARAMETERS IN TRAINS IN REAL TIME
- PROVIDES HEALTHY, PURIFIED AIR TO PASSENGERS AND ON-BOARD STAFF DURING THE TRIP

Why is it important to sanitise and purify the air inside a train coach?

In this kind of public transport, the **air is mainly recycled**, with a low percentage of renewal with outside air, thus favouring an **pollutants accumulation** inside the train coach, in its HVAC or in its ducts.



* Ya-Fen Wang *et al*, 2010.

The average respirable fractions for **bacteria and fungi detected in train wagons are much higher than in other indoor environments**, averaging **62.8%** and **81.4%*** higher. In the same study it was also pointed out that outdoor temperatures can affect the airborne microorganisms load in the indoor air of a train coach, reaching high peaks especially in the summer/autumn season.

* Ya-Fen Wang *et al*, Size and seasonal distributions of airborne bioaerosols in commuting trains, 2010.

The airborne **particulate matter (PM) concentrations are also very high in this kind of evironments**. Besides contributing to environmental pollution, an increase in PM concentrations can, when they are inhaled, favor the onset of respiratory tract infections. Moreover, it can cause allergic reactions in predisposed subjects, as well as increase the risk of respiratory diseases. It is estimated that for each 5 microgram (µg)/m³ increase in PM 2.5, the relative risk of contracting lung cancer increases by 18%, while it increases by 22% for each 10 µg/m³ increase in PM 10*.

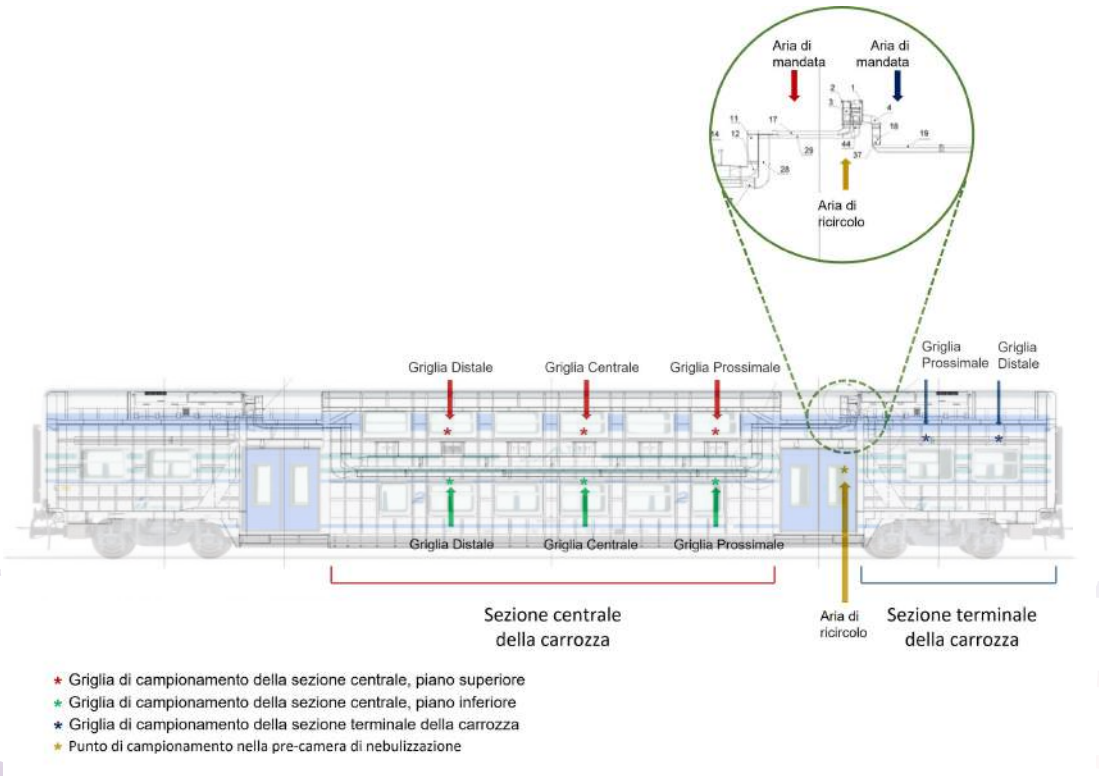
- ACCUMULATION OF POLLUTANTS IN CARRIAGES, HVACS AND PIPELINES
- HIGHER AVERAGE OF 62.8% AND 81.4% FOR RESPIRABLE BACTERIA AND FUNGI IN CARRIAGES
- HIGH CONCENTRATIONS OF AIRBORNE FINE DUST IN RAILWAY CARRIAGES
- INCREASED RISK OF RESPIRATORY DISEASES

*AIRC, *L'inquinamento atmosferico può aumentare il rischio di ammalarsi di cancro al polmone e di altri tipi di tumore?*, 2018

TRAIN SETTING TEST

STE and the **University of Urbino Carlo Bo** were the first to perform this kind of tests in a train environment. In fact, no scientific data were reported on air sanitation systems applied to the railway and tram sector, before.

We tested our **CSA SYSTEM S-TRAIN** on the medium-distance train (Vivalto). Through these tests, results confirmed that the installation of **air sanitization and purification systems is required on these transports** to guarantee healthy air for passengers and train staff on board.



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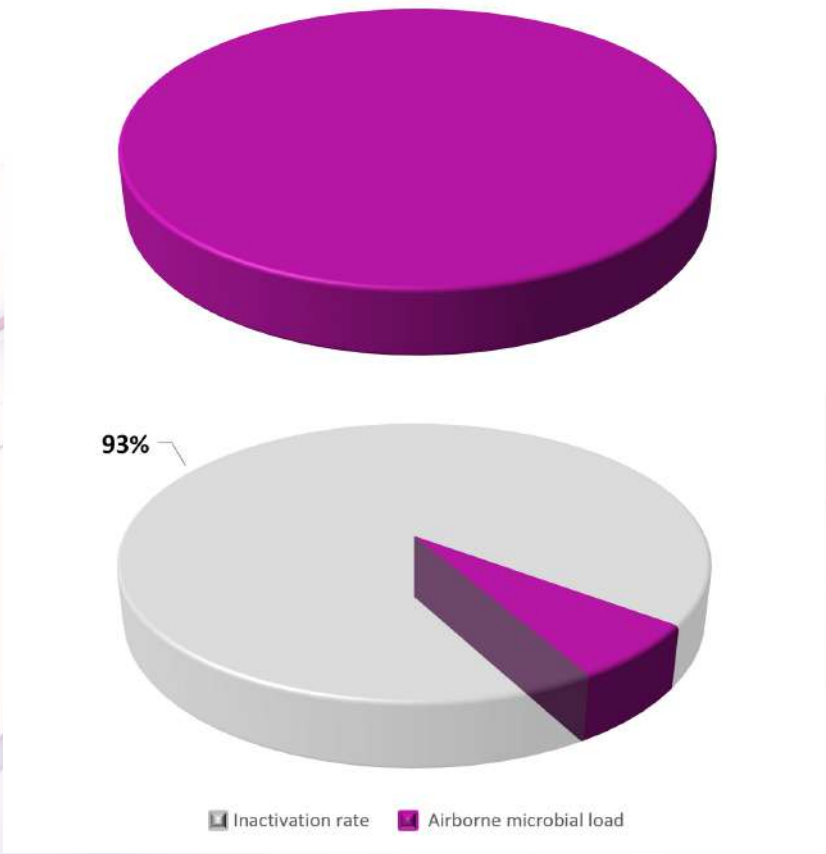
EFFICACY TEST



Despite that the microbial concentration used during the efficacy trials performed on the **CSA SYSTEM S-TRAIN** was significantly higher than that typically microbial load inside a train coach, the device was able to **achieve average microbial inactivation rates of over 93%**.

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POTENTIAL APPLICATIONS IN THE RAILWAY SECTOR

The **CSA SYSTEM S-TRAIN** can be applied for other applications in the railway sector, such as inside an underground train or inside a tram.

HIGH-SPEED TRAINS

LOCAL TRAINS

UNDERGROUND

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SCIENTIFIC PUBLICATIONS

As a university spin-off, STE develops products and offers services with scientifically validated solutions. In addition, **our products are the subject of many scientific publications** in international journals, available on our website.

Read our scientific publications:

- Baldelli, G., Aliano, M.P., Amagliani, G., Torresan, G., Magnani, M., Brandi, G., Schiavano, G.F. Airborne microorganisms inactivation with a UV-C led and ionizer-based Continuous Sanitation Air (CSA) system in trains environment. Journal of preventive medicine and hygiene. 2021; Vol.62 N.1.

- Baldelli, G., Aliano, M.P., Amagliani, G., Magnani, M., Brandi, G., Pennino, C., Schiavano, G.F. Airborne Microorganism Inactivation by a UV-C LED and Ionizer-Based Continuous Sanitation Air (CSA) System in Train Environments. Int J Environ Res Public Health. 2022;19(3):1559.

- Palma, F., Baldelli, G., Amagliani, G., Aliano, M.P., Brandi, G., Schiavano, G.F. Use of an eco-sustainable UV-C LED continuous sanitation air (CSA) system in indoor sport environments. Journal of preventive medicine and hygiene. 2022; Vol.63 N.2S1.

- Palma, F., Baldelli, G., Schiavano, G. F., Amagliani, G., Aliano, M. P., & Brandi, G. Use of Eco-Friendly UV-C LEDs for Indoor Environment Sanitization: A Narrative Review. Atmosphere. 2022; 13(9), 1411.

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