



ADAPTING THE NEW NORMAL

CERBERUS™ BIO-DEFENCE SOLUTION

OFFICE SPACES

Pure Light Led Products is a South African manufacturing company. Over lock-down period new range of Ultraviolet Germicidal Disinfecting products was developed and certified, specifically designed to combat air-borne diseases such as Covid19, TB, Flu, Measles, etc. UV-C radiation is a known disinfectant for air, water and surfaces that can help mitigate the risk of acquiring infection

Offices are the places where employees confined in an enclosed space for a long period of time, sufficient enough for virus to infiltrate into human body. Thus such places require an improved protection from highly infectious viruses and bacteria. Prevention plays a vital role in keeping staff healthy, as it will reduce or stop infection transfer

Devices specifically designed to keep air consistently clean and surfaces disinfected, serving as proactive and preventative solution to minimise air-borne and surface virus transfer



PROBLEM

Research conducted by various scientific institutions (among others TOHO University* in Japan and AALTO University* in Finland), shows that when person continuously breathing, speaking, sneezing or coughing, an aerosol cloud is emitted. Hundreds of thousands of contagious aerosols can be generated within a few minutes. Most of the heavier droplets falls on the ground within one minute, contaminating surfaces. Micro-droplets (1/10 000 of 1 millimeter) can drift in the air for a long time, if no air movement is present. If aerosols contains high concentration of viruses or bacteria and if they are inhaled for long enough, the chance of infection will increase

Air conditioning will worsen situation, as enforced air flow will spread contaminated aerosols evenly

Centralised air conditioning systems may not be efficient, as inlets and outlets may not be positioned close enough to infected person to catch infected aerosol

Keeping windows open helps to clean air, but its not always possible due to office building architectural design, as well as due to adverse weather conditions (during rains, cold or hot weather)

References:

* AALTO University Research
<https://www.youtube.com/watch?v=ajHKONt-GrM>

* TOHO University Research
<https://www.youtube.com/watch?v=H2azcn7MqOU>

SOLUTION

UV-C rays are lethal to viruses and bacteria, as it destroys links in their DNA

Coronavirus is an air-borne disease and thus virus should be intercepted and neutralised while it in the air, before it reach and contaminate surfaces or get inside of a human organism.

Rate of air circulation & disinfection plays crucial role in reduction of possible disease transfer. Despite pandemic commercial aircrafts flying at full capacity, with every seat and row occupied by passengers. How is that authorities worldwide permitted 100% occupation during flights? Answer is that air being constantly filtered and disinfected during flights, reducing risk of air-borne particles flying around*

In the same way as GP prescribes to patient multiple drugs to treat illnesses, multiple devices creating multiple lines of defence can stop virus and prevent it from spreading

Devices to be placed/installed in “hot spots” areas, e.g. places with high chances for disease transfer - reception, office desks, meeting rooms, canteen, other office areas with high concentration of people

Every device designed to be energy efficient and will not have a significant impact on the electricity bill



HOW SAFE IS AIR TRAVEL?*

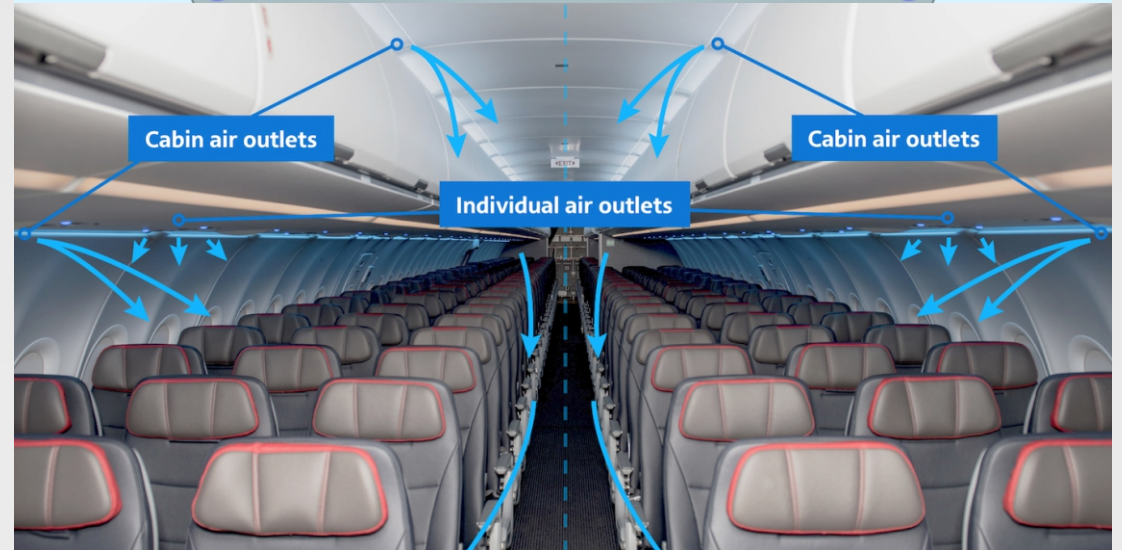
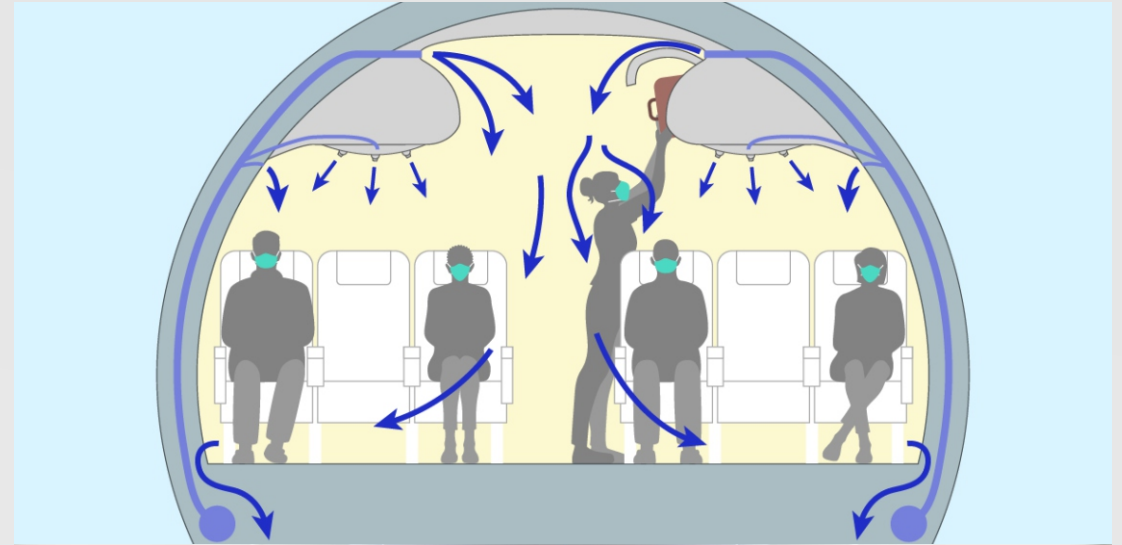
At first thought, a narrow metal tube in which strangers are crammed together for hours might seem like a flying petri dish, especially during a pandemic. The reality is a bit more nuanced. While there are risks associated with flying, it may be safer than you think. For starters, the air quality on a commercial airliner is actually quite high, with the air volume in the cabin being completely refreshed every two to four minutes.

Once air leaves the cabin, about half is dumped outside, and the rest is sent through HEPA (high-efficiency particulate air) filters, similar to those used in hospitals, before being mixed with fresh outside air and entering the cabin again. Of course, passengers and crewmembers moving up and down the aisles can disrupt this airflow, altering the path of any airborne particles. And while the HEPA filters used in commercial aviation can filter out 99.97% of virus-sized particles, they can't capture every respiratory droplet or viral aerosol before someone else inhales it.

Still, the design of air-handling systems on commercial aircraft makes it unlikely that you'll be breathing in air from anyone more than a few rows away. In fact, a 2018 study that examined the transmission of droplet-mediated respiratory illnesses during transcontinental flights found that an infectious passenger with influenza or another droplet-transmitted respiratory infection was highly unlikely to infect passengers seated farther away than two seats on either side or one row in front or in back.

And that was without masks.

* <https://medical.mit.edu/covid-19-updates/2020/09/how-safe-air-travel>



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IN SOUTH AFRICA



PURE LIGHT LED PRODUCTS
PURE LIGHT GROUP COMPANY

INVISIBLE WALL

Cerberus® Invisible Wall UV-C lamp (patent pending) is a desk based device designed to separate parties with an “invisible wall” of disinfecting UV-C light, as well as with vertical curtain of air flow. Any contagious particles (bacteria, viruses) expelled by potentially infected person on the other side of the table and floating in the air, will be destroyed or severely weakened at the moment of UV-C light crossing. Particles will also be pushed upwards with the flow of air. Device creates narrow vertical curtain in vertical projection, with about 170 degree coverage sideways, with the maximum efficiency at radius of about 30cm. Built-in fan constantly circulate and disinfect air from both sides (suck from the sides and push cleaned air upwards)

Safety measures to be taken when using this lamp, to avoid accidental direct exposure to skin and eyes (don't look inside). Recommended distance of 30cm from the device is advisable

To be positioned in the middle of the meeting desk during office meetings in-between parties, or at Receptionist desk to protect staff from potentially infected visitors

Level of air circulation is 68 m³ an hour, so in the room size 3m x 3m with ceiling height of 2.7m air will be circulated and disinfected about 2.8 times per hour, or every 21 minutes



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UV-C CEILING LAMP

Cerberus® Ceiling UV-C Lamp is an open type device for ceiling installations, designed for air re-circulation and upper room free-flowing air disinfection. Dual function of sideways irradiation via open louvers for the upper room disinfection and active inflow of air from below area with an immediate disinfection of passing air

Installed at minimum height of 2.7m (average ceiling height in every building) it completely safe for people below. Device designed to be used during a day with people present, constantly circulating and disinfecting air in premises. Ideal for installation in offices above staff desks, complimenting of functionality of the Invisible Wall device (catching pushed upwards air)

Smallest device on just 7,2W of power consumption (stronger units available for bigger and higher ceilings premises) has level of air circulation of 68 m³ an hour, so in room size 3m x 3m with ceiling height of 2.7m air will be circulated and disinfected about 2.8 times per hour. Working together with an Invisible Wall device air will be circulated and disinfected in such a room approx. every 11 minutes



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UV-C HANDHELD LAMP

Cerberus® Handheld UVC lamp for manual disinfection of surfaces in close proximity. Level of UV-C irradiation at 5cm - 10cm is sufficient for fast disinfection of surfaces on which ultraviolet light is exposed

Ideal for replacement of chemical based disinfectants, as it can be used on appliances, furniture, keyboards, computers, phones, papers, etc., e.g. where wet liquid solution can cause damage

Safety measures to be taken when using this lamp - do not point to people or animals, avoid contact with exposed skin or eyes



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UV-C SURFACE LAMP

Cerberus® UV-C Surface is open type lamp for surface installation (wall, ceiling), designed for open space free-flowing air and surface disinfection. UV-C irradiation is emitted above the horizontal plane or directed by the reflector

Installed on the wall or ceiling, exposing UV-C light to objects below. Ideal for overnight office's surfaces disinfection (floor, furniture, walls and any other objects exposed to the light) , replacing Fumigation process

Safety measures to be taken when using this lamp to avoid exposure to staff and patients (movement sensors and/or timers switching ON/OFF lamp)



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RECEPTION

Example of Reception Room size 6m x 3m:

2 x UV-C Ceiling Air Recirculating Devices. One positioned above visitor's seating area and another above receptionist desk. Size/strength of devices determined by the room volume and desired circulation rate.

For example 2 x 7,2W devices will circulate air in the room approx. every 21 minutes

2 x UV-C 9W Surface devices to disinfect unoccupied Reception area overnight. It would take approx. 3.5 hours to disinfect exposed room's surfaces

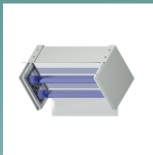
2 x Invisible Wall devices positioned 1m apart will provide protection for staff working at Reception desk

1 x UV-C Handheld device will provide on-site immediate disinfection for paperwork, computers, printers etc.



UV-C CEILING

Mounted on ceiling to actively circulate air, as well as irradiate upper room area. Number and strength of devices determined by room volume



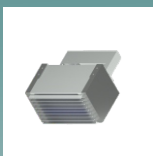
UV-C SURFACE

Mounted on ceiling with UV-C tube exposed to objects below. Switched ON during night time only to disinfect floor, walls, furniture etc.



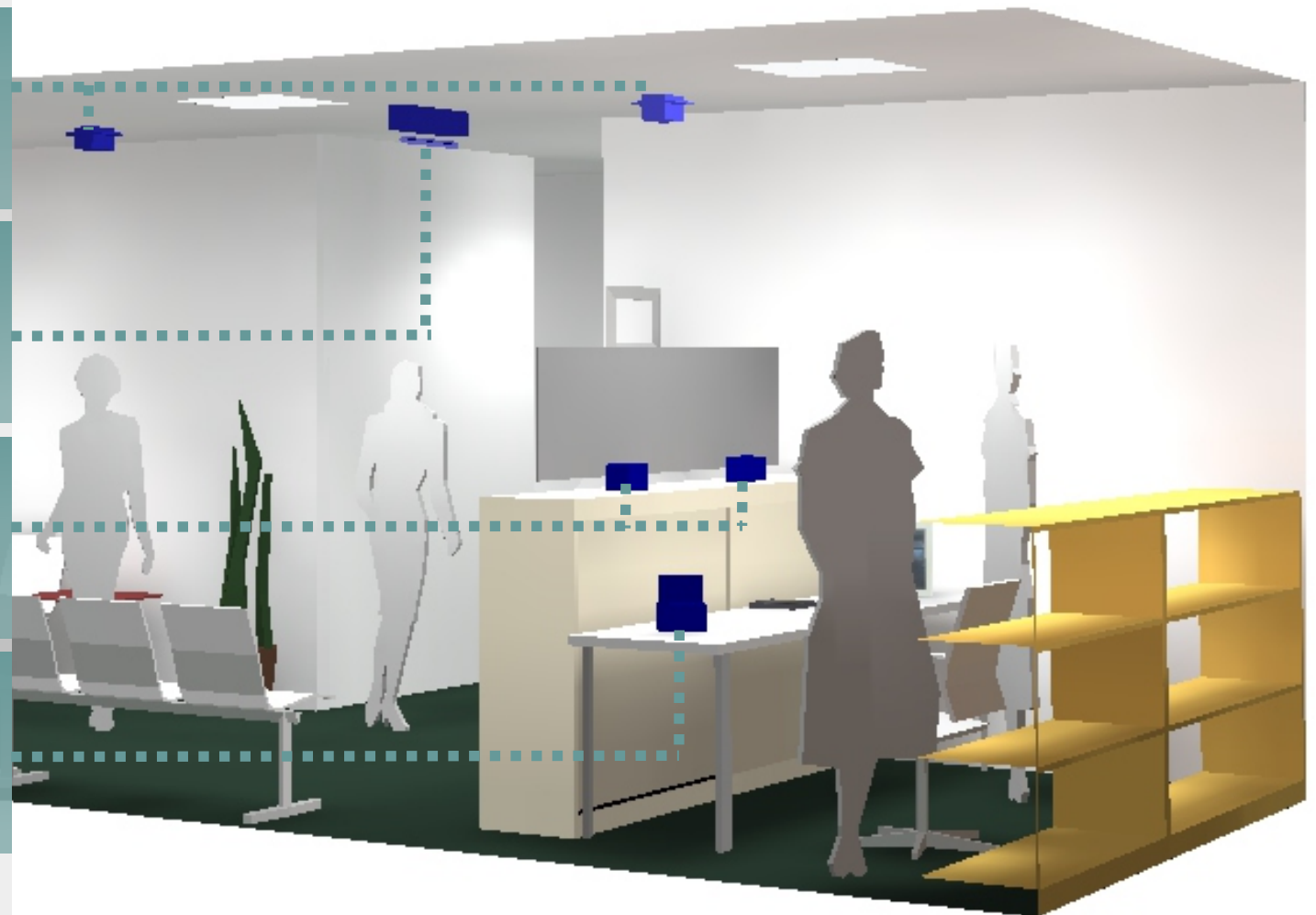
UV-C INVISIBLE WALL

Placed on receptionist desk to separate staff and visitors. To be installed with an additional front clear plexiglass screen



UV-C HAND HELD

Used to disinfect desk surface, paperwork, keyboards, printers, etc.



OFFICE

Example of Office Room size 6m x 12m:

3 x UV-C Ceiling Air Recirculating Devices. Mounted on the ceiling above “hot-spot” areas, such as visitor’s seating area, meeting table and worker’s desks. Size/strength of devices determined by the room volume and desired circulation rate. For example 3 x 25W/136m³/h devices will circulate air in the room approx. every 28 minutes

2 x UV-C 25W Surface devices to disinfect unoccupied office area overnight. Mounted on the ceiling in positions where they can evenly cover premises and using timer switch, they will switch ON/OFF during night hours. It would take approx. 4 hours to disinfect exposed room’s surfaces

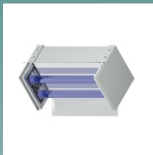
1 or 2 Invisible Wall devices positioned in the middle of the meeting desk will provide protection for meeting participants

1 x UV-C Handheld device will provide on-site immediate disinfection for paperwork files, furniture, computers etc. surfaces



UV-C CEILING

Mounted on ceiling to actively circulate air, as well as irradiate upper room area. Number and strength of devices determined by room volume



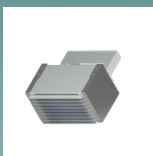
UV-C SURFACE

Mounted on ceiling with UV-C tube exposed to objects below. Switched ON during night time only to disinfect floor, walls, furniture etc.



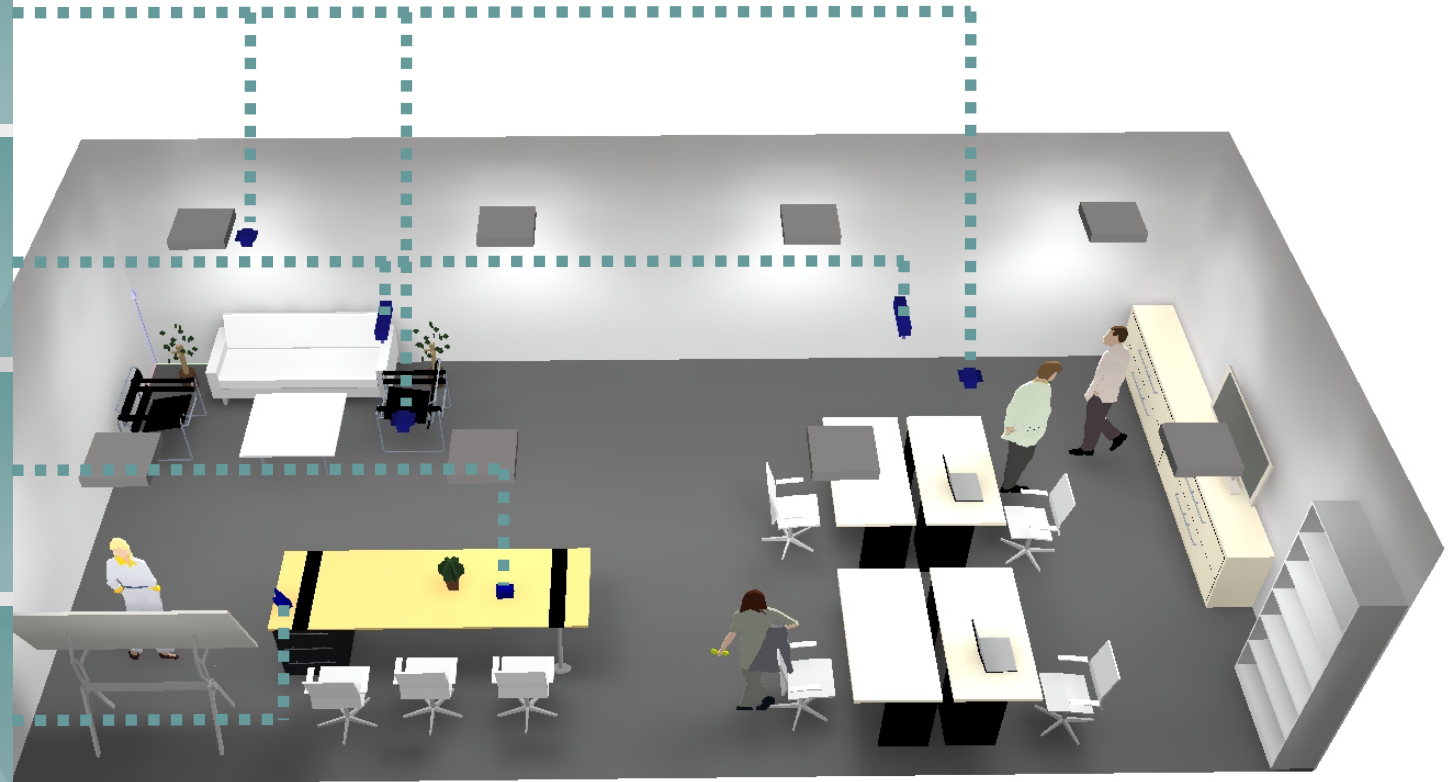
UV-C INVISIBLE WALL

Placed on meeting table to separate meeting participants



UV-C HAND HELD

Used to disinfect desk surface, paperwork, keyboards, printers, etc.



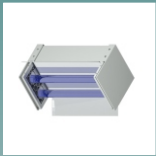
MEETING ROOM

Example of Meeting Room size 5m x 3m:

1 x UV-C Ceiling Air Recirculating Devices. Mounted on the ceiling above meeting table. For example one device power consumption of 25W will circulate air in the room approx. every 18 minutes

1 x UV-C 9W Surface device to disinfect unoccupied rooms overnight. It would take less than 3 hours to disinfect room exposed surfaces

2 x Invisible Wall devices positioned in the middle of the desk to separate meeting participants. With both devices running, air will circulate in the room every 8 minutes



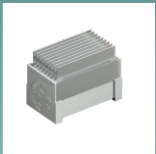
UV-C SURFACE

Mounted on ceiling with UV-C tube exposed to objects below. Switched ON during night time only to disinfect floor, walls, furniture etc.



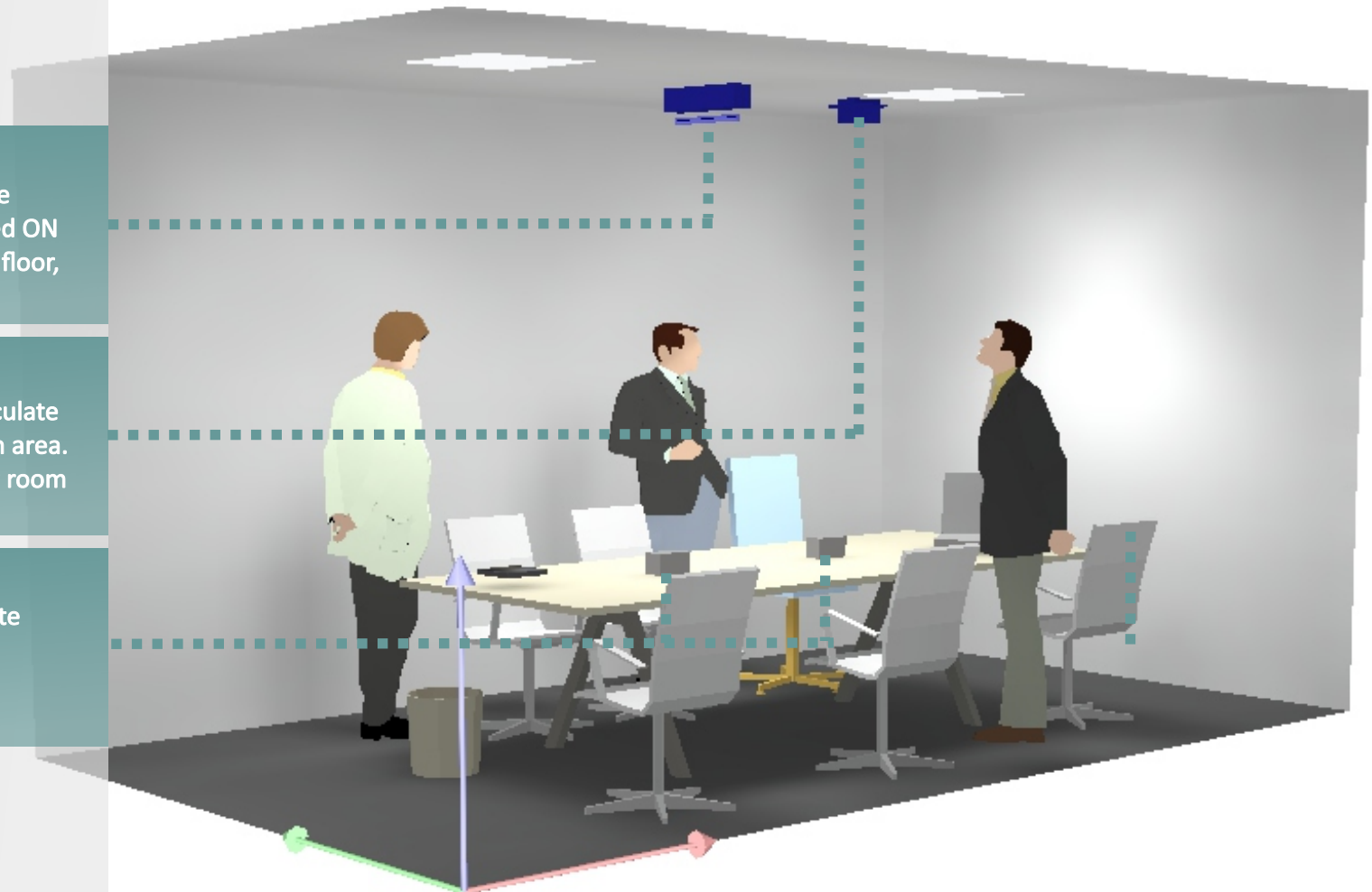
UV-C CEILING

Mounted on ceiling to actively circulate air, as well as irradiate upper room area. Number of devices determined by room volume



UV-C INVISIBLE WALL

Placed on meeting table to separate meeting participants



CASE STUDIES AROUND THE WORLD



New findings warn of higher risk in airborne coronavirus transmissions | COVID-19 Special

What does the latest research tell us about the spread of coronavirus? Do masks help prevent new infections? A study by Berlin's Charite Hospital has found the risk of catching the coronavirus from contaminated surfaces is lower than thought. The bad news is the risk from droplets and aerosols is greater than previously thought. Aerosols are tiny particles, like fine dust. Virus particles can attach themselves to the aerosols and spread infection. <https://www.youtube.com/watch?v=-PmD7ajep54&feature=youtu.be>

THE CONVERSATION

Academic rigour, journalistic flair

Ultraviolet light can make indoor spaces safer during the pandemic – if it's used the right way

Ultraviolet light has a long history as a disinfectant and the SARS-CoV-2 virus, which causes COVID-19, is readily rendered harmless by UV light. The question is how best to harness UV light to fight the spread of the virus and protect human health as people work, study, and shop indoors. The virus spreads in several ways. The main route of transmission is through person-to-person contact via aerosols and droplets emitted when an infected person breathes, talks, sings or coughs. The virus can also be transmitted when people touch their faces shortly after touching surfaces that have been contaminated by infected individuals. This is of particular concern in health-care settings, retail spaces where people frequently touch counters and merchandise, and in buses, trains and planes.

<https://theconversation.com/ultraviolet-light-can-make-indoor-spaces-safer-during-the-pandemic-if-its-used-the-right-way-141512>

spaces4learning

Impacting K-12 & Higher-Education Environments

Ceiling Unit Uses UVC Light to Clean Classroom Air

A Florida company with an office in Purdue Research Park has introduced a technology it said would help schools reduce the risk of COVID-19 transmission. Energy Harness has released a device that attaches to ceiling grids and uses UVC light to clean and circulate air. The Active Airflow UV-C Fixture unit has a fan system to draw in the air, where it is cleaned and then cycled back into the classroom.

<https://spaces4learning.com/articles/2020/08/12/ceiling-unit-uses-uv-c-light-to-clean-classroom-air.aspx>



US National Library of Medicine
National Institutes of Health

The History of Ultraviolet Germicidal Irradiation for Air Disinfection

Public health concerns such as multi- and extensive drug-resistant tuberculosis, bioterrorism, pandemic influenza, and severe acute respiratory syndrome have intensified efforts to prevent transmission of infections that are completely or partially airborne using environmental controls. One such control, ultraviolet germicidal irradiation (UVGI), has received renewed interest after decades of underutilization and neglect.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2789813/>



FAQ

Can UV-C light prevent COVID19 transmission?

Ultraviolet radiation of C band (UV-C) is the most effective sterilizing remedy (in range between 200nm to 280nm), as organisms with damaged DNA can't replicate. During 2020 research conducted by many scientific organisations confirmed efficiency of UV-C against COVID19 virus. Research centers not limited to include: IUVA, the International Ultraviolet Association, a non-profit organization dedicated to the advancement of ultraviolet technologies; ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers; IES - established in 1906, the recognized technical and educational authority on illumination, and many others scientific and research centers, as well as test labs worldwide

Design Standards

In medical area UV-C is a familiar technology (invented back to 1877), as it used for decades for disinfection in ICU, surgeries, other medical facilities. Devices designed according to SABS and European CE standards. Measurements verified and confirmed by testing conducted at NMISA (National Metrology Institute of South Africa). Devices obtained CE certification (equal to South African SABS standards and acceptable in South Africa)

Full Installation and Support

Support to be provided at planning stage to determine correct type, strength, quantity and installation location for every device. Team of qualified installers will conduct installation (or consult if done by other installers) and provide necessary training. Support team will conduct inspection on regular basis, maintaining devices for problem-free experience, subject of SLA agreement

Benefits:

- Set of devices will protect staff and visitors from getting infected by sick persons. Besides saving lives (!), reduction in sick leave among staff will bring direct economical benefit
- Long term universal protection against currently known airborne diseases, not only COVID19, but TB, flu, measles etc.
- Better chances to face-off against any new future pandemic (Covid19 pandemic will not be the last: WHO chief)
- Hand held device for surface disinfection is easy plug&play device and can replace chemical spray based solutions. How does one disinfect desk with the paperwork laying around?
- Premises should be disinfected on daily basis and chemical based fumigation process can be quite costly, if done frequently. UV-C based disinfection can be done as often as necessary without incurring any additional costs



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