PURE LIGHT LED PRODUCTS

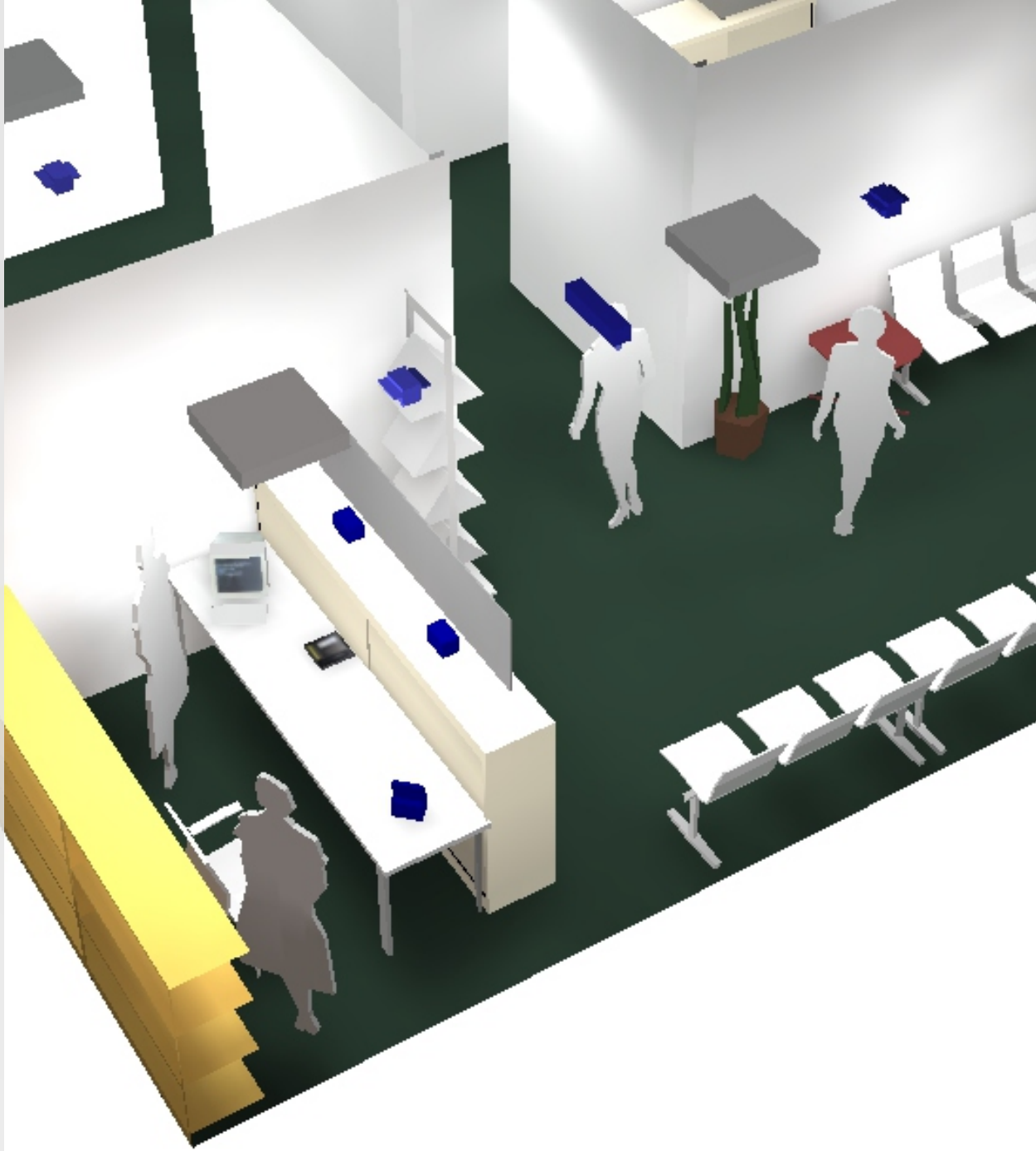
ADAPTING THE NEW NORMAL

CERBERUS™ BIO-DEFENCE SOLUTION FOR EDUCATIONAL FACILITIES

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, Measles, Flu etc. UV-C radiation is a known disinfectant for air, water and surfaces that can help mitigate the risk of acquiring infection

School classroom is the place of children high concentration, confined in 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 teachers, staff and children healthy, as it will reduce or stop infection transfer

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



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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=ajHK0Nt-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. Even during current 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, classrooms, toilets, other school areas with high concentration of people and low inflow of fresh air.

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

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

HOW SAFE IS AIR TRAVEL?*

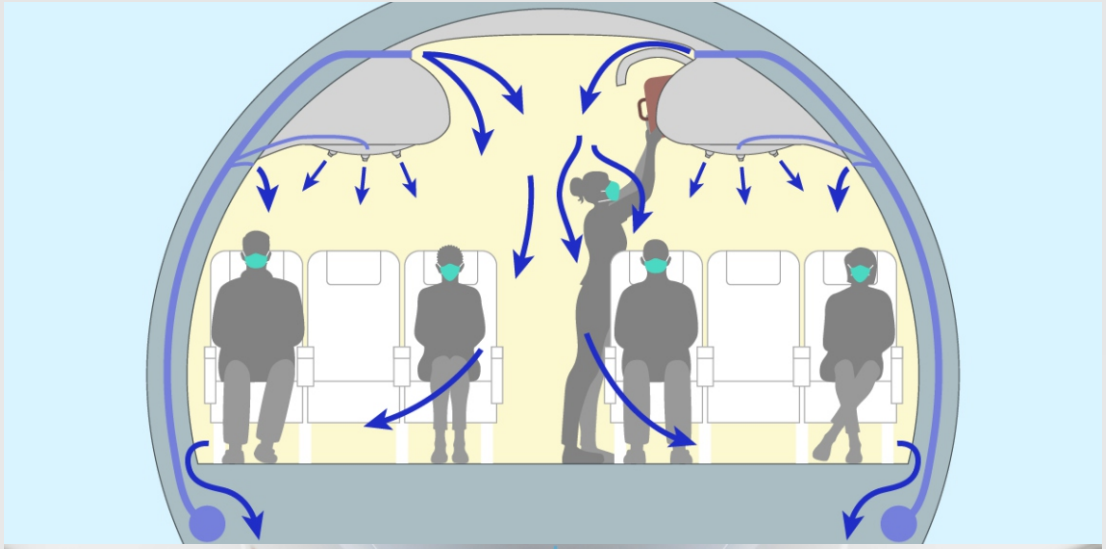
At first thought, a narrow metal tube in which strangers are crammed together for hours might seem like a flying petri dish, especially during a pandemic. The reality is a bit more nuanced. While there are risks associated with flying, it may be safer than you think. For starters, the air quality on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

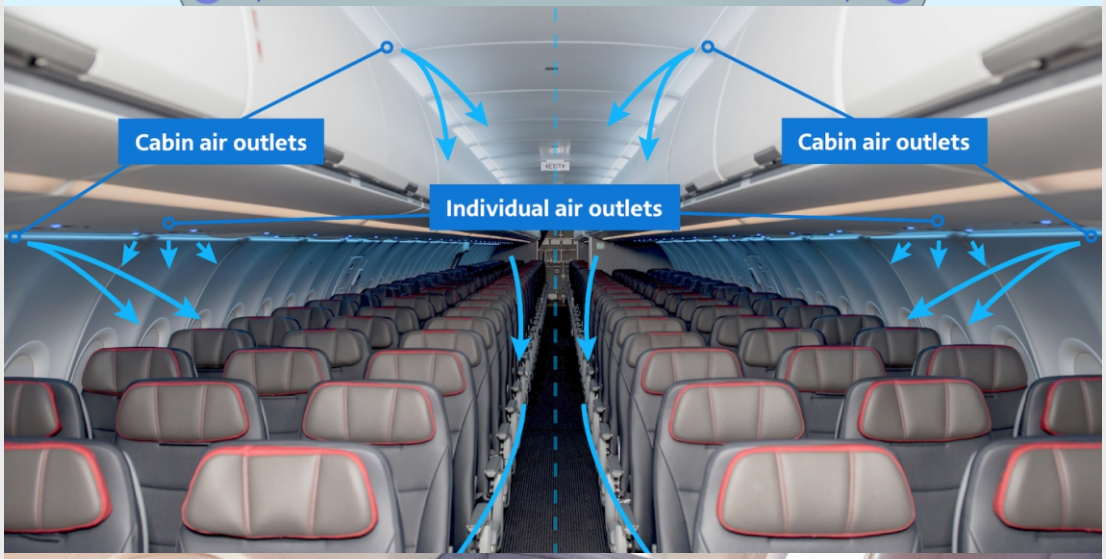
Once air leaves the cabin, about half is dumped outside, and the rest is sent through HEPA (high-efficiency particulate air) filters, similar to those used in hospitals, before being mixed with fresh outside air and entering the cabin again. Of course, passengers and crewmembers moving up and down the 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





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 desk during meeting in-between parties

Level of air circulation is 68 m^3 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 classrooms above study desks

Smallest device on just 7,2W of power consumption has level of air circulation of 68 m^3 an hour, so in room size 6m x 6m with ceiling height of 2.7m four devices will circulate and disinfect air about 2.8 times per hour. Installing stronger fittings with 136 m^3 an hour will increase air circulation to about 6 times ah hour.

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UV-C HANDHELD LAMP

Cerberus® Handheld UV-C lamp for manual disinfection of surfaces, groceries or any other objects 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, keyboards, computers, phones, books, papers (pupil's homework), 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 school surfaces (floor, walls, furniture and any other objects exposed to the light) disinfection, 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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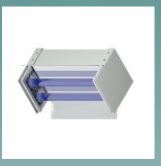
RECEPTION

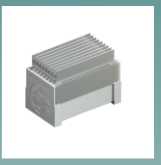
Example of Reception Room size 6m x 3m:

2 x UV-C Ceiling Air Recirculating Devices. One positioned above seating area and another above receptionist desk. Size/strenght 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 files, notes, credit cards etc.

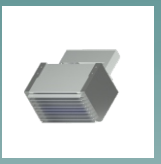
UV-C CEILING
Mounted on ceiling to actively circulate air, as well as irradiate upper room area. Number of devices determined by room volume



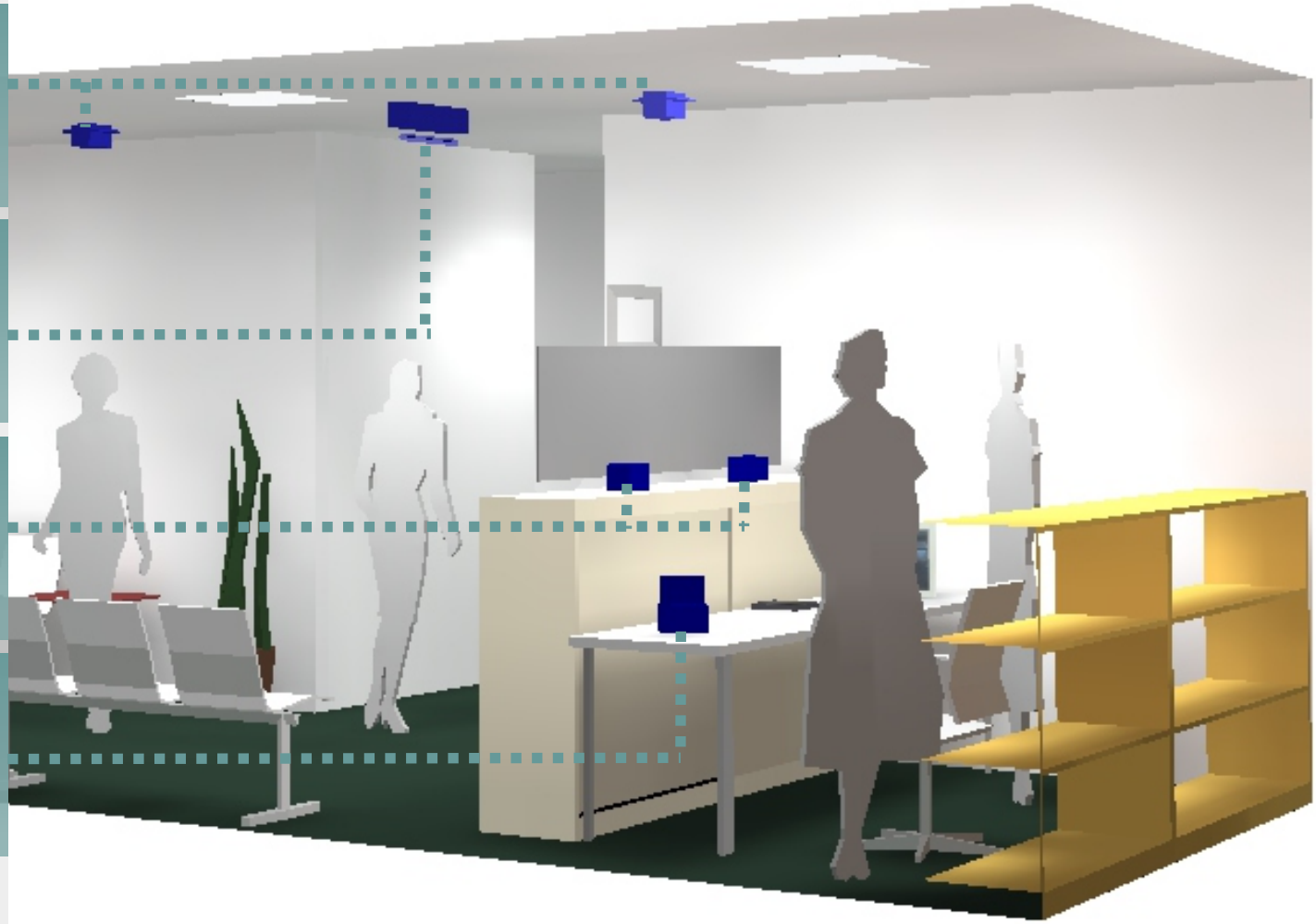
UV-C SURFACE
Mounted on ceiling with UV-C tube exposed to objects below. Switched ON during night time only to disinfect floor, walls, furniture etc.



UV-C INVISIBLE WALL
Placed on receptionist desk to separate staff and visitors



UV-C HAND HELD
Used to disinfect desk surface, paperwork, credit card machines & credit cards, cash, keyboards, etc.



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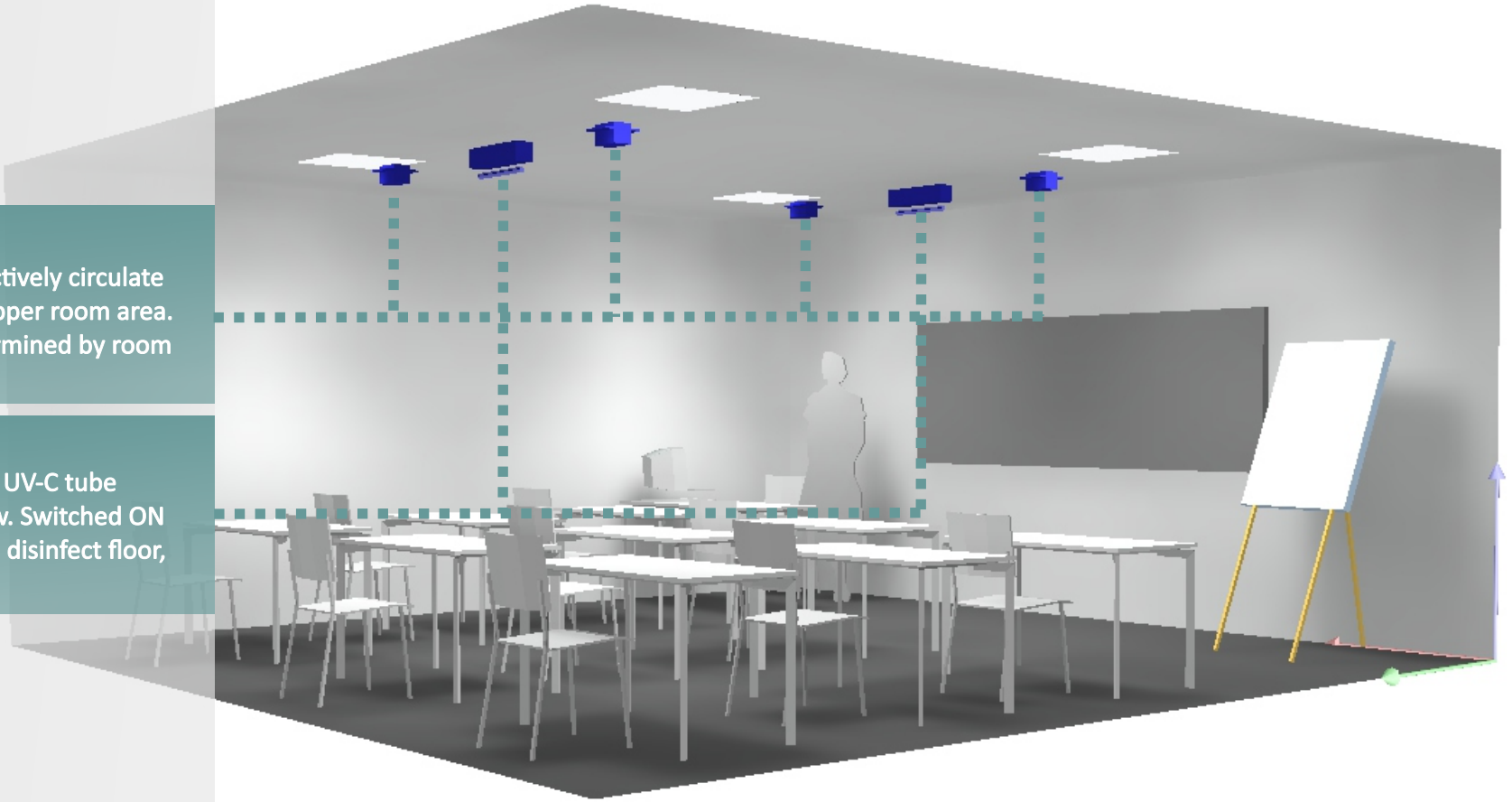
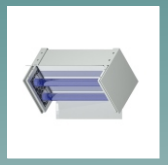
CLASSROOM

Example of Classroom size 6m x 6m:

4 x UV-C Ceiling Air Recirculating Devices. positioned in square formation to provide even coverage. Devices with power consumption 7W will circulate air in the room approx. every 21 minutes and 30W devices with 136m³ per hour air flow will circulate air every 10 minutes
2 x UV-C 25W Surfaces device to disinfect rooms overnight. It would take less than 2 hours to completely disinfect classroom



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

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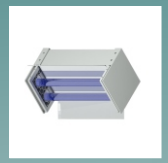
OFFICE

Example of Office size 3m x 3m:

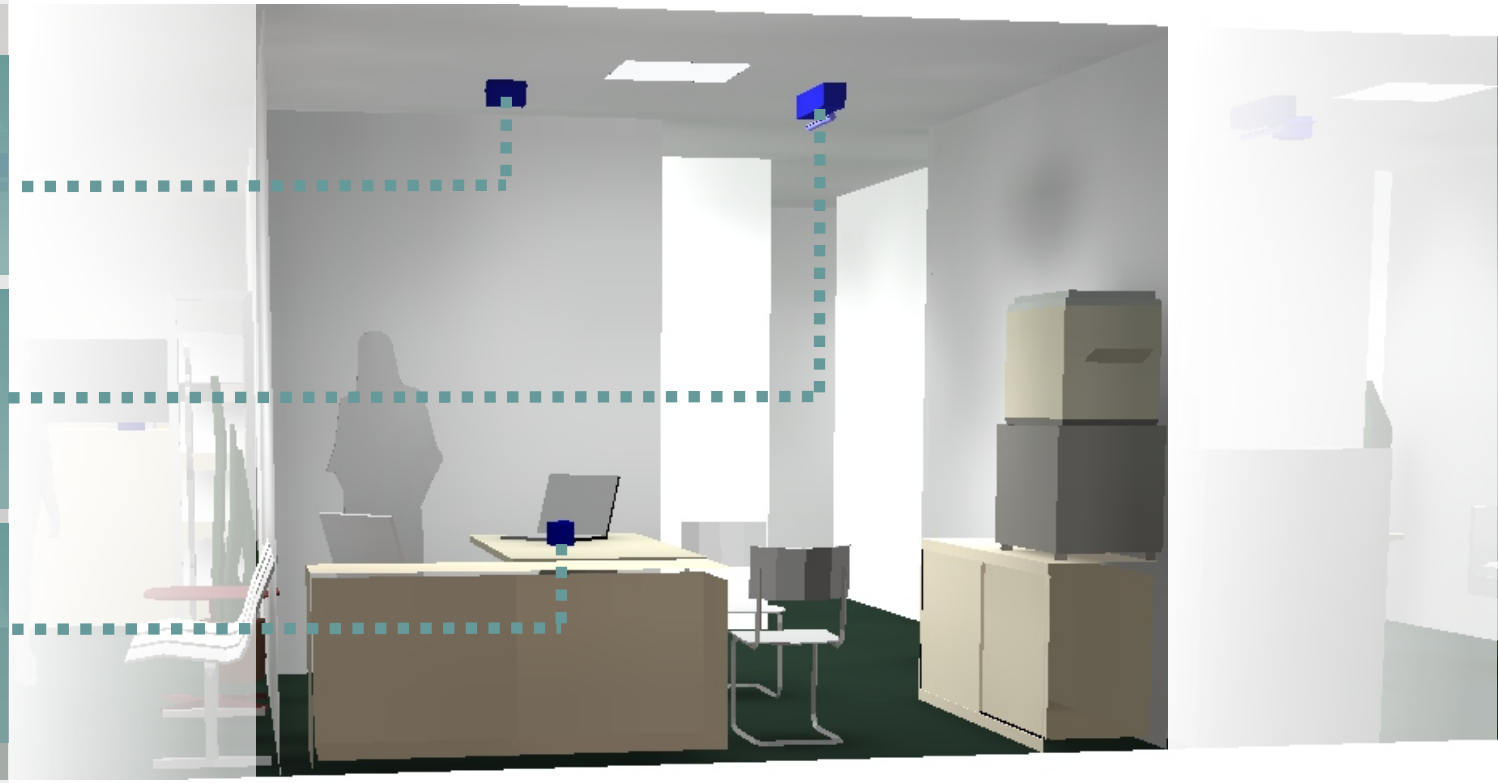
1 x UV-C Ceiling Air Recirculating Device. Positioned above desk. Device with power consumption of 7W will circulate air every 21 minutes
1 x UV-C 9W Surface devices to disinfect rooms overnight. It would take less than 2 hours for complete disinfection
1 x Invisible Wall device positioned in the middle of the desk to separate parties during conversation

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 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 working desk to separate meeting participants



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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 and test labs worldwide

Design Standards
In medical area UV-C is a familiar technology (invented bask 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 children, teachers and staff from infecting each other. Besides saving lives (!), reduction in sick leave among staff will maintain quality of education, as well as bring direct economical effect in sick leave payments
- 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 teacher's desk with paperwork 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
- Parents knowing that school implemented improved bacteriological defensive measures, will be less reluctant to send children to school

CASE STUDIES AROUND THE WORLD

Waterloo Catholic District School Board

With the return to in-person learning happening across the province, school boards have been looking for ways to reassure parents everything possible is being done to make classrooms safe. For the Waterloo Catholic District School Board, those efforts now include the power of the sun. "So the UV light kills the bacteria as it goes through," said Terri Pickett, senior manager of facility services for the Waterloo Catholic District School Board. "It actually alters the DNA as it goes through, so it kills it more than just filters it." The WCDSB says it has ordered around 11-hundred UV air purifiers to be installed in classrooms across the school system.
https://www.kitchenertoday.com/coronavirus-covid-19-local-news/u-v-air-purifiers-to-be-installed-in-all-wcdsb-classrooms-2723259

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-uvc-light-to-clean-classroom-air.aspx

NCSA
Nebraska Council of School Administrators

Making Schools Safer with UV-C Disinfection

Amidst the ongoing pandemic, educators and school leaders continue to work tirelessly and find innovative ways to navigate the new normal. As schools look to reopen and stay open, superintendents and directors of facilities are focused on strengthening disinfection protocols to make classrooms and school facilities safer.
https://www.ncsa.org/making-schools-safer-uv-c-disinfection

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