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UV Disinfection Fixture

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Abstract: ***The rapid increase in global cases of COVID-19 illness and death requires the implementation of appropriate and efficient engineering controls to improve indoor air substances. This project focuses on the use of the ultraviolet germicidal irradiation air purification technology, which is particularly applicable to buildings where fully shutting down the germs is not feasible using design analysis & improving the output of UV disinfection fixture. Till now, the unprecedented global spread of novel coronavirus disease (nCOVID-19) threatened human health, economy as well as ecosystem services gravely. An efficient disinfection technology is highly demanded. Ultraviolet process seems like a potential candidate, in which it can help.***
Keywords: UV Disinfection Fixture, UV Disinfectant, Ultra-Violet Cleanser

I. INTRODUCTION

Pollution of the macro and micro environment has caused concerns for decades and in recent times the macro consequences have been subjected to agreed international protocols, aimed at reducing pollution. Additionally, national and international laws now exist to limit the existence of micro-organisms, particularly those which affect human, animal and bird health in the environment and the food chain. A consequence of this concern has been that pollution reduction is now an industry, covering areas such as changing technologies to reduce primary and consequential pollution and chemical, biological and physical cleaning. Included in these techniques is purification using ultraviolet (UV) C light (UVC), which has the benefit of being both efficient and arguably the most energy effective technology. UVC purification has a long and honourable history in cleaning room air. However, growth in other applications such as high-tech volume liquid treatment and domestic ponds has expanded, whilst surface treatment of food has been used to extend shelf life in supermarkets, resulting in less waste food and lower stockholdings. Whilst UVC can be used as the exclusive solution in some applications, it is often used in tandem with other techniques. It follows that a single technology solution approach is unlikely to be ideal. It also follows that since UVC is so simple and energy effective, it is perhaps wise to consider this option first. Philips Lighting has been closely associated with progress in this field by developing, manufacturing and marketing lamps generating UVC and continues to research new lamp configurations. This brochure is the fourth survey of information to be aimed at production and technical staff in organization's where micro-organisms present problems. Micro-organisms such as bacteria, moulds, yeast 'sand protozoa can be destroyed or removed by physical, biological and chemical methods. UVC works using a photolytic effect whereby the radiation destroys or inactivates the micro-organism so that it can no longer multiply. For DNA it does this by causing adjacent thymine bases to form a chemical bond thus creating a dimmer and if sufficient of these are created, DNA cannot replicate. Some micro-organisms can repair themselves by absorbing UVA. In other cases UVC (and indeed UVA or UVB) can cause bond splitting in a molecule resulting in the creation of free radicals, which are often highly labile and which can react together to produce an inert end product. For purifying these effects are produced by wavelengths below 320 nm, with the optimum effect occurring at around 260 nm. The phenomenon whereby micro-organisms can be disfigured or destroyed is independent of host state (fluid or solid). Indeed with Ph. or temperature, the important feature of the action is that radiation can reach the organism; this means that a bacterium shadowed by another or by a particle will escape attack. Unlike other techniques, UVC photolysis rarely produces potentially dangerous by-products.

II. PROBLEM STATEMENT

Eliminate the oil and scale present on a superficial level, the projection of the abrasives eliminates consumption from the surface also, giving a particularly surface condition which has simple bond to the paint. We realize that around 80% of the surface disappointments happen when the pre-treatment of the surfaces isn't finished appropriately. Consequently, this progression of sandblasting the surface, earlier to painting, galvanization or such a covering should not be neglected as it is considered as the most basic stage for a great pre-treatment of surface. It is one of the most straightforward and the quickest approach to eliminate old paint and rust from the metal surface. Yet, for the utilization of nearby sand shooting measure on a little parts, As we can't do shooting measure in open air, so every time we need to do same in shut restricted space, in the wake of doing shooting measure on entire occupation in impacting kept space, some of the time occupations required some new parts connection or some little improve on work however we did shooting measure on work, so again we shift occupations to kept room for same in this manner work taking care of cost increments.

In this paper to keep away from this giving expense, there is need of plan and improvement of versatile sand or shot shooting machine, with the help of same, rather than dealing with work, we can do neighbourhood impacting of modified parts or new welded little segments on same spot, in this way we can limit dealing with cost occupations.

III. WORKING METHODOLOGY

A. *Introduction*

Work methods are the physical actions employed to perform a task. Evaluating and modifying work methods to prevent discomfort and injury is one of several components of an effective ergonomics program. Work methods are also called work practices.

B. *Review of The Working Methodology*

1 No, UV 2x2 fixture: A sheet of metal is used which is of material mild steel. Blanking of sheet is done by size of 740×590 mm sheet from bigger sheet of 2500×1250mm.On the same blanked sheet 2 bends are processed on both ends of bigger side of size 75 mm each. On other side two side piece blanking is done of size 600x75mm each. All these blanking are then bended with 10 mm border on front side. Both these side pieces are joint with the previous bigger part by spot welding to complete a square fixture.

Now another part of fixture is the frame. First the blanking of frame is done on cutting machine with size of 600x20mm with four number pieces. All the four pieces are bended on bending machine at 10 mm on the side of 20mm.And all the pieces are spot welded from all sides to make a frame. After that four pieces of clips are been blanked from sheet in size of 20x35mm which will be used as hanging clip. After joining all the part grinding process is done on all the parts. Holes are drilled for screw of M4x10 on the frame and for hanging of size M4x6 screw. A blanking for the box of size 65x65x90mm is done for the case of timer. It is bended according to that size. Two fixing clips are been spot welded on both sides of the box for fixing. An aluminium sheet is used for the purpose of reflection with a blanking size of 650x650mm.It is bended on all four sides by 70 mm with an angle of 45 degree. All these parts except aluminium sheet are passed through chemical 7 tank process for prevention from rusting. After this process it is been dried for some time following to that it is been powder coated with a glossy white colour. And been heated in a oven chamber for 2 hours. After the powder coating process, the fixture is assembled with all the parts with addition to that UV-c tube and its ballast of four quantities are been assembled. Two holders for each tube 44 are been used to fix it. A 3-way connector is used to connect it to the power supply. With addition to its digital On-off delay timer is used for switch off the light at specific time. With addition to it a buzzer is used to indicate the completion on process. Single core 1 sq.mm wires are used for connection of lamp to ballast and timer and main supply also. The aluminium sheet used as reflector is fixed with the pop rivet screw. Suspension rope been used for hanging of fixture at room.

IV. OBSERVATION

A. *Benefits*

While there are definite limitations to UV-C disinfection technologies, there are many benefits as well. Disinfection times are fast, with a typical disinfection cycle lasting about 15 minutes. This allows for extremely fast turnover times for rooms or other spaces being disinfected. Due to its simplicity, UV-C disinfection is extremely easy to understand. All surfaces within a certain distance will observe an assured level of disinfection in a certain amount of time as long as the light is not blocked from shining on that surface. It becomes very easy to plan the use of a UV-C disinfection system when the parameters and limitations are easily established and understood. There is no need to establish air flow patterns with UV-C as you would with a fogging system. Nor is there a to isolate rooms from HVAC systems or seal doors. This, along with the lack of chemical mixture, makes the preparation time quick to setup and start a UV-C disinfection cycle. The cost to run UV systems is very low, as systems are powered by regular wall outlets. With that, a typical UV-C treatment costs under two cents. UV systems also require little maintenance and upkeep due to their simplistic nature. UV bulbs last thousands of hours at their peak output, limiting the need for routine consumable change out and maintenance.

B. *Drawbacks*

While UV is effective at inactivating a wide range of microorganisms, there are limitations for its use. As it involves light waves, UV operates in a “line-of-sight” fashion, only irradiating surfaces within its sightlines. Surfaces can be blocked from the light if objects are in the way, much like a beach umbrella offering protection from the sun. These areas that become blocked from the UV light are commonly referred to as shadow areas. Surfaces in these shadow areas do not receive adequate disinfection as UV light does not have the ability to reflect well.

Shadow areas can be addressed by moving the UV light source to a second position to accommodate disinfection of the surfaces blocked from first disinfection cycle. UV light also does not penetrate well into organic materials, so for best results, UV-C should be used after a standard cleaning of the room to remove any organic materials from surfaces.

Distance also plays a factor into the efficacy of UV light. The strength of the UV-C light decreases the further away it gets from the light source, following the inverse square law. This means that at twice the distance, the UV-C will have ¼ of its power that was present at the original reference point. This relationship limits how far a single source of UV light is effective before it is too weak to provide adequate disinfection. Most systems deal with this by quantifying their UV-C output at a given distance, and using that distance to generate treatment times. Sensors are available which can measure the UV-C output of the UV systems at any location, such that adequate treatment times can be interpreted.

V. RESULTS

A. Surface of each object under uv light got disinfected.

B. All the objects are 99% safe to use as it is virus free.

C. This technology should be used under a well perform manner so that no can cross the path When the sanitising is on under the UV.

D. As we conclude in our Aim This sanitising process Of UV can be used for sanitiser as it give 99.99% of pure sanitisation & If this technology can be used further and research will be covered in full manner then we can minimise the disadvantage of this UV Fixture.

E. As it is a very cheap, this technology can be used in large scale so that the manufacturing cost of per item can be reduced at some certain.

VI. SUMMARY

The UV room disinfection device category is booming. Many different companies now make and sell UV devices, which have various levels of effectiveness. The different devices are based on one of two main UV technologies, mercury UV or pulsed xenon UV. Each device is designed to be used in a different fashion from the next. Prospective purchasers of UV devices will benefit from learning the four types of data companies use to substantiate UV efficacy claims: dosimetry, in vitro studies, environmental studies, and clinical outcome data. Dosimetry is acceptable if used carefully, lab studies are excellent, environmental studies are riddled with technical problems, and peer-reviewed clinical outcome studies are fantastic, though costly and relatively rare. Microchem Laboratory is the industry leader in UV device testing with a dedicated, customized room for testing and years of experience running device tests for virtually every leading UV brand.

VII. CONCLUSION

When we fix our UV model at a particular room or place it helps in sanitization of room for all time. we only have to make sure that nobody passes through the area when light is active for some interval as it provides harm to the skin in negligible amount which we can't observe through the naked eyes. We can use signboards for the same to keep people out when the light is active.

Thus, UV sanitization becomes helpful and important for living as it not only helps in keeping bacteria and viruses at bay but, is very useful in pandemic situations such as now.

VIII. FUTURESCOPE

The UV disinfection system, powered by UV water disinfection technology, utilizes ultraviolet light of wavelength 253 nm, which is used to remove toxins, biohazards, bacteria, algae, mold, and other unwanted organic materials, while not incurring any residual taste or regents. UV disinfection technology alters the DNA of microorganisms and impedes their reproduction.

Each UV disinfection system has its own lamp intensity specific to its application. For instance, the US Department of Health and Human Services normalized the standard exposure of 16,000 µwatt-sec/sq. cm for the UV disinfection system.

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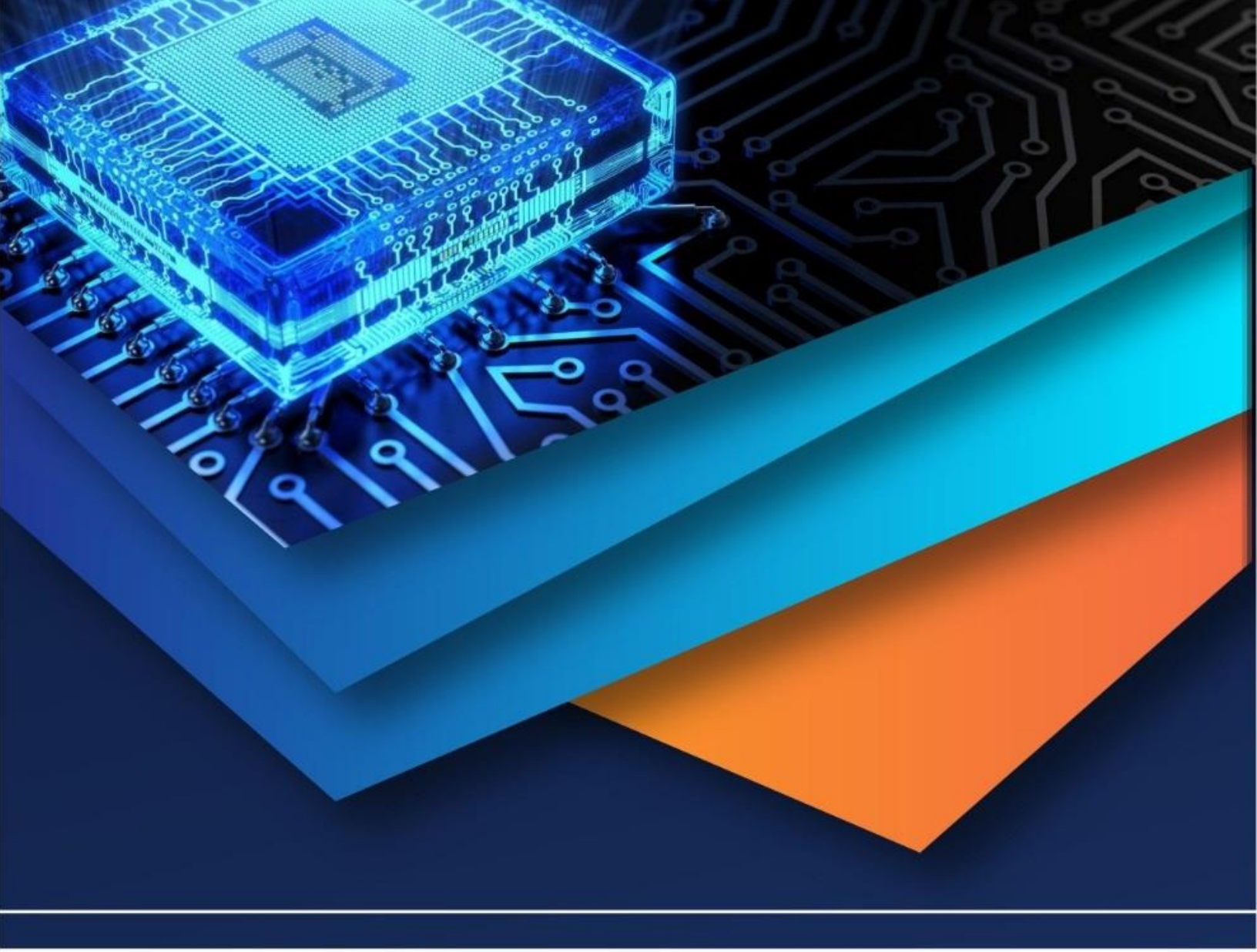

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