UV-C Air Disinfection
EMC Headquarters
Case Study

LEADING THE FUTURE OF
LIGHTING + TECHNOLOGY

Executive Summary

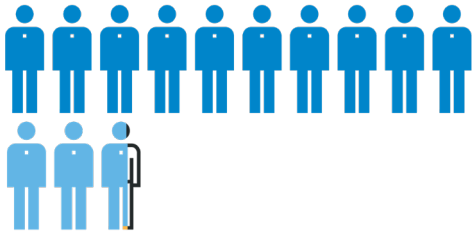
Since March 2020 when COVID-19 gripped the world causing millions of deaths and considerable damage to economies across the globe, organizations have struggled with the challenge of how to reconfigure their business processes and facilities to create a healthy work environment for their employees. For organizations that did not have the option to "go remote" the challenges were particularly acute.

At the peak of the pandemic in 2020/2021, the absence of consistent, verifiable information led organizations to experiment with modified work policies (masks, social distancing, contact tracing, work-from-home initiatives, etc.) as well as a range of disinfection technologies (ionizers, photocatalyzers and disinfectant lighting). Arguably, these measures often had mixed results.

As a work-from-the-office business, EMC experienced, first-hand, the challenges associated with protecting in-office employees while sustaining business operations. Unlike many companies that relied essentially on masks, social distancing and surface cleaning, EMC took the additional step to install proven UV-C air disinfection throughout its corporate headquarters.

From November 2020 – August 2022:

54% of EMC's corporate HQ employees contracted COVID-19.
All of these employees contracted COVID-19 while away from the office.



127% of EMC's corporate HQ employees were exposed to COVID-19 due to in-office contact with infected employees (some employees were exposed multiple times).
None of the exposures resulted in a subsequent COVID-19 infection.

Using UV-C disinfectant lighting combined with basic social distancing/contact tracing, EMC was able to effectively maintain a safe in-office work environment and continue to serve its customers.

This case study highlights EMC's journey to a disinfection solution that allowed the company to successfully navigate the COVID-19 crisis.

EMC's experience can provide a starting point for implementing a healthy building strategy that can help futureproof organizations against the effects of future health emergencies.

UV-C Air Disinfection Implementation
EMC Headquarters

Background

Like most of the world, EMC found itself in a precarious situation with the emergence of COVID-19 in the first quarter of 2020. Organizations everywhere struggled to formulate and implement effective responses to the pandemic in an environment characterized by turmoil and uncertainty at company, state and national levels.

There was confusion over the extent of air versus surface contamination as the primary mechanism for the spread of COVID-19.

Unavailability of COVID-19 tests made isolating the infected, identifying vulnerable population segments and contact tracing difficult.

Inconsistent "shelter-in-place" orders forced business closures, mask mandates, etc. and seemed to change with each reported surge in infection.

PPE shortages and the lack of proven therapeutics and vaccines essentially left organizations on their own to find practical ways to protect staff and continue operations.

EMC's Pandemic Response

Key objectives

- Protect employess
- Stay in business (The company needed a solution that would protect people at the office in order to continue serving its customers.)

What did EMC do?

- Phase 1: (March – October 2020)
    - Instituted partial in-office staffing depending on pandemic conditions
    - Instituted CDC guidelines for masks + social distancing
    - Deployed temerature-taking kiosks at all entrances
    - **Installed proven UV-C air disinfection in the HVAC system at the corporate HQ, housing approximately 80% of the company staff. (The UV-C system was designed to deliver a calculated 99.99% COVID-19 reduction with every 1.36 HVAC air exchanges.)**

- Phase 2: (November 2022 – Present)
    - Added a program to encourage COVID-19 testing + vaccination
    - Added COVID-19 exposure tracking and quarantine procedure (made possible by the wide availability of COVID-19 testing)
    - Returned to full time in-office work in stages from November 2020 - January 2021

EMC's UV-C Implementation

EMC considered direct airborne pathogen destruction to be a key component of an effective pandemic response plan. The deployment of UV-C disinfectant lighting was, therefore, of critical importance. The following outlines the company's UV-C implementation project:

Project Details

756,000
cubic foot office building

10
complete air cycle exchanges daily

88%
UV-C first pass reduction of COVID-19

99.99%
daily COVID-19 reduction with MERV-10 air filters and 10 cycles

The Project

EMC's Specialty Lighting application engineers researched available technologies and the best approach to ensuring the most effective and safest solution for its employees.

As a result, the company selected UV-C disinfection technology (commonly referred to as Ultraviolet Germicidal Irradiation or UVGI), used for decades in hospitals, food handling and laboratory settings.

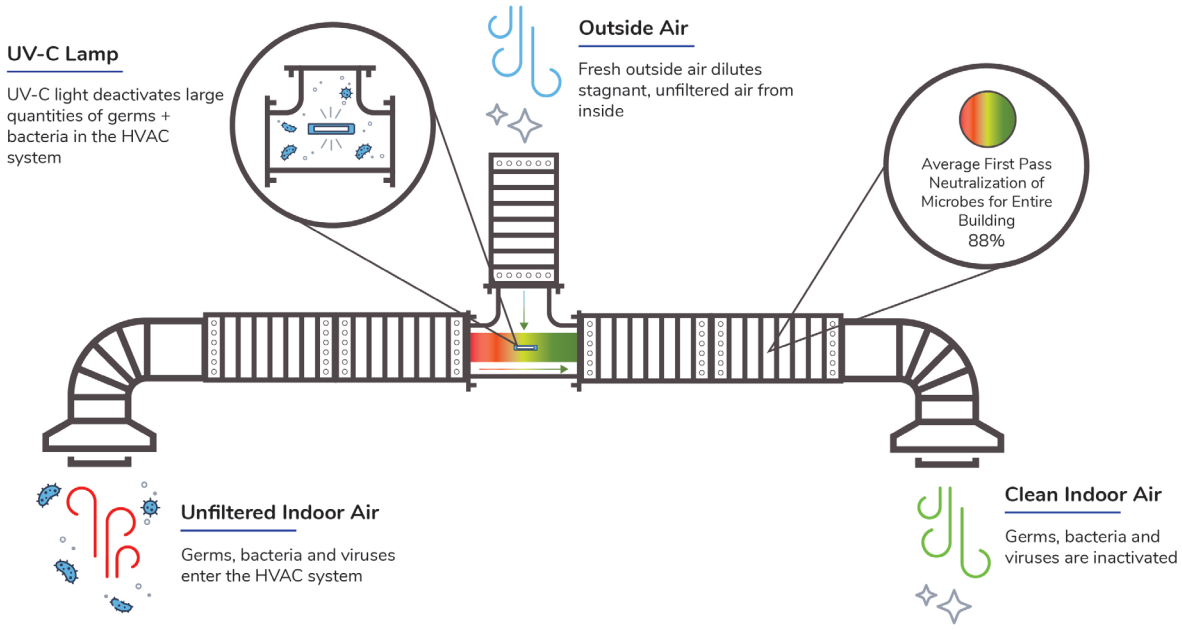
Consistent with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Pandemic Building Readiness Guide, EMC chose UV-C air purifiers that would be installed in the supply ducts of EMC's rooftop unit (RTU) air handlers.

These purifiers use low pressure UV-C lamps to neutralize infectious microbes, including COVID-19, from the air as it circulates through the HVAC system.

Analysis

EMC took facility-wide airflow measurements and calculated the HVAC system's air circulation performance. The building's HVAC system cycled 756,000 cubic feet of air (the facility's total interior air volume) 10 times per day. Nineteen UV-C air purifiers were specified in order to maximize disinfection.

The diagram below depicts how the UV-C lamps are installed in the air ducts.



EMC confirmed the efficacy of the system using a proprietary mathematical model, specific to in-the-field HVAC performance, that predicts microbe neutralization. These calculations addressed: Duct size and air flow rate, UV-C lamp irradiance levels and microbial resistance to UV.

The UV-C units, in combination with the HVAC system's MERV-10 filters, were calculated to achieve an 88% reduction in airborne COVID-19 during each building air exchange cycle. Based on that performance, a calculated 99.99% reduction in COVID-19 would be achieved in 1.36 building air exchange cycles.

As a result, the air surrounding a standard workstation at EMC could theoretically be replaced with clean air approximately every 10 seconds depending on the location of the nearest air duct!

Installation

In 2020, ease of installation was a significant consideration. In-duct UV-C offered a number of attractive features:

- Fast installation: Simple mounting from outside the HVAC ducts allowed EMC to upfit its headquarters (29 UV-C units) within ten days following receipt of units.
- Damaging UV-C light could be completely isolated from building occupants, allowing 7/24 operation to maximize air disinfection.

Conclusions

Our investigations indicate that the majority of organizations that needed to work in-office in order to continue operations relied on the CDC guidelines to control the spread of COVID-19 in their facilities.

While these measures had some benefit, a Google search will return a plethora of accounts of high-profile outbreaks that disrupted or shut down businesses.

As stated previously, EMC implemented the CDC's recommendations. But what is believed to have made the difference—what allowed EMC to create an office environment that was, arguably, one of the safest spaces that employees visited during the early days of the pandemic—was the scientifically rigorous application of UV-C air disinfection.

That being said, EMC's experience is anecdotal. So, the company has partnered with a major health care group to undertake a multi-year study to assess the benefit of UV-C for reducing infection in senior living facilities. The study will include up to 50 locations (approximately 2,250,000 square feet of floor space) with UV technologies deployed in surface as well as air disinfection applications. Work is expected to begin in the fourth quarter of 2022.

Before

After

EMC's Comprehensive Air and Surface Disinfection Solutions at Your Facilities

This project provided EMC the opportunity to develop and validate an analytical approach to assess and specify effective solutions for reducing COVID-19 and other harmful microbes in any facility, providing safer environments where people live and work. Let EMC help you implement the best solution for your indoor disinfection needs. EMC can assist with:

- **Turnkey disnifection solutions**
  EMC provides expert, turnkey disinfection solutions to meet your needs. Whether it's air disinfection, surface disinfection or a combination of both, EMC can analyze, specify, install and service site-wide or room-by-room solutions tailored to your requirements.

- **Measuring the effectiveness of UV-C air purification solutions**
  EMC applies different methods to model and demonstrate microbe reduction for air and surface disinfection using various proven technologies.

- **Delivering peace of mind**
  Along with turnkey disinfection solutions, EMC helps you deliver information to your facilities team, employees and customers. Custom designed monitoring systems can be developed to assist your facilities team with maintaining your disinfection system at its optimum performance. Systems can link to display signage and messaging to help inform your employees and customers about your organization's commitment to a safe environment.

MAXXimize Your Air Disinfection System

EMC's turnkey disinfection approach, CleanMAXX™, helps customers maximize the results of each project phase—from purification analysis to maximizing the long-term value of the disinfection system—bringing an immediate and positive impact to health and safety.

The CleanMAXX™ Process ensures your disinfection system's success by maximizing results in each project phase:

Prioritize
Formulate an effective disinfection strategy for your business

Audit
Ensure accurate baseline to develop an effective solution and executable proposal

Design
Select the best fit and performance for your existing equipment and application

Logistics
Coordinate turnkey services to support daily business and project needs

Installation
Complete on time with a comprehensive and clear scope

Service
Maintain long-term safety, value and effectiveness of your new disinfection solution

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