

CLEAN AIR SOLUTIONS FOR HEALTHCARE INDUSTRY

Mr. Rahul Uppal (3-TP 2010) was appointed as Chief Operating Officer for AAF-Daikin EEMEA (Eastern Europe, Middle East and Africa), CIS and SAARC countries in Dec 2017. He is a mechanical engineer and has held several leadership positions at Camfil, a Swedish company. He has also been the youngest MD for Camfil, as well as the youngest COO at AAF-Daikin.

As a leader in the air filtration industry, he truly believes that it's important to preserve and protect human life by bringing clean indoor air at facilities across the globe.



HEALTHCARE SCENARIO AND THE ROLE OF AIR FILTRATION: Being under a huge impact of the COVID-19 pandemic, the healthcare facilities and pharmaceuticals are still under great pressure. Considering the same, the probability of Hospital Acquired Infections or Healthcare-Associated Infections (HAI) is high and maintaining Indoor Air Quality (IAQ) in such situations is becoming more crucial. All hospitals are prepared for the possible arrival of patients with COVID-19, but air quality evaluation is also necessary to identify solutions with high-efficiency air filtration system in compliance with the WHO standards. The government must investigate and facilitate the right solution to fight this pandemic.

BACKGROUND: Researchers at Harvard University found that higher levels of the particulate matter 2.5 (PM_{2.5}) were associated with higher death rates from the disease. (Source: [Air pollution linked with higher COVID-19 death rates](#)). They also find that an increase of 1µg/m³ in PM_{2.5} is associated with an 8% increase in the COVID-19 death rate. (Source: [COVID-19 PM2.5 A national study on long-term exposure to air pollution and COVID-19 mortality in the United States](#))

Pharma companies are continuously working on clinical trials in their cleanrooms, but changes relative to globalization, population and economic shifts are transforming the pharmaceutical landscape at a rapid pace. This new medical need is putting more pressure on innovation, productivity and time to market. At the same time, sustainability has entered the playing field with a focus on energy efficiency, waste management and emission reduction. All these developments shed a new perspective on the role of air filtration.

IMPORTANCE OF AIR FILTRATION IN HEALTHCARE FACILITIES: Healthcare facilities pose a unique design challenge as their systems have a broad range of ventilation requirements to protect from airborne hazards. As clean air is vital to protect patients, staff and visitors from airborne diseases or infections, especially considering that patients may have suppressed immune systems, it will make them more susceptible to infections.

WHAT CAN BE THE SOLUTION? As the global climate changes rapidly, air filtration solutions are challenged daily.

HEPA (High-Efficiency Particulate Air) Filters: HEPA filters are known as high-efficiency air filters. They have broad application in cleanrooms and other areas requiring the very highest levels of contamination control. HEPA filters media are manufactured to meet the standards to remove 99.97% of airborne particles down to the size of 0.3 microns. The virus COVID-19 is determined to be 0.125micron in diameter. The most debated question is, can HEPA filters remove the particle size of 0.125micron? The answer is yes. The virus does not live on its own, the virus particles tend to affix on the aerosolized droplet, skin flake or dust particles and move as an aerosol. It can also travel through the building if it is not trapped in the HVAC system. These aerosols can get caught in HEPA filters. So, it is necessary to upgrade the air filtration system to HEPA filter as the last stage of filtration in the AHUs (Air Handling Units). The challenge remains if the arrested virus gets a

breeding ground on the HEPA media surface, but it can be handled by practicing fumigation of the whole air circuit periodically. For critical areas, fumigation might be required every day.

ISHRAE (Indian Society of Heating, Refrigeration and Air Conditioning Engineers) advises that reduction of indoor dust levels is a step towards mitigation of the source of COVID-19 transmission. Also, in temporary precautionary quarantine or isolation rooms that are used to isolate the suspected cases where the patients' exhaled air can contain the virus (of range 160nm), the virus may not fly in the air occasionally but they can enclose into the larger droplets and move as an aerosol.

ISHRAE circulated a comprehensive guideline to use HEPA filters both in supply and exhaust air for isolation rooms to treat COVID-19 patients. They also recommended that HEPA filters shall be tested and certified for performance in accordance with international standards like IEST, EN, ISO, IS etc). American Air Filter holds the honour to have India's first and only air filtration company who has auto-scan tested HEPA and ULPA (Ultra Low Particulate Air) filters.

Recirculation Units: These are designed specifically to enable a healthcare facility to quickly and inexpensively convert a standard patient room to a negative pressure isolation room to treat COVID patients. These units are stand-alone complete air purification systems to recirculate and clean the air in a controlled environment. These combine particulate filters, gas-phase cassettes and high efficiency filters to remove both airborne particles, virus, bacteria, fungus, mold, creating total clean air solutions to remove both airborne particulate and gaseous contaminants.

It can also be rolled into an ER, OR, ICU, or radiology suite when an airborne infection isolation room is required. It can be utilised as a recirculating device in outpatient clinics, waiting areas, and other common use areas where the status of patients and visitors is unknown.

Ceiling Mounted Air purifiers: This is the best-recommended option for different kinds of buildings. It has powerful three-stage filtration with UV light and a fan. This solution can also be used for ambulances and test labs thus, protecting medical staff from possible virus carriers during transferring patients. As a supplement of indoor fresh air, it can be connected to an existing fresh air system or mixed (fresh and recirculating) air system.

Case reference: [AAF Helps Convert Standard Laboratory into Corona Testing Lab](#)

Role of Internet of Things in Air Filtration: According to NCBI, the requirement of an integrated air management system, based on real-time monitoring, would lead to optimal air quality, along with improvement in environmental and economical sustainability. Internet of Things (IoT) has stepped into every industry and the air filtration industry has adopted the app-driven HVAC sensor technology effectively. This technology is not just a device that measures the particle counts in a room, but it also provides real-time filtration data.

The company has launched next-generation monitoring and facility management tool Sensor360 which enables the customer to understand and plan their air filter performance and maintenance in an entirely new way. Sensor360 is the first IoT (Internet of Things) patented technology platform that demonstrates the effectiveness of a building's filtration system by monitoring particulate levels.

INITIATIVES FOR COVID-19 PANDEMIC: With the help of air filtration experts, new industrial-grade air filtration systems like PurAir ceiling mounted solution and AstroPure500 recirculation unit with UV light have been launched specifically taking into consideration the pandemic. IAQ as a service is another initiative offered in the Opex model instead of Capex where a customer does not have to buy the equipment but pays monthly/annually for clean air per square feet for a period. Due to the known co-relation between bad air quality and COVID spread, IAQ is gaining more importance. These initiatives are bringing more awareness to people and the government on implementing the health policy for contagious diseases in the country.