

Clean air in manufacturing plants – The Corona pandemic is a wake-up call to improve air quality inside manufacturing plants and other occupied spaces

Filtration solutions are available that allow manufacturing plants to achieve and maintain clean plant air that is relatively free of fine dust and viruses. Ulrich Stolz, Head of Technical Engineering at Keller, explains how this works, which systems are required, and where it is advisable to use them.

Until recently, air pollutants such as coolant and oil mist, welding fumes or dust from machining processes have been the primary focus when it came to the safe filtration of emissions in manufacturing plants. Presently, during the time of the Corona pandemic, the question arises as to whether companies should also protect their employees against viruses, especially the Corona virus Sars-CoV-2, and how to effectively implement this protection.

The Corona virus is a largely airborne hazard

First, it is important to know that viruses are microscopic in size. They measure only 20 to 330 nanometers (= thousandths of a micrometer, μm). According to current studies, the Corona virus is between 80 and 120 nanometers in size. Tiny viruses usually adhere to droplets ($> 5 \mu\text{m}$) or to aerosols ($< 5 \mu\text{m}$) from the body. Droplets are generated when people sneeze, cough or yell. Aerosols are already generated during normal speech. Aerosols can remain in the air from a few seconds to several hours, depending on the surroundings. Based on current knowledge, 45% of people infected with Corona are infected via droplets, 45% via aerosols and 10% via direct contact such as shaking hands or touching contaminated surfaces. This means that **the primary means of transmission is airborne.**

Efficient filtration systems stop viruses

This is positive news for manufacturers who are already operating high-performance extraction systems, such as dust collectors using Keller's KLR filter elements. Equipment which filters the finest particulate from fine dust can also capture a high percentage of airborne fungi, bacteria and spores. Combined with a secondary filter level of H13 or H14 quality filters (HEPA), even viruses can be reliably filtered from the air. We can combine such a secondary filter with all types of collectors - whether dry filters, wet scrubbers, coolant and oil mist collectors or electrostatic separators. If requested, we can add UVC radiation or ozone as additional air disinfecting measures.

Wake-up call: Checking the indoor air quality

The questions and discussions regarding air quality during the Corona pandemic should be seen as a wake-up call to perform an air quality analysis inside plants and work spaces, and to initiate improvements. Changes in production processes often result in slight modifications, and consequently the increasing dust load in a plant is barely noticed. Ideally, filtration systems capture airborne pollutants released during machining processes as close as possible to the emission source, and extract them. However, such proximity cannot always be feasible in terms of process technology. Impurities can then circulate into plant air and impact the overall air quality of the work environment.

Finest particulate can be hazardous

If the fine dust load increases as a result of some manufacturing processes, it provides viruses additional opportunity to spread. Recent studies have indicated that viruses cannot only spread with via droplets and aerosols, but can also attach themselves to fine dust particles. Such fine dust particles are already a proven health hazard even without a virus load and can lead to various diseases of the lungs and cardiovascular system, among others. This makes it imperative to filter even the finest particles from the work environment.



Good news: Keller's extraction systems that filter the finest particulate from the air can also capture a high percentage of airborne fungi, bacteria and spores.

Reducing the basic load of fine dust

Companies who want to further minimize employee health hazards can adopt countermeasures by adding an overall plant filtration system to complement the machine extraction system, and significantly reduce contamination with pollutants such as fine dust, viruses, bacteria, fungi, pollen and spores.

The AmbiTower from Keller has been designed for this very purpose. This collector with high performance filter plates and a secondary filter stage is available in various designs and dimensions. It supports the stratified air principle, wherein dust laden air is extracted from the overhead air space of the plant and returned as purified beneficial supply air to the work area. Therefore, a combination of direct extraction at processing machines and ambient air filtration using the AmbiTower provides optimal operating conditions. The systems can also be flexibly modified at any time so that the operator can always comply with all relevant occupational exposure hazard limits.

Breathable environment

In addition to the AmbiTower, Keller offers the AmbiWall to handle high volumes of fine dust emissions in highly polluted areas, especially in workplaces where extraction directly at the tool is impossible. The wall-shaped dust collector also protects from harmful noise, splashing and employee vision hazards - which are essential in welding operations, for example. Several AmbiTowers and AmbiWalls can be combined into a single unit that automatically adjusts the airflow according to the volume of fine dust present. This means that each unit only extracts as much as is actually necessary.



The AmbiTower from Keller extracts the dust laden overhead air and returns it in purified form to the employee work space. As a result, the combined extraction at processing machines and room air extraction using the AmbiTower creates optimal air quality. It significantly reduces basic contamination by air pollutants such as fine dust, viruses, bacteria, fungi, pollen and spores.

Weighing the various benefits

The final solution adopted depends strongly on each individual case. The situation in a company where many people work closely together in a confined space must be handled differently than in a company where a few employees operate machinery in an expansive hall. It is necessary to weigh all the risks, costs and benefits involved. While the costs can be quantified quite accurately, the risk/benefit assessment also depends on individual factors. Based on experience, several beneficial safeguards can frequently be combined. If the fine dust volume in plants and work areas is decreased, the following advantages can be achieved.

- Cleaner air prevents various diseases, especially those of the respiratory tract.
- Employees enjoy a more comfortable and safe work environment, supporting their overall motivation.
- Less dust is deposited, noticeably reducing cleaning requirements.
- Machines and systems have a prolonged service life, and the risk of accidents is reduced.

Conclusion

Anyone desiring improved air quality in their manufacturing plants and workshops should consider a coordinated system of exhaust air, supply air and recirculated air. Keller can combine extraction systems in such a way that even the finest particulate is filtered, which is ecologically sensible, energetically optimized, compliant with laws and regulations, and customized for your individual needs. We would be pleased to collaborate with you for a clean-air environment.



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