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# Adapting Buildings to the Latest Research

## Dynamic VAV Optimization

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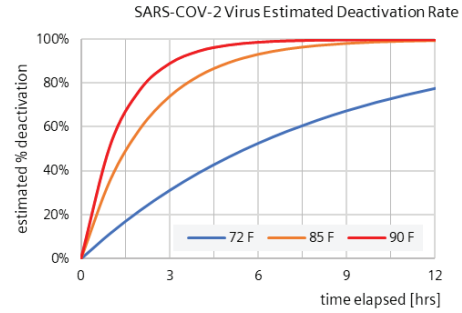
### The World Has Changed

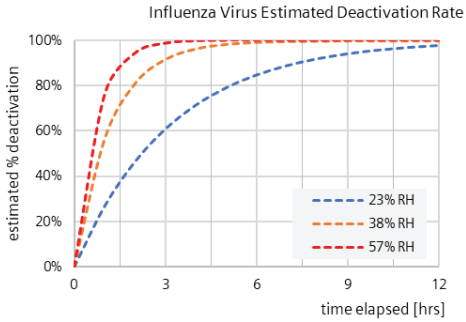
The SARS-CoV-2 outbreak that causes COVID-19 has left commercial, educational and government buildings largely empty, with occupants unwilling to return until they are confident that the environments are safe. Organizations that operate in these buildings are having their operations adversely affected, and the buildings themselves risk losing value. The COVID-19 pandemic has fundamentally changed how buildings must be operated. Recent studies suggest that actions can be taken to support buildings becoming more resistant to pathogens like SARS-CoV-2. As we continue to learn more, our strategies for keeping our buildings safe must remain adaptable.

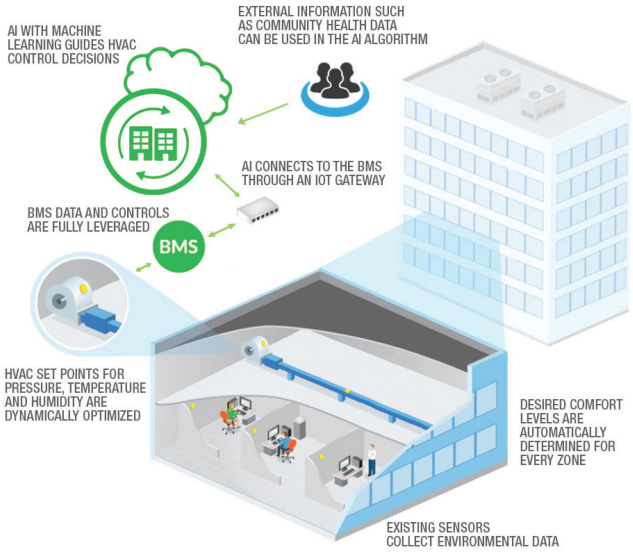
### What We Know Today

Viruses can be transmitted in aerosol form through the air, and also via contact with contaminated surfaces. Many studies have shown that the inactivation time (i.e. lifetime) of viruses is dependent on temperature and humidity. Most viruses are inactivated more slowly when temperature and humidity are low, and are inactivated faster when temperature is high or humidity is moderate. The following figures show the average inactivation time of SARS-CoV-2 and influenza as a function of temperature and humidity (from references [1] and [2]).

Similar studies have been conducted for SARS and MERS [3,4]. Another study published in March 2020 [5] shows that the inactivation time of SARS-CoV-2 is similar to SARS and MERS.






## HOW IT WORKS

- Controls the indoor environment based on latest guidance from ASHRAE and other research organizations while ensuring comfort
- Will accelerate pathogen inactivation (depending on the allowable disinfection period field conditions, and other operating constraints)
- May reduce HVAC energy consumption by up to 25%

### How Software Can Help

Temperature and humidity can both be controlled in buildings. Ventilation, which affects the concentration of virus in the air, can also be controlled. It is possible to adjust these variables in accordance with the latest industry guidance and research to reduce the infectiousness of buildings and make them healthier for occupants.

Siemens Dynamic VAV Optimization (DVO) utilizes a patent-pending software solution to optimize heating, ventilation and air conditioning (HVAC) systems to help defend buildings against pathogens. When buildings are occupied, environmental conditions are established that help reduce virus transmission, while still operating within acceptable comfort bounds so that people can be productive. When buildings are unoccupied, the HVAC system takes steps to disinfect the building.

The solution is built upon the DVO cloud-based platform for optimizing building comfort and energy efficiency that uses AI and machine learning.

The platform integrates with your existing Siemens building management systems (BMS) which enables rapid deployment in most large buildings.

The solution has three different modes of operation: **Green Mode**, **Defense Mode**, and **Decontamination Mode**.

**Green Mode** optimizes temperature, pressure and humidity setpoints to maintain occupant comfort and minimize energy consumption.

**Defense Mode** optimizes a model based indoor air quality metric that incorporates the latest guidelines for maintaining healthy indoor environments while ensuring compliance with the thermal comfort and ventilation requirements of occupants.

**Decontamination Mode** assists in accelerating the rate of decay for viruses through the use of elevated temperature during unoccupied periods. Model-based optimization is used to either achieve a target level of disinfection as fast as possible and with the least energy possible, or to achieve the highest level of disinfection in a defined time window.

Each mode of operation is configurable to optimize results for every building, based on its location, layout, hours of operation and other factors.

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