Creating a Clean Environment for the Health and Safety of Students, Staff and Teachers

Reducing Virus Spread in Classrooms

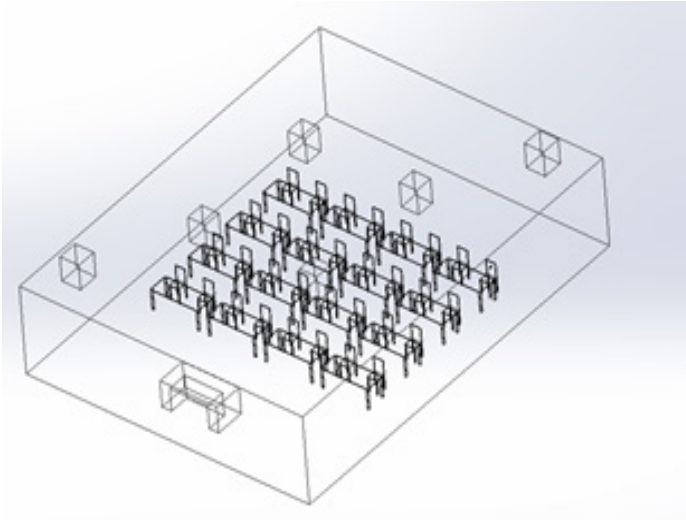
Enabling Wellbeing

Form#: BR-035
Reducing Virus Spread in Classrooms
Rev: 09-2020

Increasing Clean Air Delivery Rate (CADR) reduces probability of infection

The challenge facing Administrators and Educators as they bring back students to a traditional classroom during a pandemic is how they are to minimize the potential for virus spread. The amount of outside air is the primary driver for classrooms equipped with ducted ventilation. These classrooms require a specific volume of outside air per student. Those guidelines are identified in ASHRAE 62.1. Those classrooms that don't have operable windows or other sources of fresh air now have a means of delivering clean air to the space.

- The American Society of Heating Refrigeration and Air-conditioning Engineers (ASHRAE) guidelines require 10 CFM (Cubic Feet per Minute) of outside air per student.
- The U.S. CDC (Center for Disease Control) recommends increasing this outside air requirement to reduce the potential for virus spread. In most cases, this is impractical due to the capacity of the systems in place. Other recommendations include, social distancing, hygiene and mask wearing.
- It is essential to understand how air moves through space as it is a significant contributing factor to the spead of the virus.



To address these issues and concerns, Halton has created computer simulations to demonstrate how a virus can spread within a classroom with existing return air systems. Also, how Halton Sentinel, a mobile filtration unit reduces the probability of virus spread.

Computer modeling can represent Typical space with occupancy

Computer modeling is an accurate tool to depict any interior environment, and based on input, how air and contaminants move within a space. With this knowledge at hand, we can estimate the concentration levels at varying locations in the room and what reductions can be achieved by deploying a Halton's Sentinel unit.

The focus is on Clean Air Delivery Rate or the equivalent amount of outside air that can be achieved by neutralizing the virus by having air pass through the Halton Sentinel. Part of the science behind the Clean Air Delivery Rate (CADR) is a formula known as the Wells-Riley equation. This equation considers the UVGI dosage, speed of the air going through the device, and inactivation rate.

Halton Sentinel

what is it?

- Simple plug and play implementation
- 6 foot plug and cord set, 120v wall outlet (10 amps)
- Combines UVGI with UV resistant MERV 13 filtration
- Locking casters for portability or anchor mounts for fixed installation
- 30.5" footprint x 60.1" tall
- UV dosage between 650µj/cm2-950 µj/cm2
- Sound: Low fan: 55dB; High fan: 63dB
- On/off capability on a mobile device

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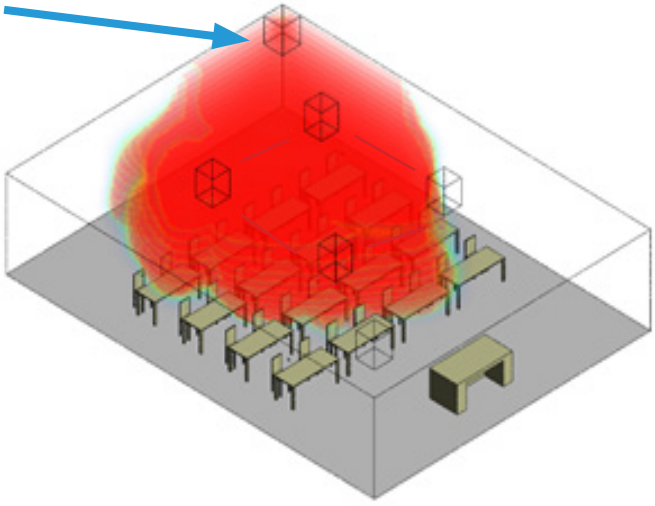
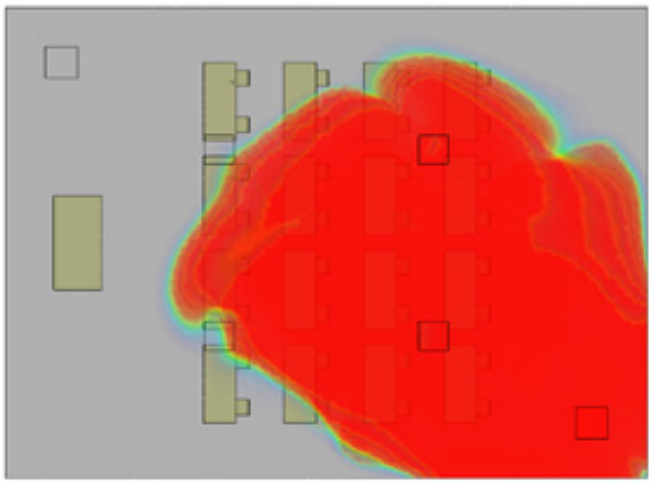
Comparing a typical classroom with a single return duct

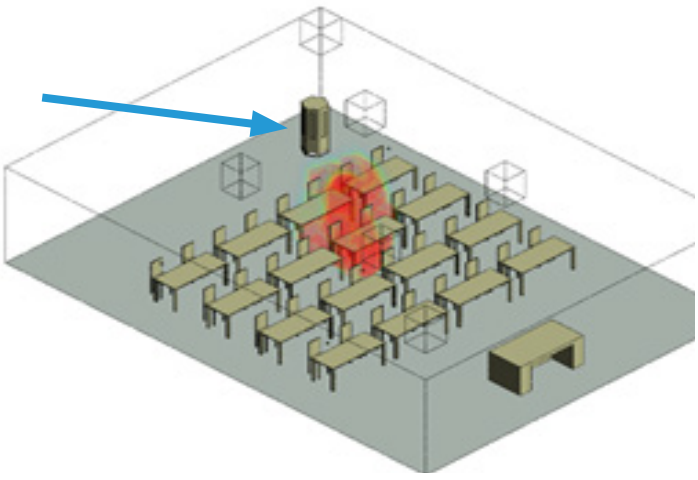


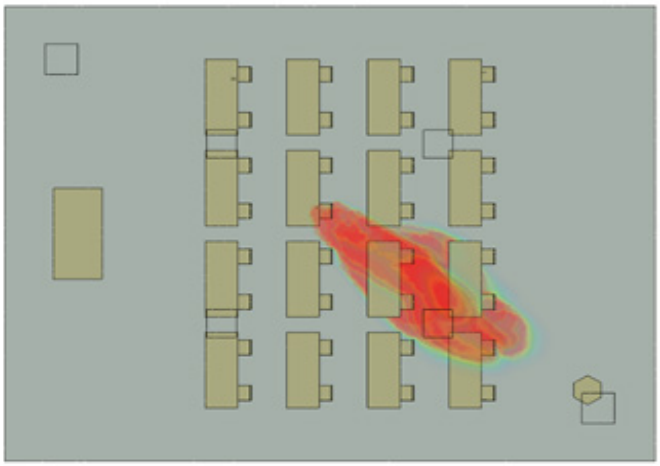


Note: 3D model shows a single return grill in the corner and 4 supply registers in the ceiling

The computer simulation depicts how a virus would spread in a classroom from an infected person.

Same classroom equipped with a Halton Sentinel, mobile filtration unit.





By introducing the Halton Sentinel unit at 1200 CFM, the potential for virus spread is.reduced significantly by 3 times or more.

Classrooms and UVGI CFD

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For example, if you had 32 people in a room sitting down, such as a lecture hall and you installed a mobile UVGI device capable of moving 1200 cfm what could you expect the result to be? The current outside air requirement would be 320 cfm (10cfm per person x 32). Some areas will have more or less outside air requirement depending on when the school was built. Adding 1200 cfm of clean air (cleaned by the UVGI device), you are now delivering the equivalent of 1520 cfm of disinfected air (320cfm +1200 cfm) which will reduce the probability of airborne infection by 3.3 times

While there is near infinite amount of scenarios that can be created, the scenarios compared in the simulations show how the mobile unit can reduce concentration by capturing particles as well as diluting the room air with clean air

Return and supply air volumes and duct placement are critical to Halton's Sentinel unit placement. The airflow patterns in the room dictate the best location for the UVGI device and can greatly impact its effectiveness

Hafcon

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