

# Operating Room Ventilation Configuration

Reducing infection with specifically designed HVAC systems

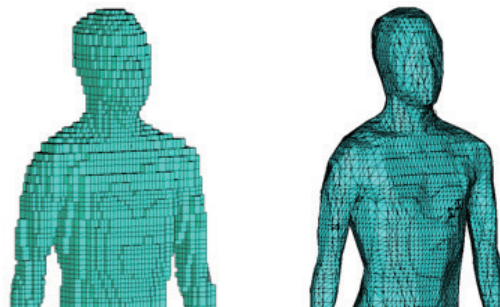
## Overview

When it comes to designing HVAC systems for an operating room, special considerations are needed to ensure a safe environment for the medical staff and the patient. In spite of preventive measures, sometimes a patient may become infected from airborne pathogens when a conventional ventilation design is used. Special design criteria is required to help prevent infection.

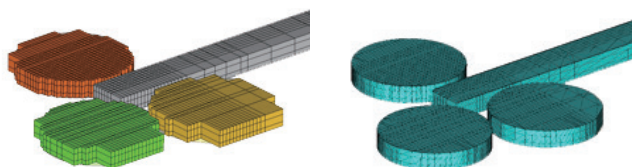
ASHRAE recommends a ventilation configuration where air flows from the ceiling directly above the operating table and is removed from the room by exhaust vents near the floor. Computational fluid dynamics with scSTREAM is used to view the effect of exhaust vent location on air velocity patterns in an operating room.

*\*Infection Control in Hospitals, Bill Drake, Health-Care HVAC*

## Mesh comparison



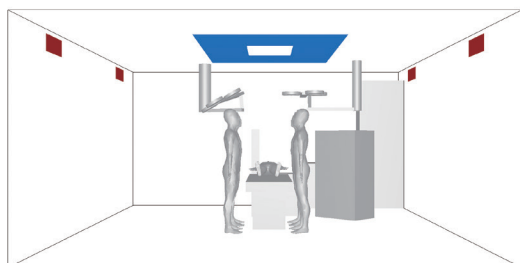
Left: Human body modeled using standard structured mesh.  
Right: Same model meshed using cut cell.



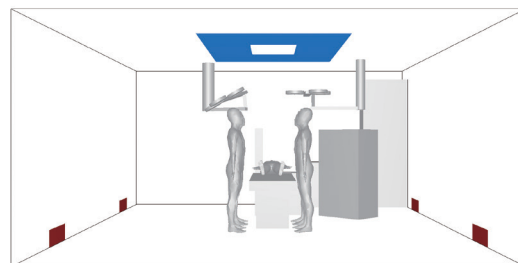
Left: medical lighting created using structured mesh.  
Right: the same model created using the cut cell method of meshing.

## Ventilation configurations

Case 1

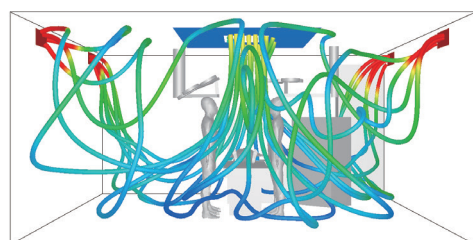
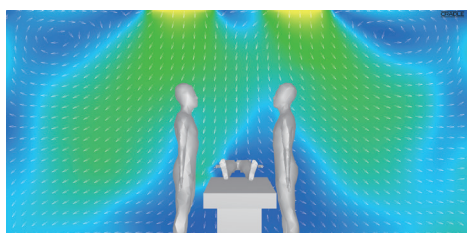


Case 2

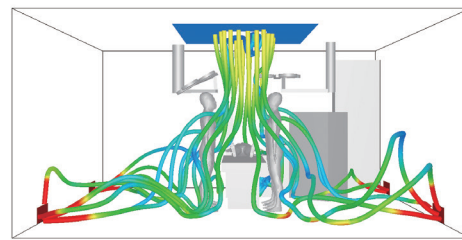
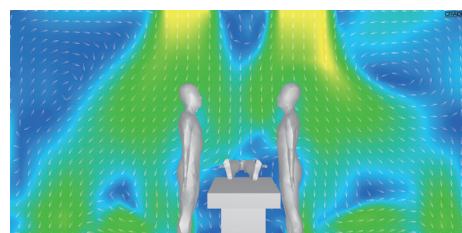


## Simulation results

Case 1



Case 2



Velocity [m/s]  
0.50  
0.00

## Notes

Both cases have similar cross sectional velocities and air flow directions. Air sweeps down from the ceiling and continues outwards away from the surgical table. However, because exhaust vents are located near the ceiling, a significant amount of air travels upwards in Case 1. This increases the probability that pathogens may be breathed in by the operating room staff.