

Analysis of a Fan inside a Clean Room OHS (Overhead Shuttle)

Case Study for Murata Machinery, Ltd.

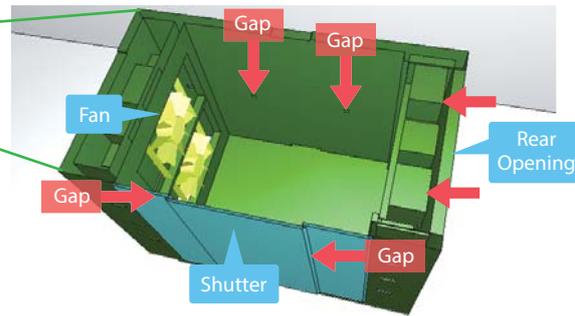
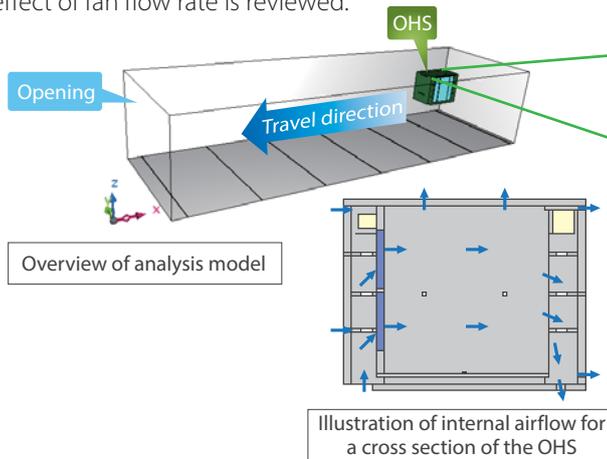
Simulating the use of a fan to prevent external air incursion into a moving clean room OHS

Analysis Objectives

As the OHS transiently travels through the clean room (including starts and stops), dust contaminated external air can enter the OHS through the OHS openings. In this model, the effectiveness of a clean room countermeasure using a fan at the front of the OHS to increase the pressure inside the OHS was assessed. The effect of fan flow rate is reviewed.

Penetration Conditions at the Moving Object Surfaces

High, medium, and low fan flow rates were simulated and compared for the presence, or absence, of external air inside the OHS. Different concentrations of diffusive species were specified inside and outside of the OHS, and the distribution of the concentrations was calculated as the OHS moved through the room.



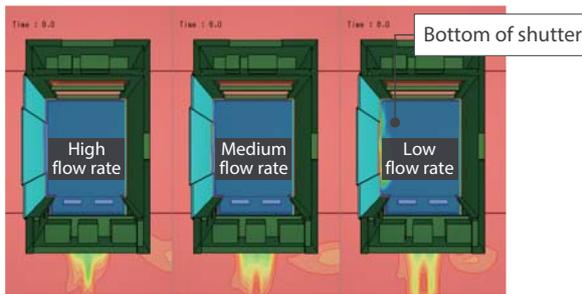
Functions used

- Transient analysis
- Diffusive species
- Multiblock
- Moving object (inflow/outflow conditions applicable on the surfaces)

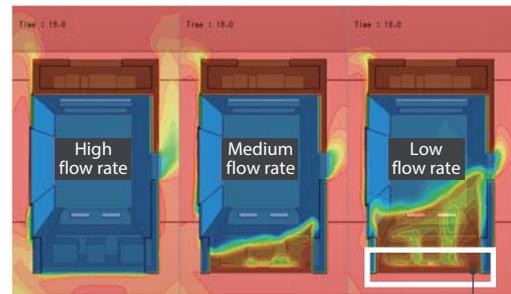
Simulation Results

When the flow rate of the fan is low, some penetration of external air through the shutter was observed at start-up and through the rear opening near the top of the OHS during deceleration and stop. Virtually no penetration of external air into the OHS occurs when the fan flow rate is high.

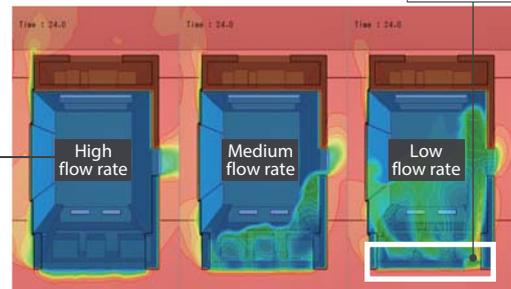
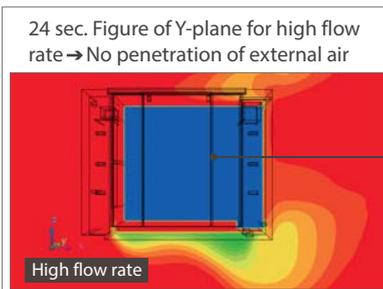
Just after the OHS starts moving (8 sec.)



During deceleration (19 sec.)



When the OHS stops (24 sec.)



Customer Comments

Being able to simulate inflow/outflow conditions on the surfaces of a moving object enabled the modeling of the fan inside the OHS. The simulations were used to evaluate the effectiveness of clean room countermeasures to prevent penetration of dust contaminated external air into the OHS.