

Window Selection For Better Natural Ventilation

Abstract

The indoor ventilation is very important as it affects the productivity of the occupants. The growing health related symptoms and demand for the electrical energy encourage the occupants to switch over to a natural ventilation. Air distribution achieves the acceptable levels of temperature, humidity, cleanliness and air motion in the occupied zone of conditioned area. Airflow and transport phenomena plays an important role in air quality. The main purpose of this study is to investigate the indoor air flow passing through doors and windows inside the room using CFD simulation. In the design of natural ventilation system, there is a wide range of possibilities with regard to the selection of window type and the positioning of windows, doors and ventilators. The experiment is performed by simulating a simplified room geometry. The study of Positioning the window at different location in the room is done considering the following cases.

Case 1. The supply of the air is introduced at the middle portion inlet wall and the exhaust air leaves the room through the ventilator.

Case 2. The supply of the air is introduced at the middle portion inlet wall and the exhaust air leaves the room through the mid zone.

Case 3. The supply of the air is introduced at the middle portion inlet wall and the exhaust air leaves the room through the roof zone

The grid is made in Ansys software and then exported to OpenFoam for the simulation. Geometries for every cases are mentioned below.

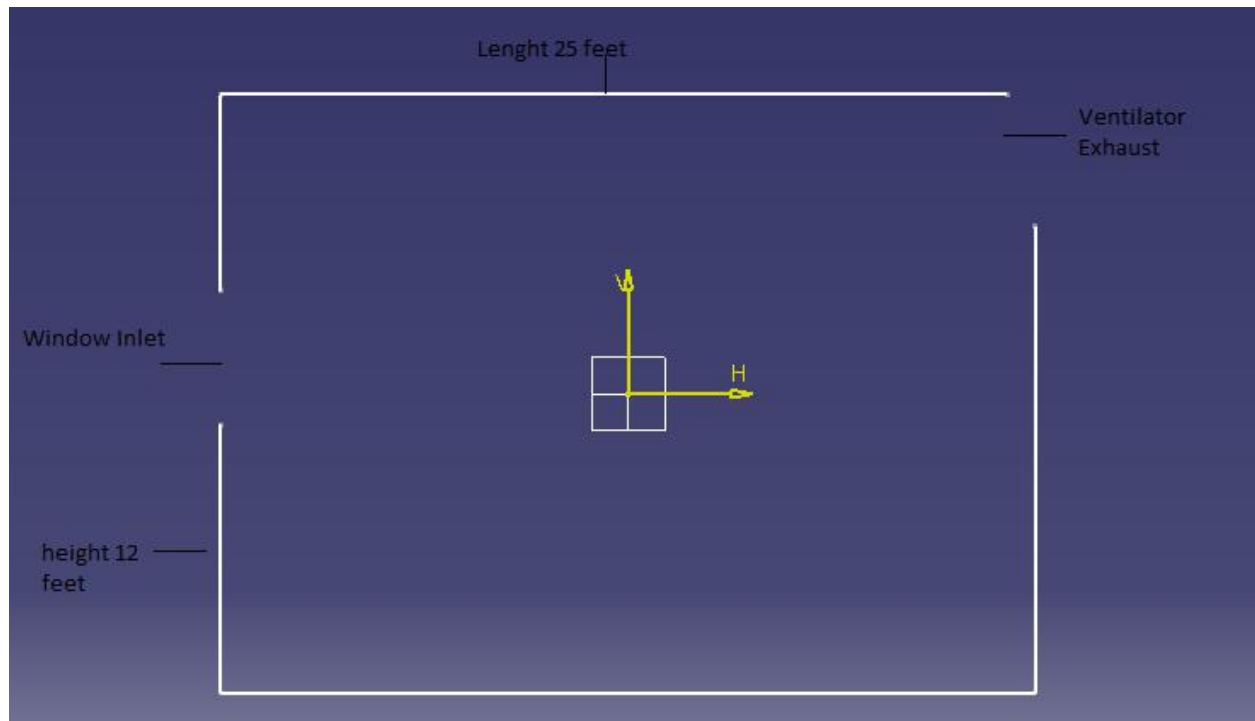


Fig 1 The outline sketch of Case 1

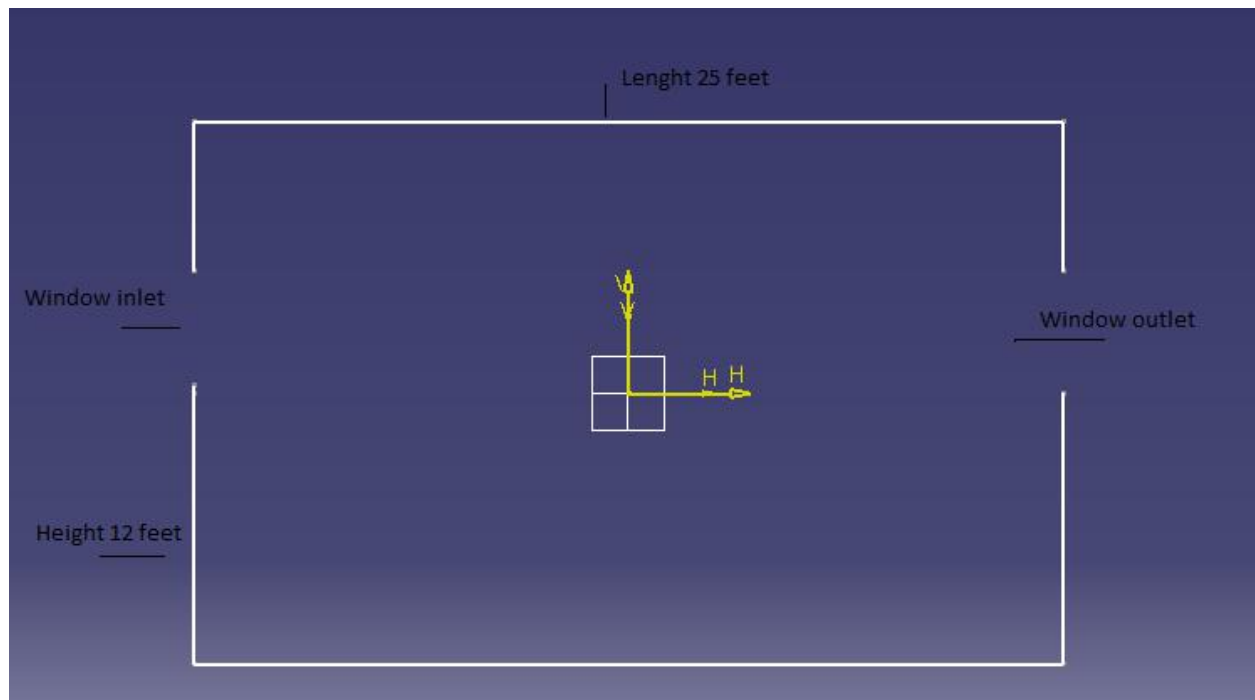


Fig 2 The outline sketch of Case 2

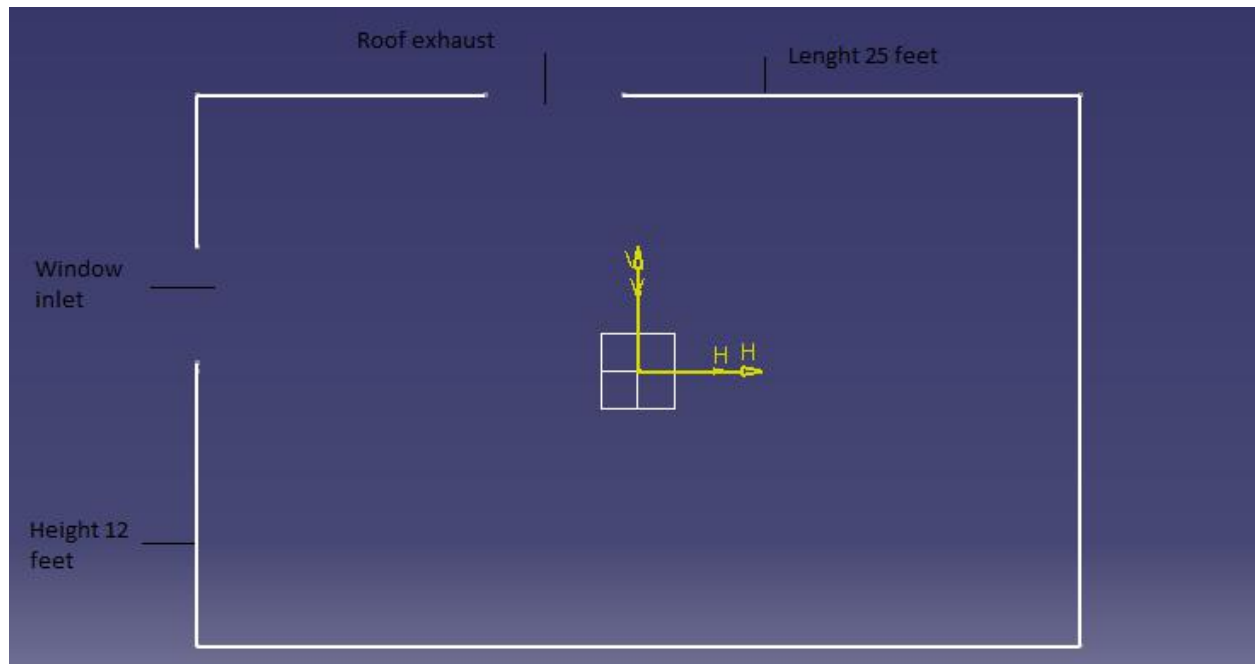


Fig 3 The outline sketch of Case 3

Keywords: Air Distribution, CFD simulation, Laminar

Boundary Conditions

Velocity = 10 m/s (At inlet)

Pressure = 101325 pa (Standard atmospheric condition)

Density = 1.22 kg/m³

Reference

1. Experimental Study of Air Distribution and Ventilation Effectiveness in a Room with a Combination of Different Mechanical Ventilation and Heating/Cooling Systems

Bjarne W. Olesen, Angela Simone, Michal Krajčlík, Francesco Causone & Michele De Carli

Pages 371-383 | Published online: 29 Mar 2016.

2. Transient natural ventilation of a room with a distributed heat source SHAUN D. FITZGERALD ^(a1) and ANDREW W. WOODS ^(a1) DOI: <https://doi.org/10.1017/S0022112007007598> Published online by Cambridge University Press: 30 October 2007