MC2™ PortalWall®
YONATAN ZVI MARGALIT
INVENTOR & OWNER

Airflow Modelling through Portalwall

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For: Portalwall

CFD Methodology

- At intake side of the portalwall, velocity is defined and the standard air properties at temperature 20 ˚C were applied.

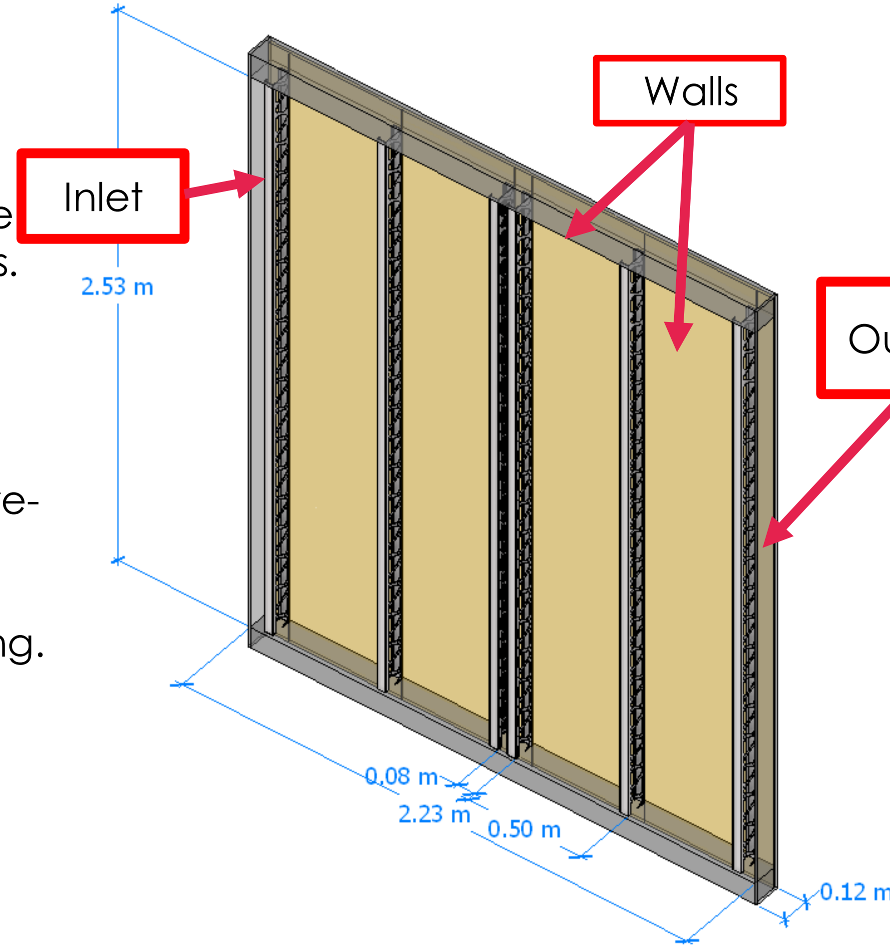
- At outlet side of the portalwall, zero gradient of velocity of air is assumed.

- The walls were modelled to be adiabatic and air is isothermal. The no slip condition was applied and zero velocity in the tree direction (Ux=Uy=Uz=0) was used for walls.

- Three dimensional steady CFD Analysis Was performed for solving the momentum, continuity. The RANS SST turbulence model was used to solve turbulence transport equations, with the both standard wall function model for near wall treatment. Finite Volume Discretization (FVM) is employed to approximate the governing equation. Interpolation scheme is employed for solution of governing equation.

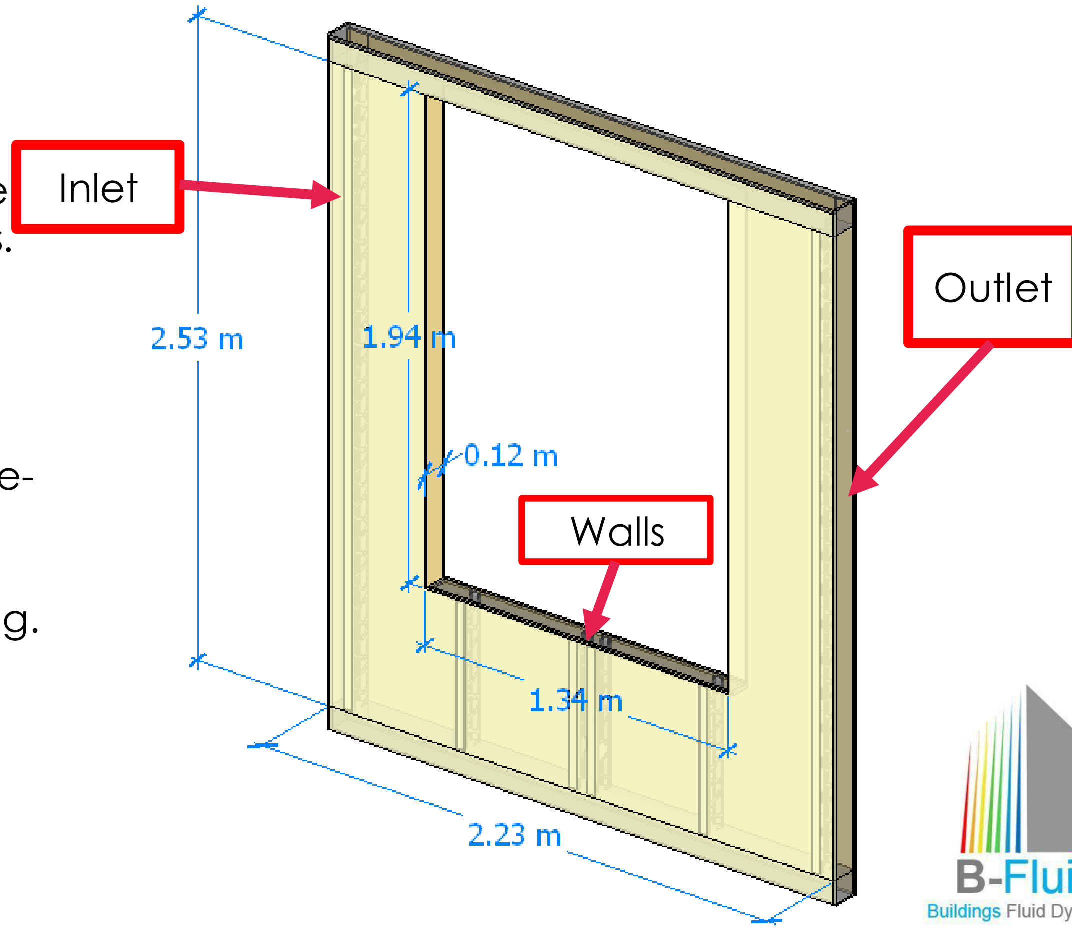
Boundary Condition and Dimensions Model A

- Fluid is considered to be incompressible.
- Default initial conditions implemented in the computer code are used for the simulations.
- OpenFoam software is applied for solving Navier-Stokes equations.
- SketchUp and OpenFoam are utilized for pre-processing and mesh generation.
- Paraview software is used for post-processing.



Boundary Condition and Dimensions Model B

- Fluid is considered to be incompressible.
- Default initial conditions implemented in the computer code are used for the simulations.
- OpenFoam software is applied for solving Navier-Stokes equations.
- SketchUp and OpenFoam are utilized for pre-processing and mesh generation.
- Paraview software is used for post-processing.



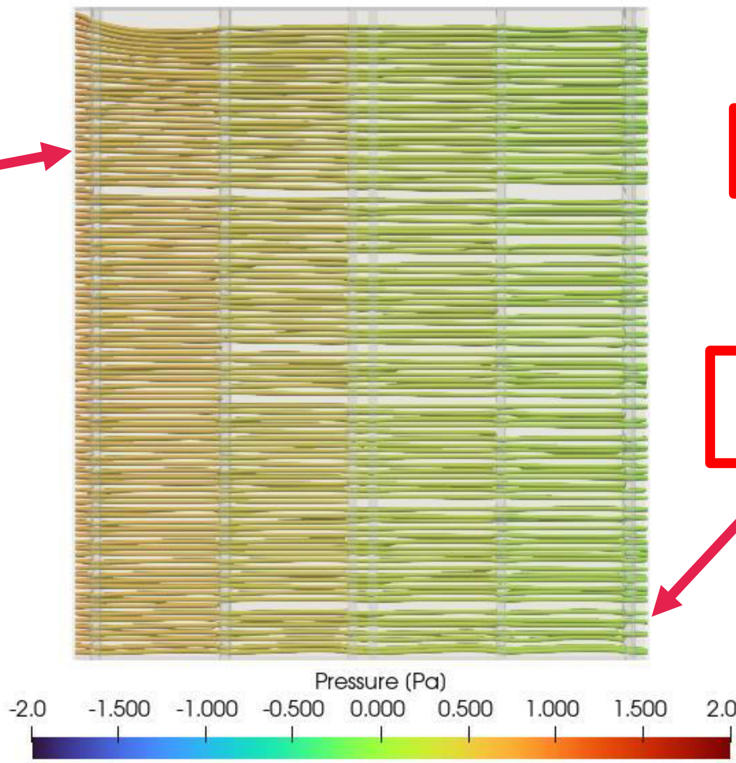
Model A
(air flow: 0.046 l/s)

Please note that for the results images the following scales have been used:

- Velocity Range: 0 – 0.3 m/s
- Pressure Range: -2 – 2 Pa

CFD Results – Model A

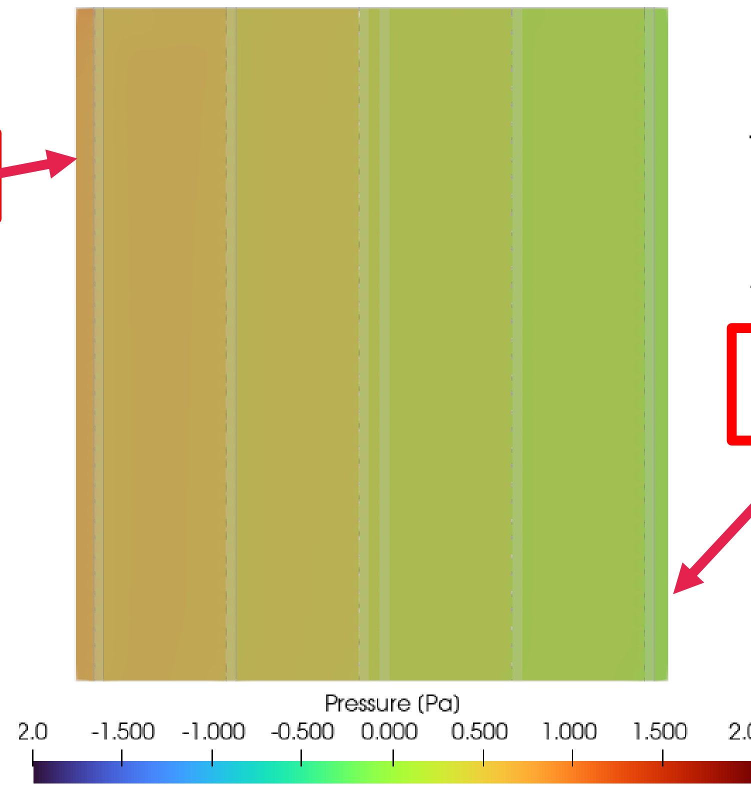
Inlet



Outlet

Air flow direction

Inlet

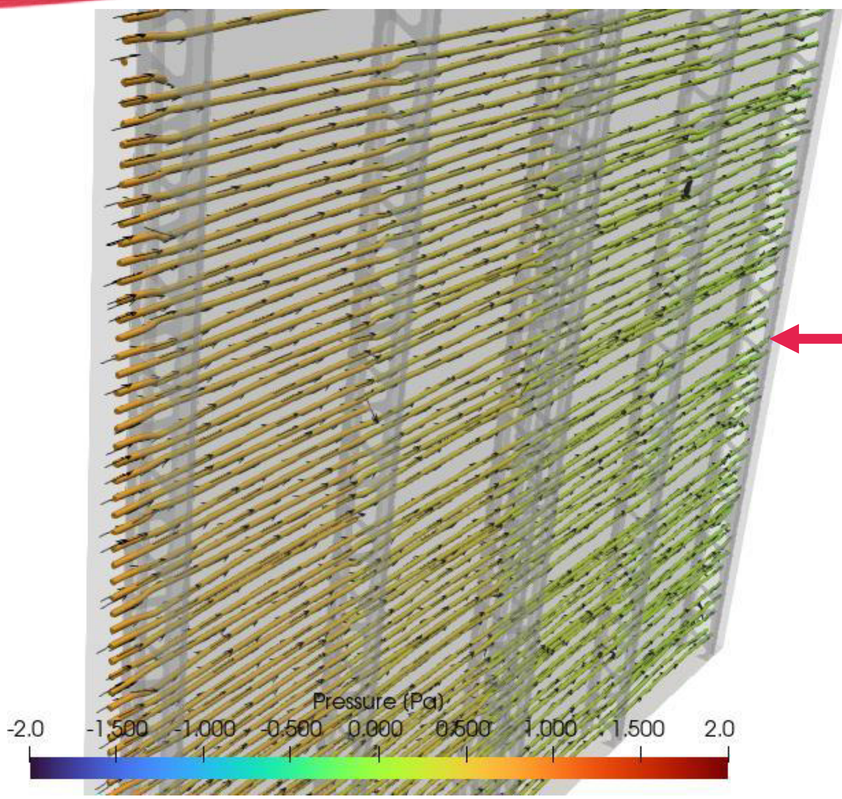


The loss of pressure is minimal in this model

Outlet

Air flow direction

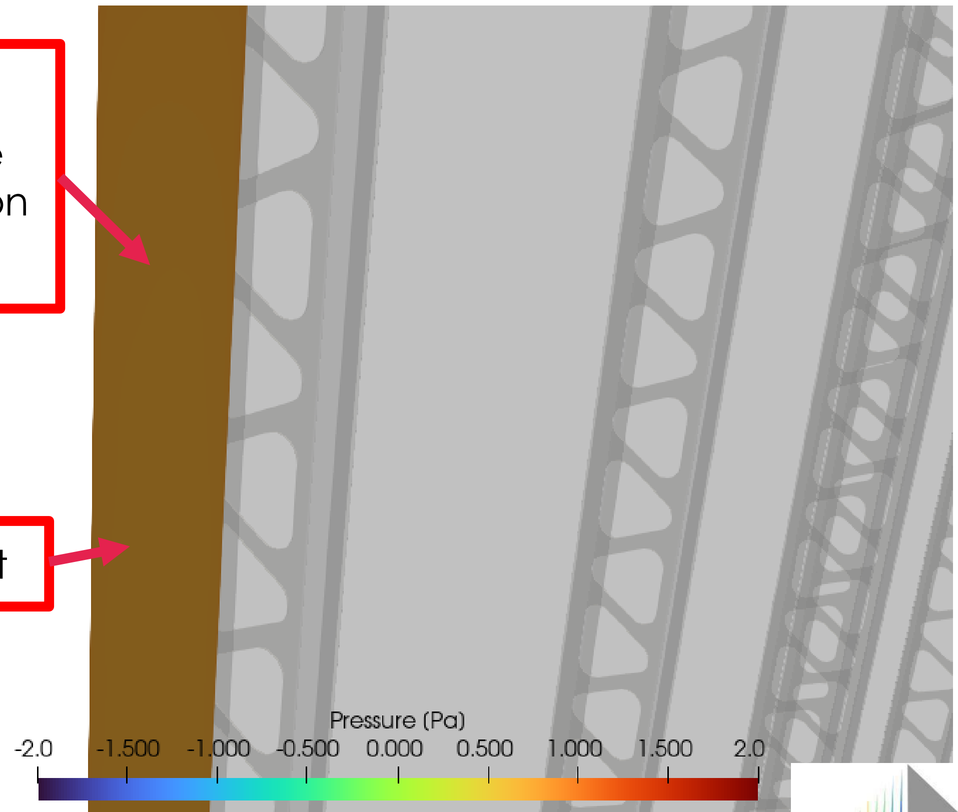
CFD Results – Model A



Uniform pressure distribution at Inlet

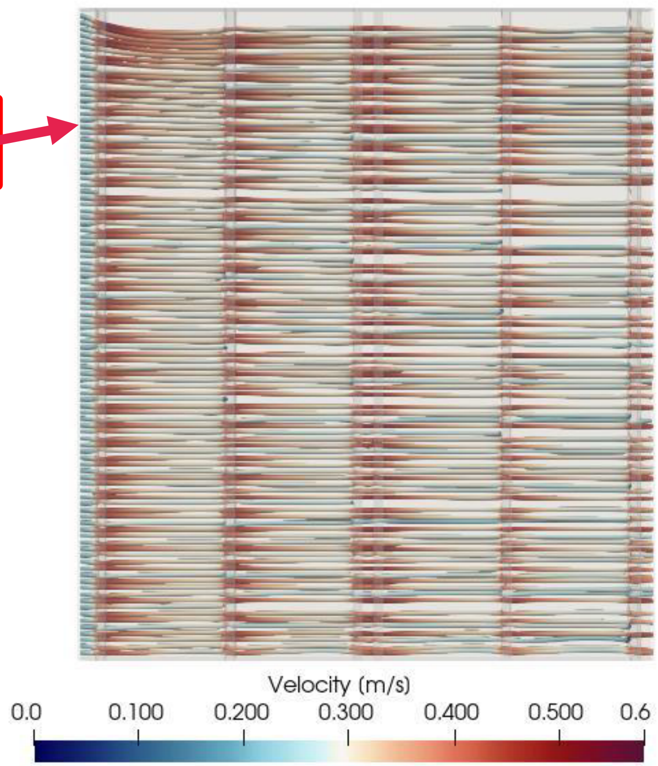
Outlet

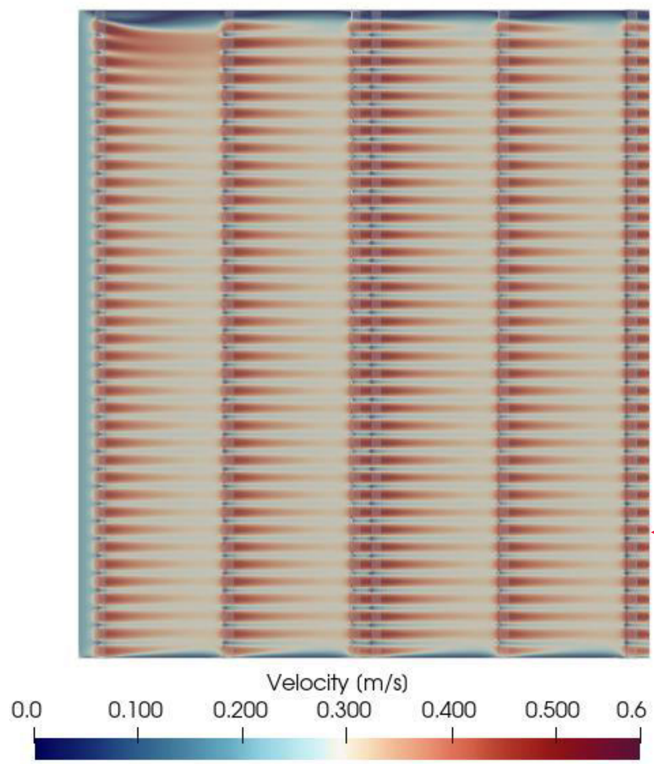
Inlet



CFD Results – Model A

Inlet





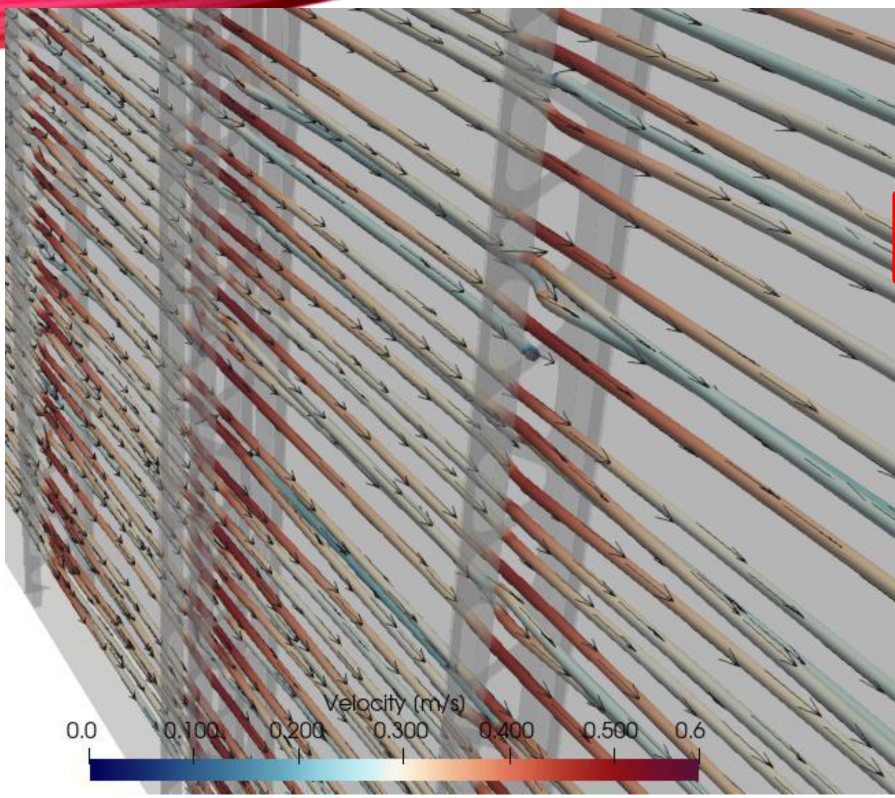
A uniform distribution of air flow results a consistent air age throughout, allowing for optimal replacement of stale air with fresh air.

Outlet

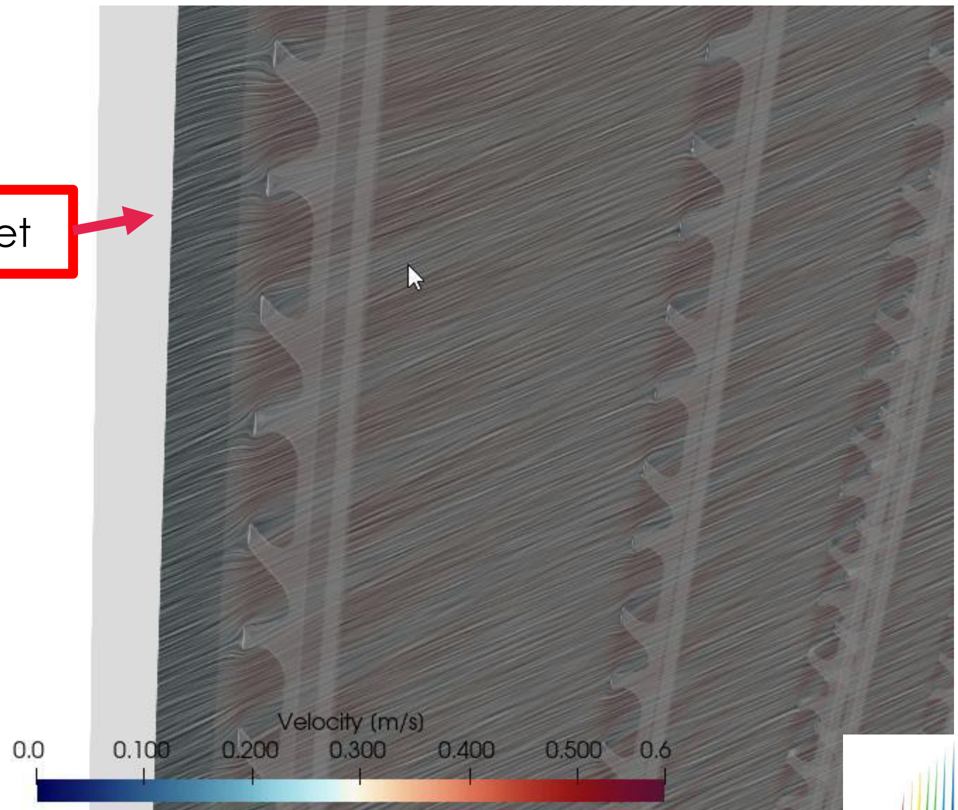
Air flow direction

Air flow direction

CFD Results – Model A



Inlet



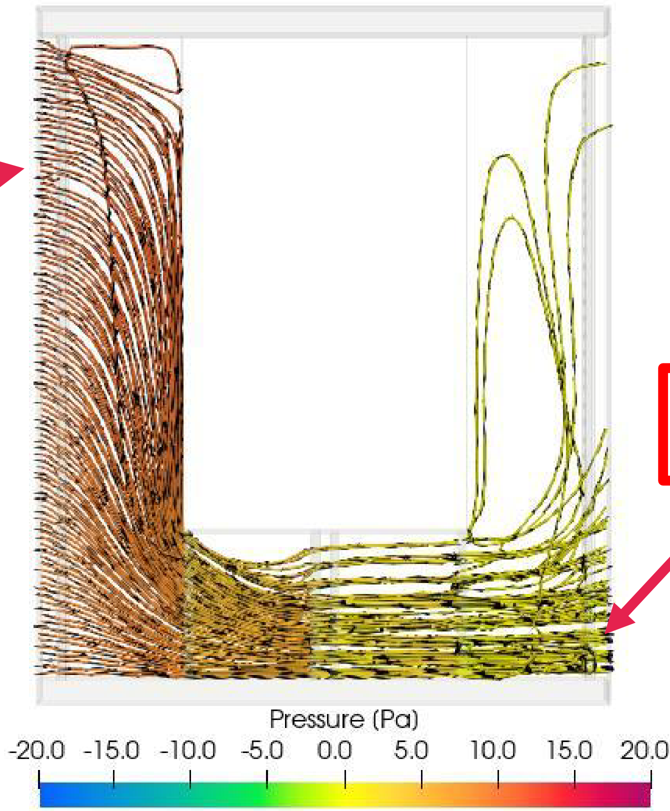
Model B
(air flow: 0.046 l/s)

Please note that for the results images the following scales have been used:

- Velocity Range: 0 – 2.7 m/s
- Pressure Range: -20 – 20 Pa

CFD Results – Model B

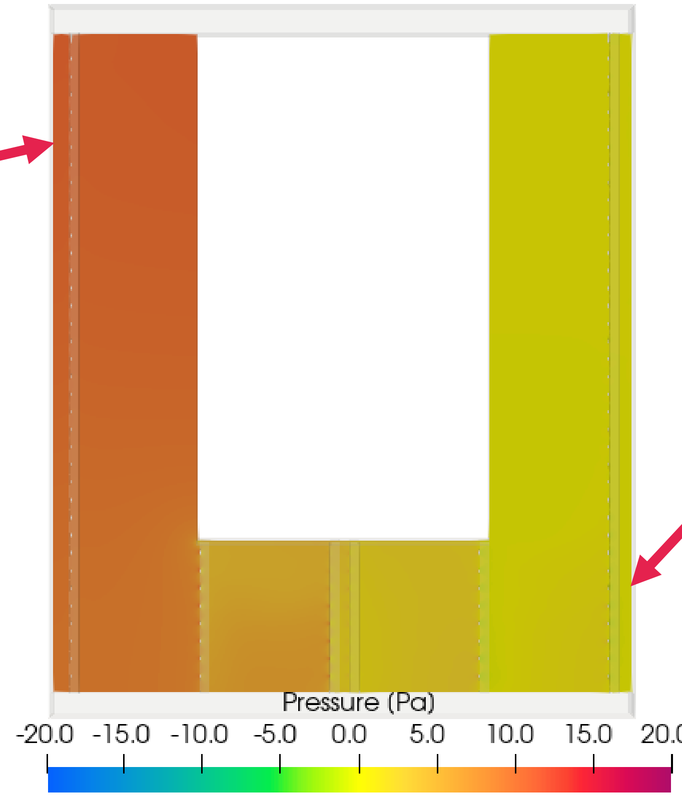
Inlet



Outlet

Air flow direction

Inlet



The loss of pressure is minimal in this model

Outlet

Air flow direction

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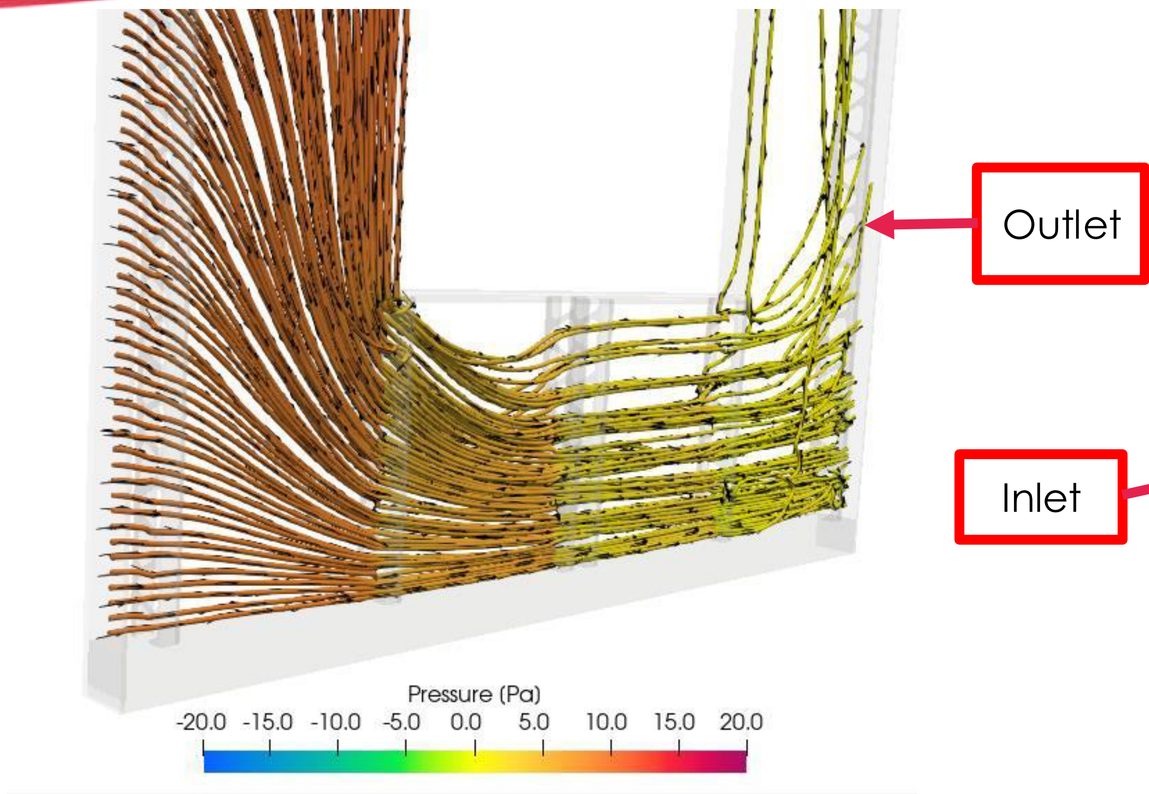
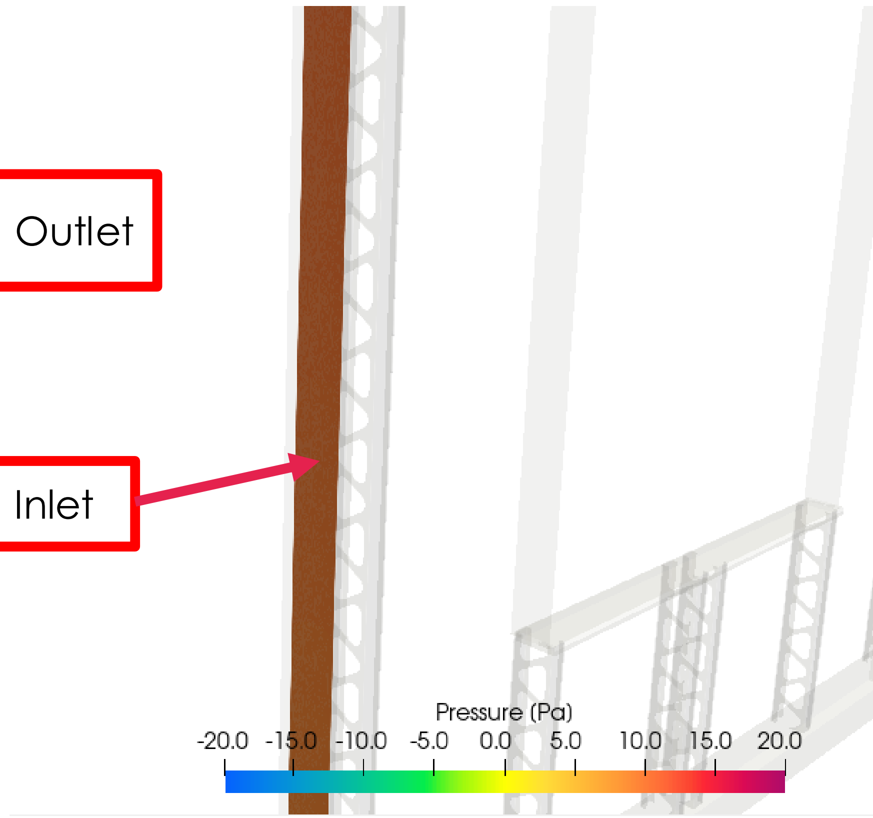
CFD Results – Model B





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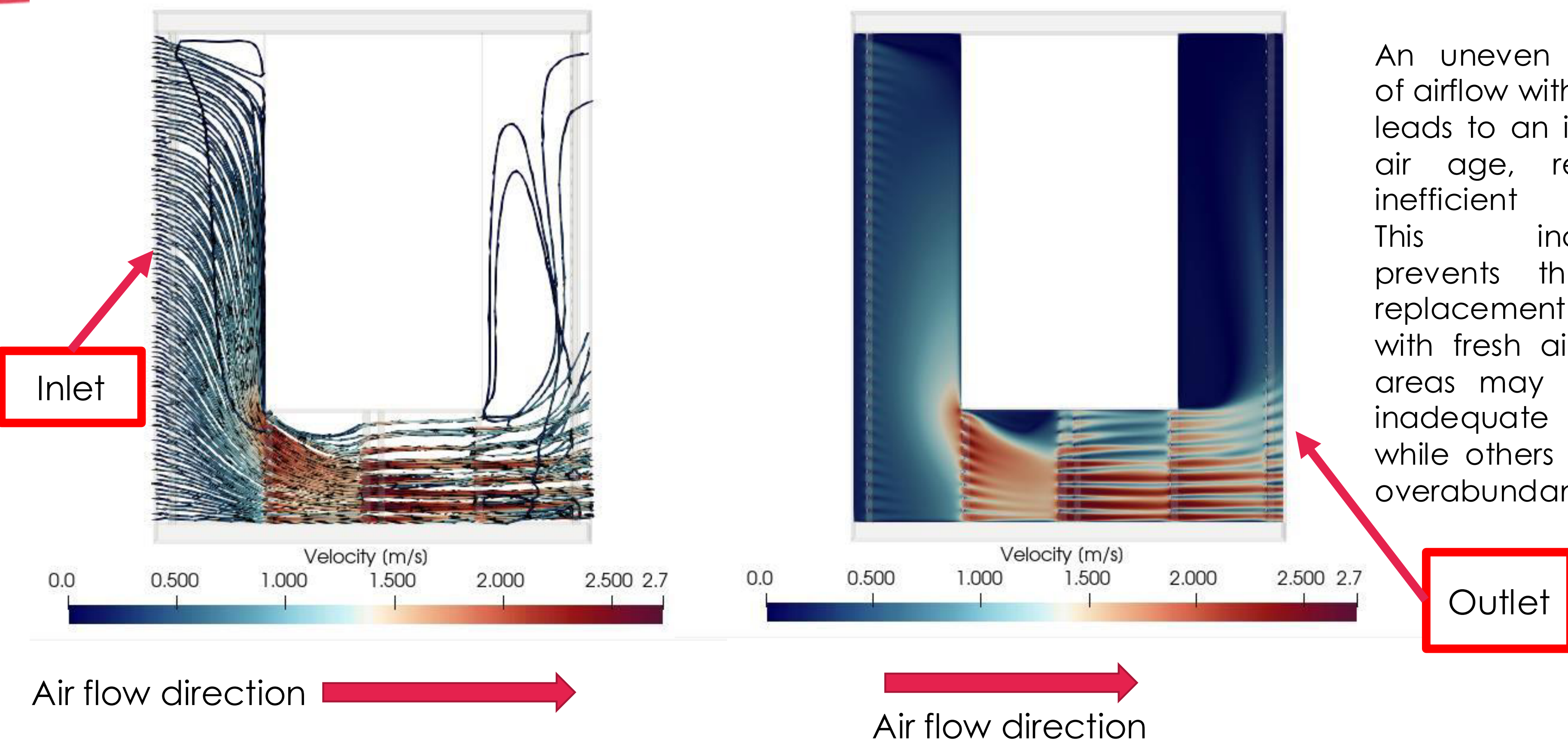
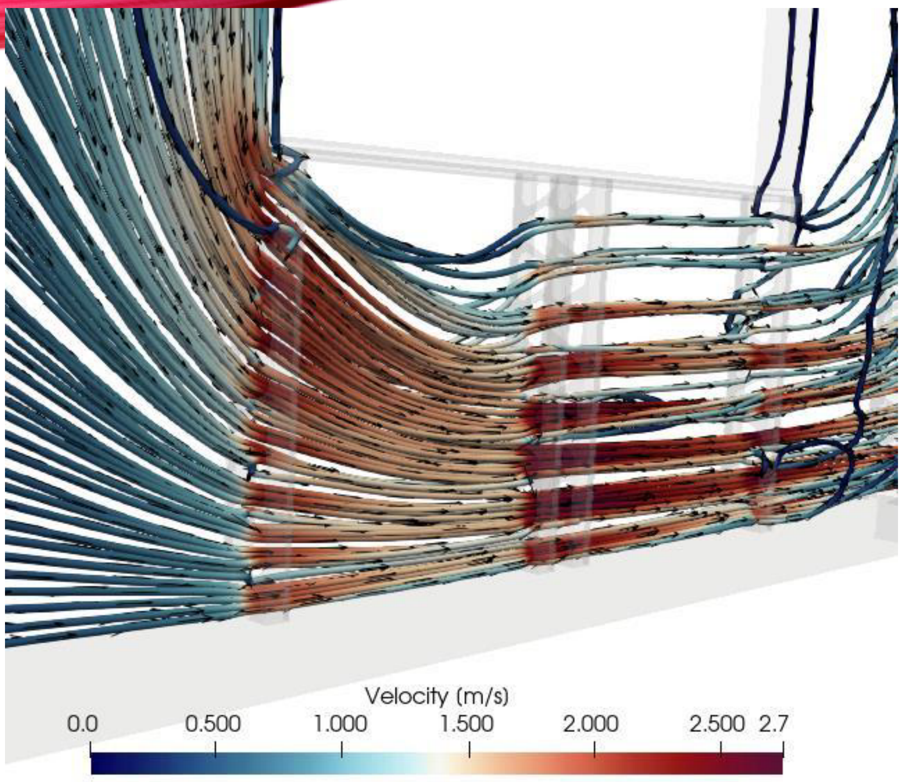
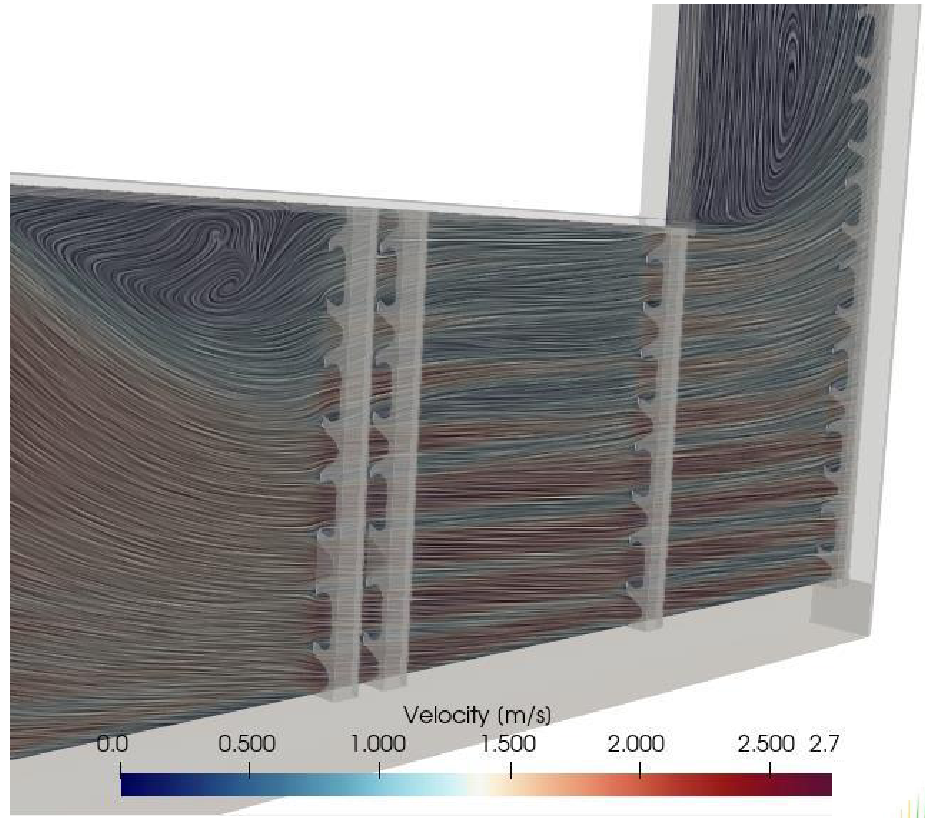
CFD Results – Model B



An uneven distribution of airflow within a space leads to an inconsistent air age, resulting in inefficient ventilation. This inconsistency prevents the uniform replacement of stale air with fresh air, as some areas may experience inadequate airflow while others receive an overabundance.

CFD Results – Model B





Summary of Conclusions

Case	Pressure drop (Pa)	Average Air speed at inlet (m/s)*
Air flow 0.046 l/s – Model A	2	0.2
Air flow 0.046 l/s – Model B	11	0.2

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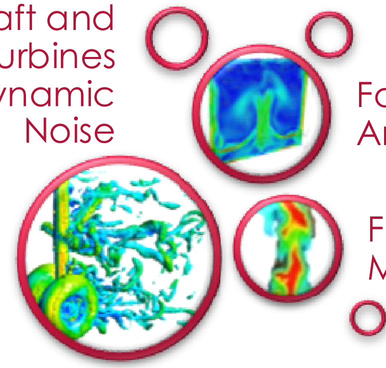
Flow Testing

Aeroacoustics Testing

Wind Tunnel Tests

On Site Smoke Testing

CFD and Multi-Physics Modelling



Aircraft and Wind Turbines Aerodynamic Noise

Façade Thermal Analysis

Fire and Smoke Modelling

Urban and Buildings Aeroacoustics

CFD & HVAC Analysis

Wind Impact study

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