Success Story: Complete Product Development Innovation

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Design | Engineering | Innovations

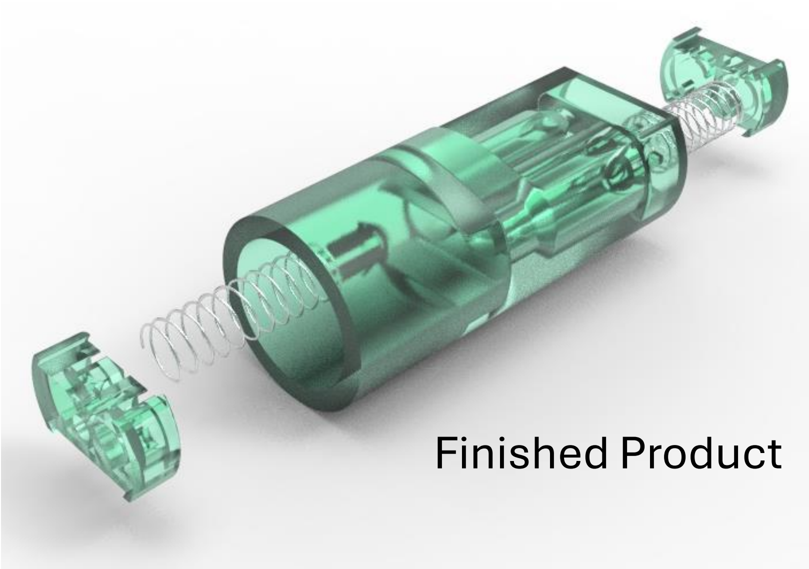
Project Brief: The requirements to have a valve that will open inwards to let air into the lungs when the pressure drops below a certain value and to let air out when the pressure goes above a certain value. This project was won by a competitive tender process via Interreg and Boost4Health initiatives.

Activities Carried Out:

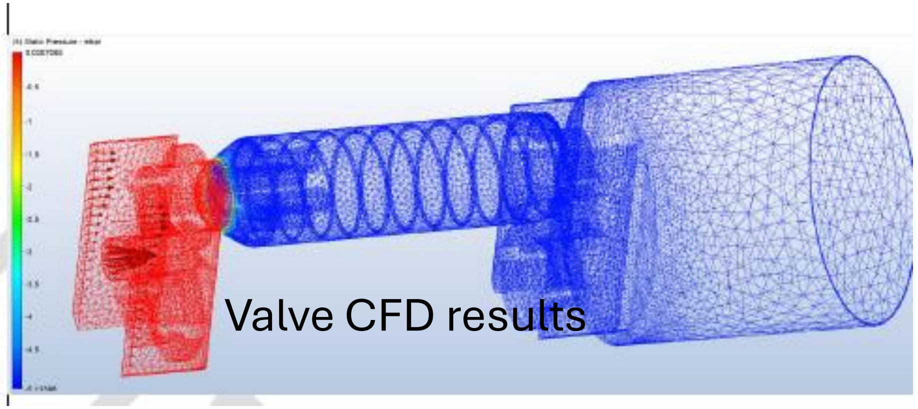
Complete development of the valve including 3D modelling, CFD, FEA, manufacturability and full scale commercialisation in accordance with **ISO13485**. CFD to determine pressure to calculate force required to overcome spring-rates, enabling opening and closing of the valve.

Outcome: Successful Delivery of the Design Package.

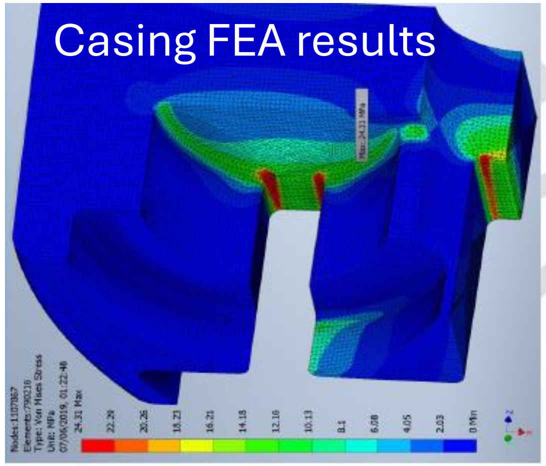
Benefits to Client: Product development where none exists, design, and verification within time, to cost, and assessment of multiple options.



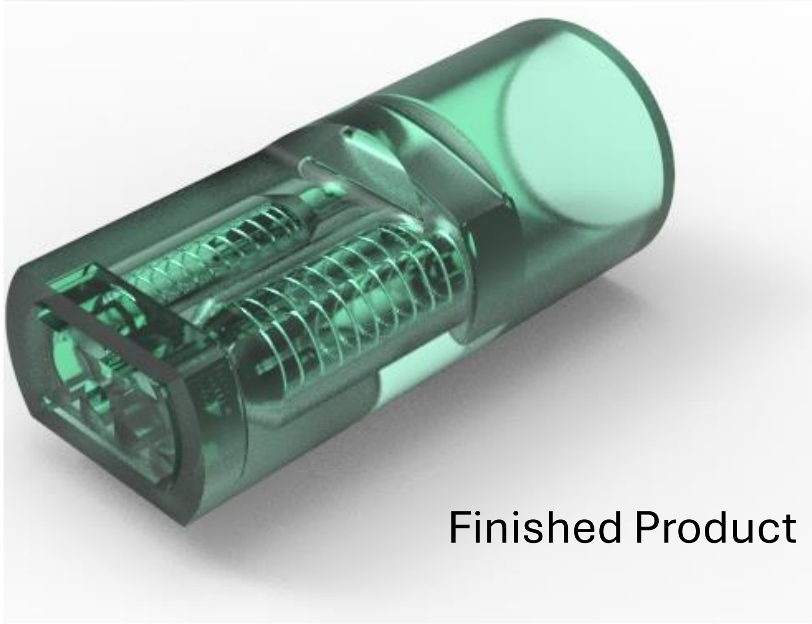
Finished Product



Valve CFD results



Casing FEA results



Finished Product

Alignment With UN SDGs

Link to Interreg North West Europe Project Brochure

Success Story: Product Design and Development

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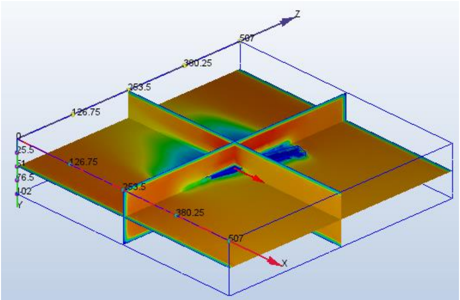
Project Brief: We were required to help with the selection of motors and drivelines for a set of marine antennae mounted on cruise ships to ensure smooth operations in wind-speeds in excess of 100 miles/hour.

Activities Carried Out:

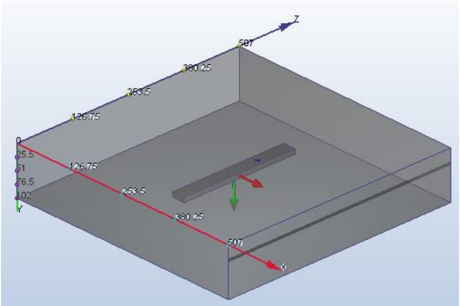
The fluid volume around the antenna was modelled using Autodesk CFD to determine the pressure-drop and forces on the antenna faces. We carried out transient analyses with moving reference frames. The forces were then used to back-calculate the power required to drive the antenna. This then helped determine the appropriate motor and driveline.

Outcome: Successful delivery of project, enabling manufacture of the antenna rotor system as per original schedule..

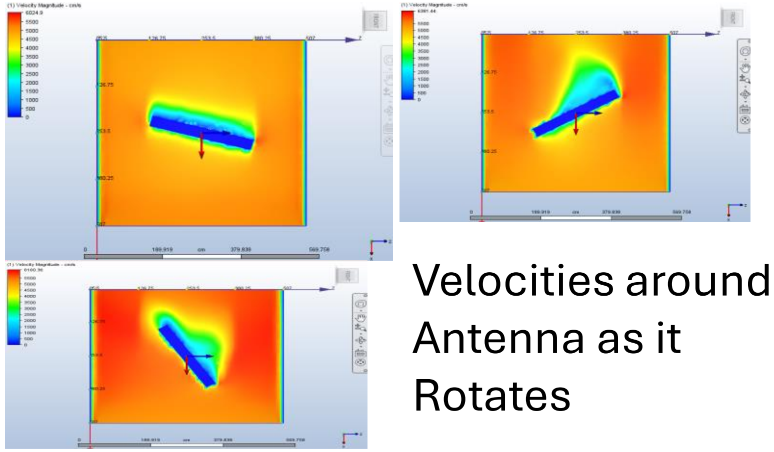
Benefits: Use of numerical modelling and simulation to stay within project timelines and provide a robust solution with all testing and calculations done virtually.



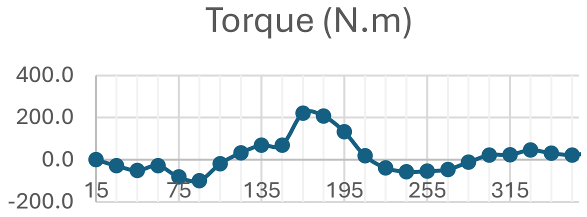
Velocities around Antenna



Antenna with Fluid Volume



Velocities around Antenna as it Rotates

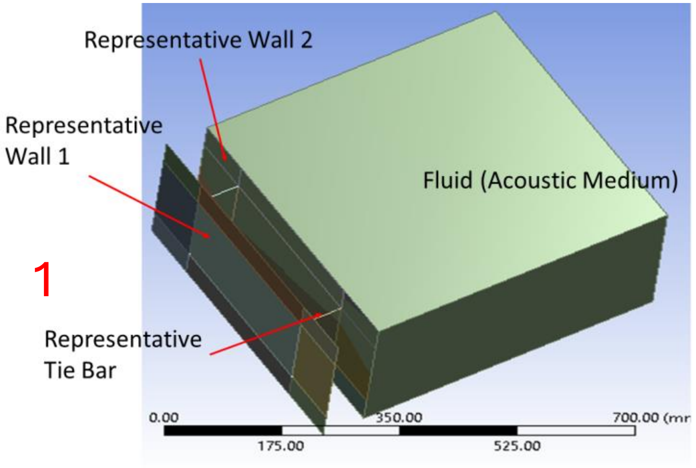


2535x273.5x102 Antenna					
wind speed	100	100	50	50	knots
antenna length	2535	2535	2535	2535	mm
antenna height	102	102	102	102	mm
air density	1.2	1.2	1.2	1.2	kg/m^3
wind speed	51.44	51.44	25.72	25.72	m/s
wind pressure	1587.6	1587.6	396.9	396.9	N/m^2
antenna side area	0.25857	0.25857	0.25857	0.25857	m^2
rotating force	205.3	205.3	51.3	51.3	N
rotation radius	1.2675	1.2675	1.2675	1.2675	m
wind/drag torque	260.2	260.2	65.0	65.0	N.m
Mass	22	22	22	22	kg
Motor Speed	50	25	50	25	rpm
Motor Speed	0.8333	0.4167	0.8333	0.4167	rps
Motor Speed	5.2360	2.6180	5.2360	2.6180	rad/s
time to full speed	1	1	1	1	s
acceleration	5.236	2.618	5.236	2.618	rad/s^2
Mass Inertia	11.80	11.80	11.80	11.80	kg.m^2
Torque Inertia	61.8	30.9	61.8	30.9	N.m
Motor Torque	322.0	291.1	126.8	95.9	N.m
Motor Power	1685.8	762.0	664.1	251.2	W

Calculation of motor power and torque

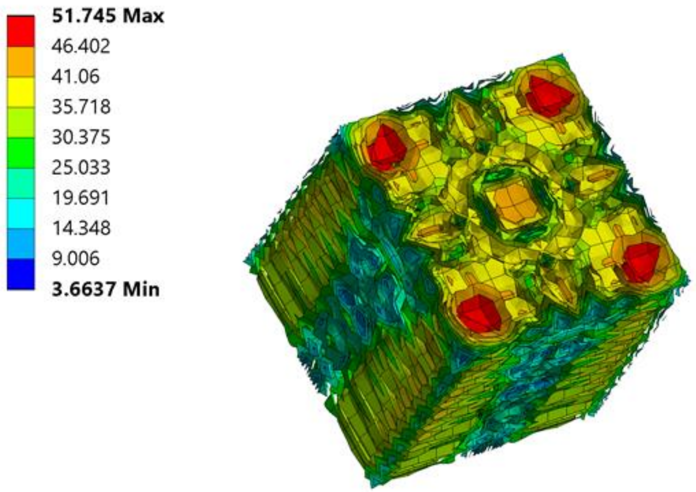
Alignment With UN

Acoustics Modelling of a Room



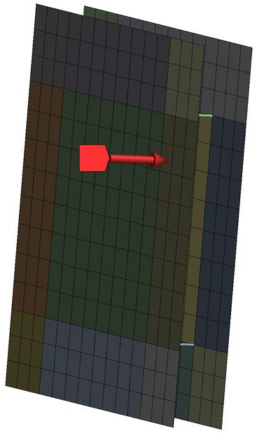
1

Iso-surfaces of sound pressure levels at two different frequencies



4

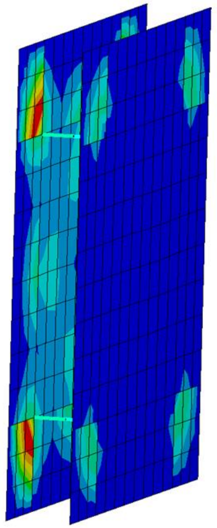
Application of a known magnitude force (excitation), with appropriate constraints on the wall

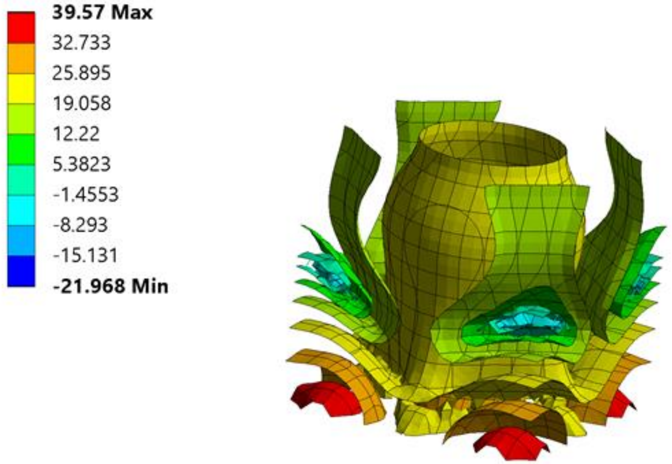


2

Results of the harmonic response (shown here) are imported as inputs into the acoustics analysis.

3





Design Optimisation of a Hall for Thermal Comfort

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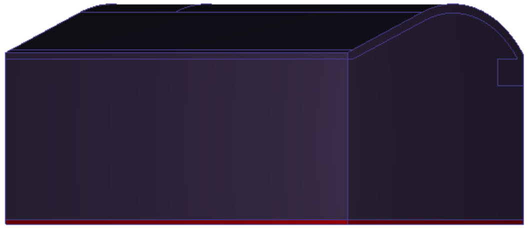

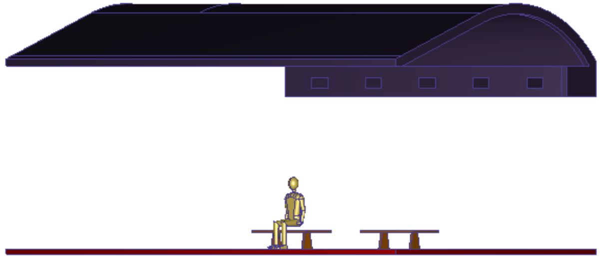

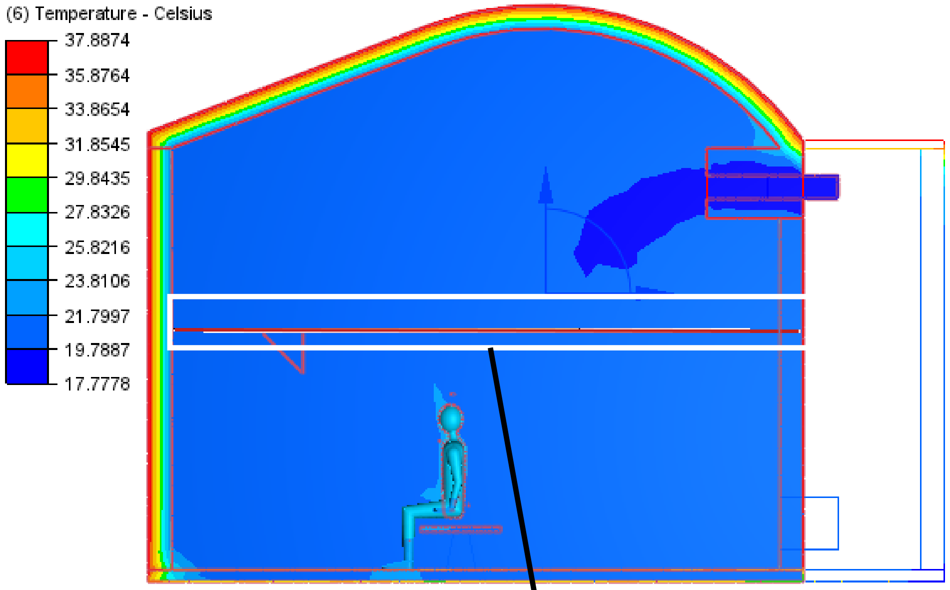

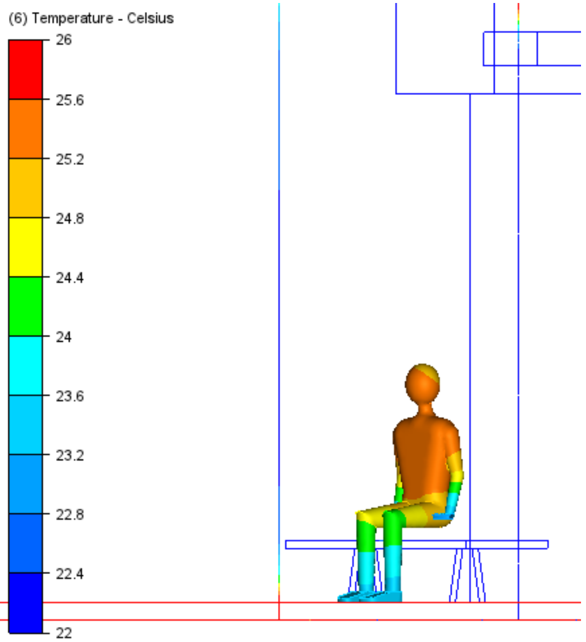

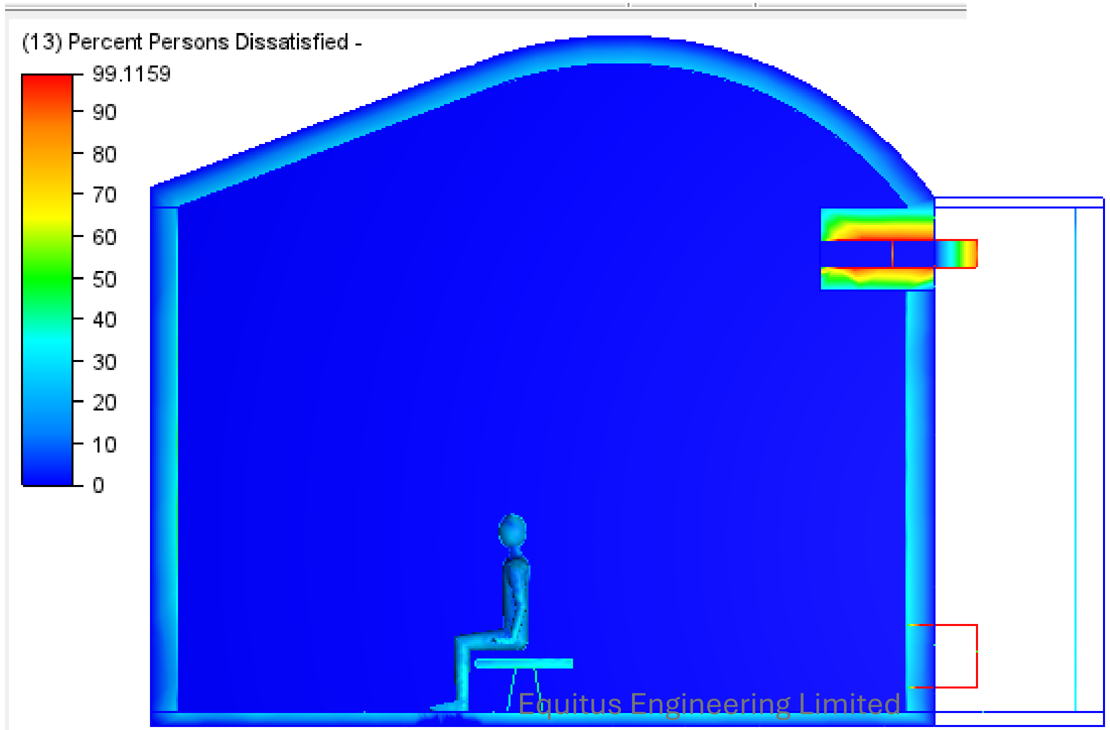

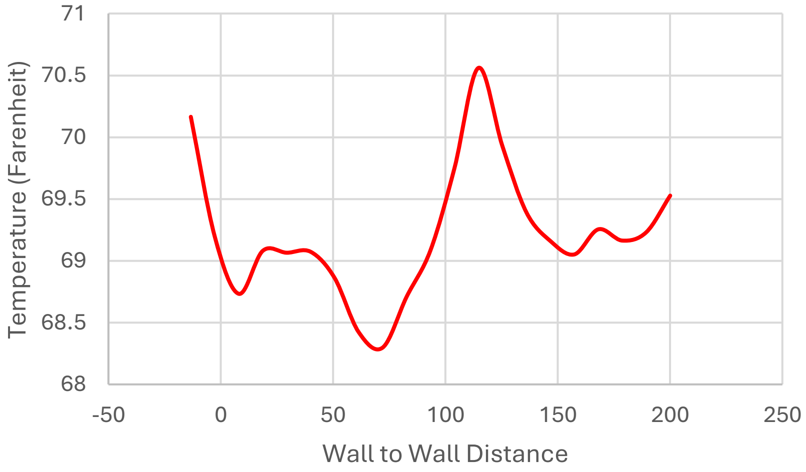

Design Optimisation of a Hall for Thermal Comfort (Contd)

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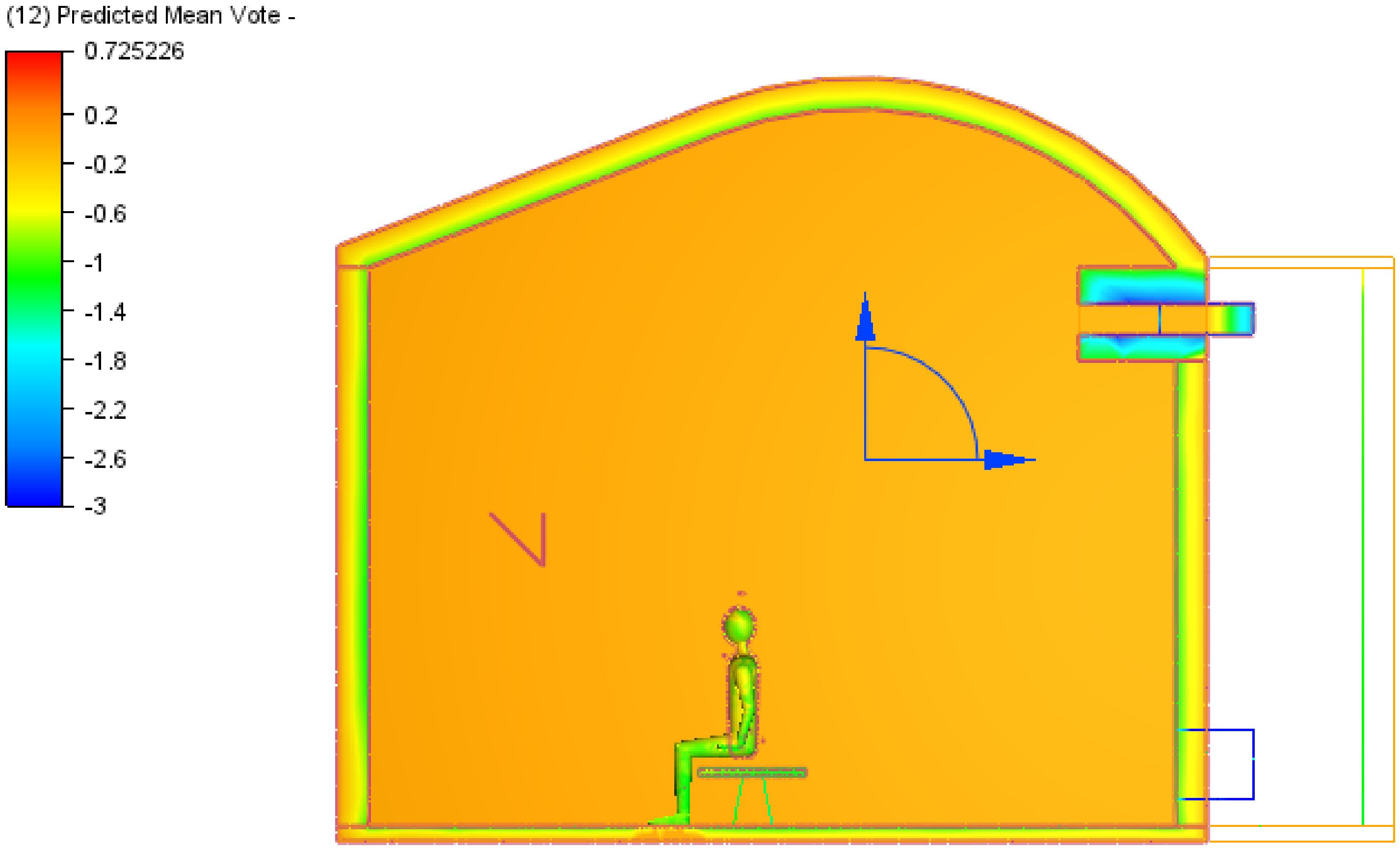

The predicted mean vote is an empirical fit to the human sensation of thermal comfort. It was later adopted as an ISO standard. It predicts the average vote of a large group of people on the a seven-point thermal sensation scale where:

+3 = hot
+2 = warm
+1 = slightly warm
0 = neutral
-1 = slightly cool
-2 = cool
-3 = cold

Alignment With UN SDGs

Design Optimisation of a Server Room

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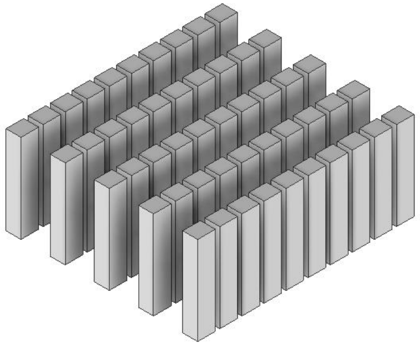
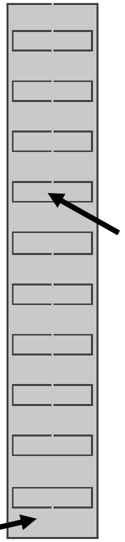
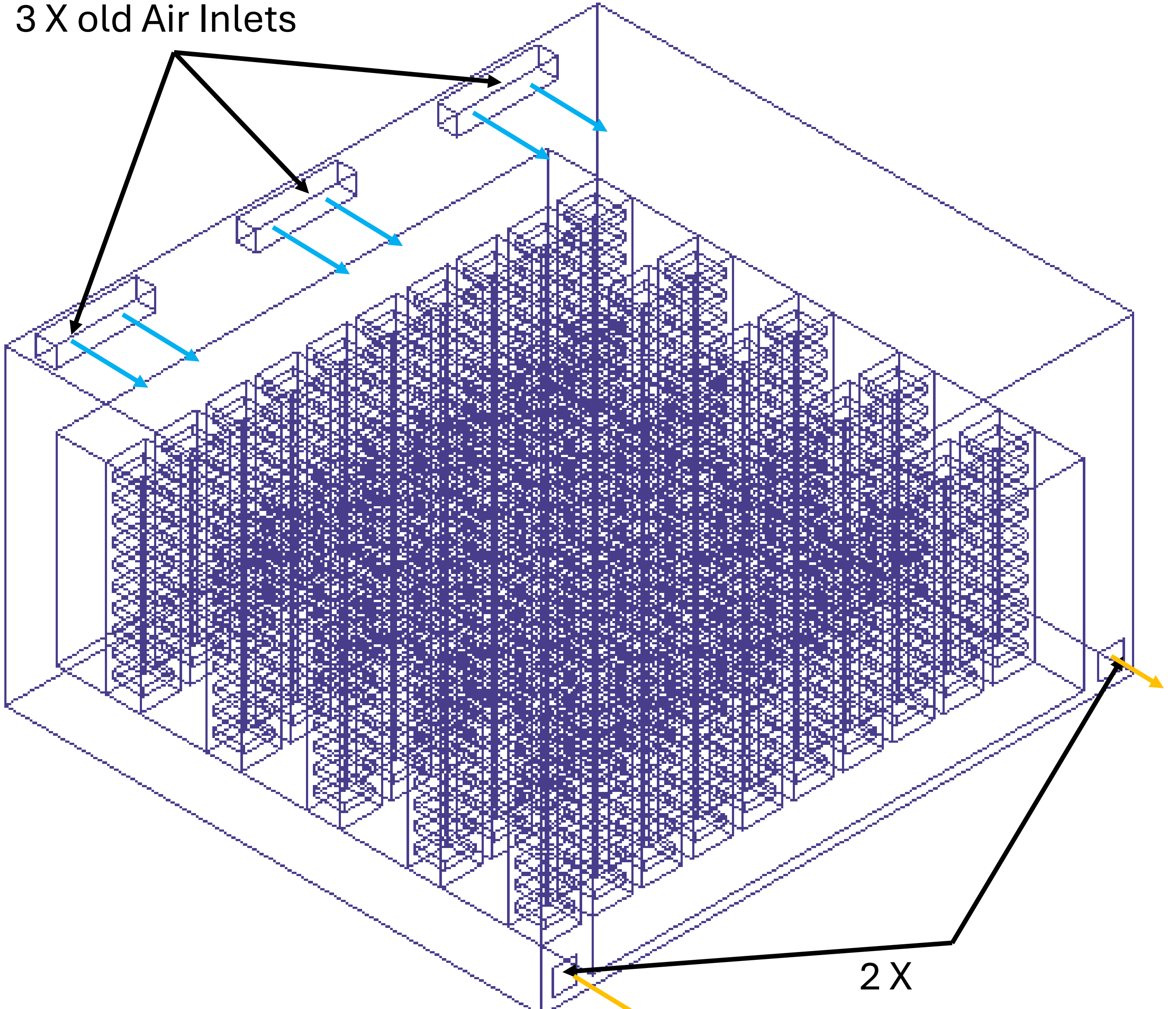
Server Rack Grid



Individual Tower





What is the optimum cooling layout to keep temperatures below X°C?

Design Optimisation of a Server Room (Contd)

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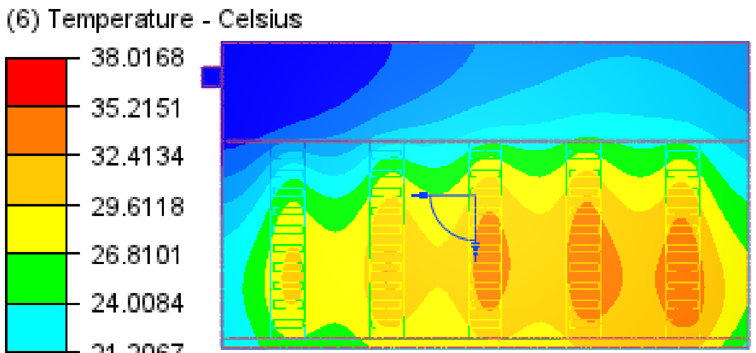
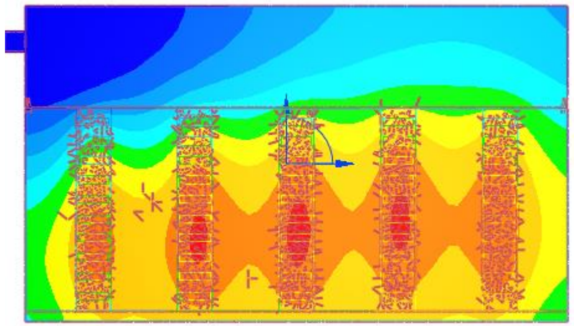
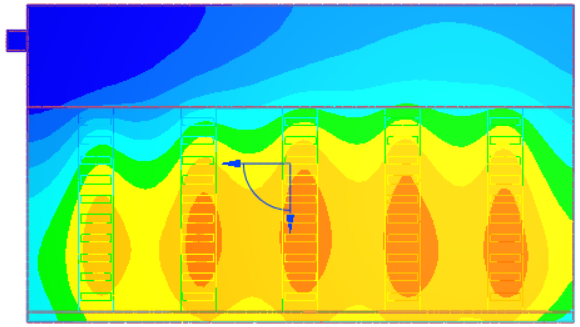
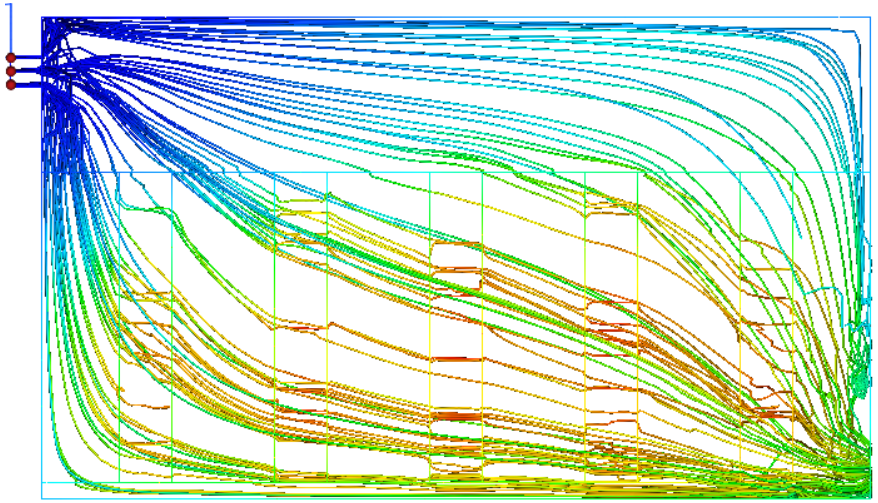
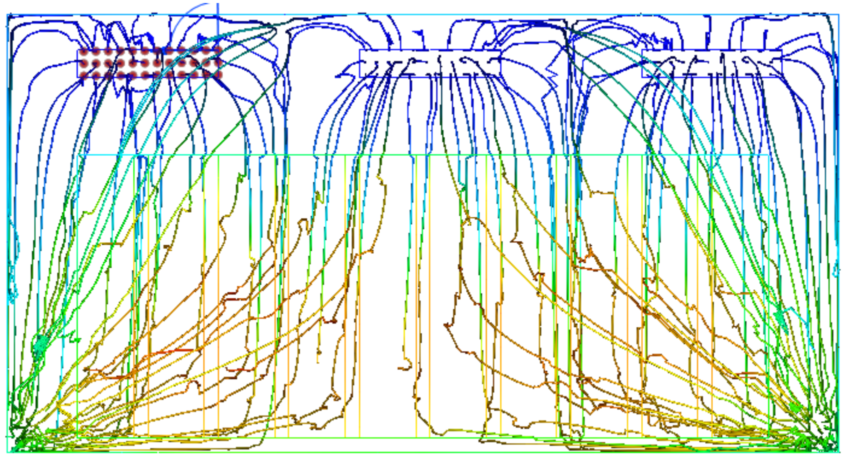


Cold Air Inlet 1


Cold Air Inlet 2


Cold Air Inlet 3


Traces Showing Air Movement



Alignment With UN SDGs