# VATPAL™

ASPIRE TO INSPIRE

THE **ART** AND **SCIENCE** OF **AIR DISTRIBUTION**

INNOVATIVE END-TO-END SOLUTIONS IN HVAC

## OUR MISSION

"To empower stakeholders through trusted relationships and innovative technology, fostering sustainable progress and creating lasting value for our community and beyond."

## OUR VISION

To empower  a connected world through the seamless integration of trust and technology. We aspire to driving a sustainable progress, and shaping a brighter tomorrow for generations to come.

## OUR MOTTO

Growing Together with Trust and Technology for sustainable future

## OUR OFFERINGS

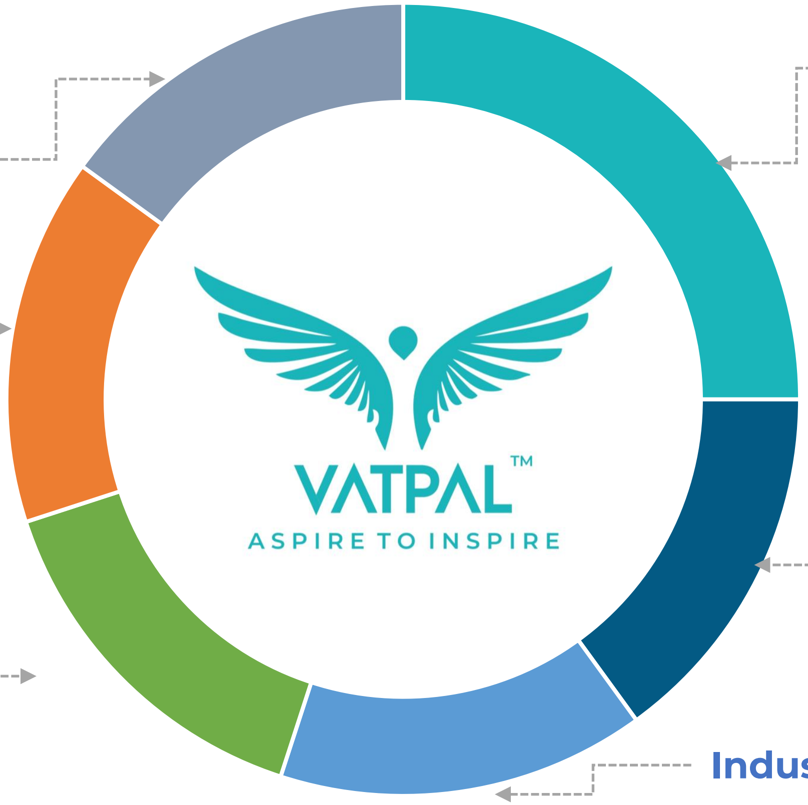
### 360° solutions with Technology JV with Worlds Leader's with unique solutions

Coated technical textiles, , thermal mattress , films and laminates

Engineering Consultancy ,CFD Stimulations etc. Brand Management .

ClimaStyring® Technologies LLP

Chillers, Heat Pumps, CDUs




Textile Ducting and Air Distributions System

EURO AIR    KE FIBERTEC

HVAC CHW Water Solutions
Trench Cooling & FCU

KAMPMANN

Industrial Ventilations Solutions

ENVIRA-NORTH SYSTEMS LIMITED

We integrate and represent innovative Global market leaders in India, bringing all HVAC solutions under one roof.

## IN ABLE HANDS

# Ulhas Keshavsingh Vatpal

Founder and CEO

**A dynamic force in the HVAC & R industry, renowned for his expertise in reorganizing and restructuring business development and sales teams.**

With a background in Mechanical Engineering from VJTI, Mumbai and an MBA in Marketing Management from IBMS, Mumbai, he combines technical expertise with strategic acumen. His journey, enriched by roles in esteemed organizations, has consistently delivered exceptional results. His unique talent lies in translating business initiatives and marketing strategies into tangible bottom-line results, driving sales, revenue, and client growth.

**18+ years in HVAC**

Collaborator

Communicator

Motivator

Visionary

**Signature Skills**

Leadership ▪ Project Enhancement ▪ Market Entry Pioneer ▪ Strategic Leadership ▪ Market Expansion ▪ Sales Excellence ▪ ROI & EBITA Improvement

**Active Committee Member**

ASHRAE, ISHRAE, CII, RATA

**Past Professional Roles**

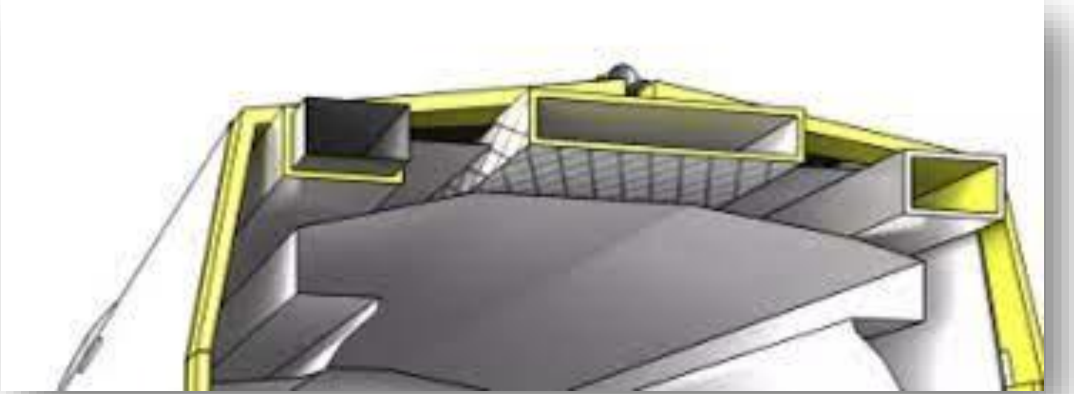
prihoda, Danfoss, BLUE STAR, VOLTAS

**Connect with Ulhas on LinkedIn** to explore potential collaborations and opportunities for remarkable growth

# “ Art & Science of Air Ducting & Distributions with unique Textiles solutions” for the Indian Railway Coaches.


## EXISTING SOLUTION FOR THE DUCTING IN RAILWAY COACHES

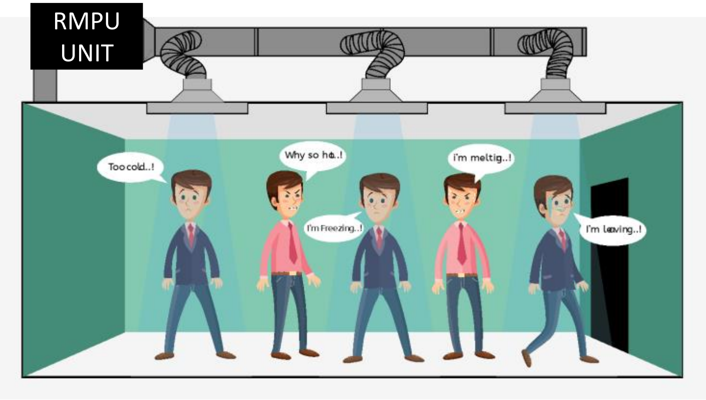
1. Aluminium Ducting with Insulation / Pre insulated Ducting



## CHALLENGES IN EXISTING CONVECTIONAL ALUMINIUM DUCTING

VATPAL™ ASPIRE TO INSPIRE

- Heavy Weight – Approx. 225 KG per Duct per coach
- Required external and internal insulation to avoid the temperature and air loss. To avoid Condensation (Water dripping)
- Hot and Cold pocket / area due to uneven air distribution.
- Dust and bacteria inside the duct – which create unhealthy environment inside the coach with high IAQ.
- Maintenance is critical and possible only with Robotics Cleaning method.
- Required Approximately 10-12 Hrs for the installation
- Insulation is not having Anti Bacterial , Anti Static properties to maintain Indoor Air Quality.




## CONVENTIONAL DUCTING

## TEXTILE DUCTING

VATPAL™
ASPIRE TO INSPIRE

# CONVENTIONAL DUCTING vs TEXTILE DUCTING

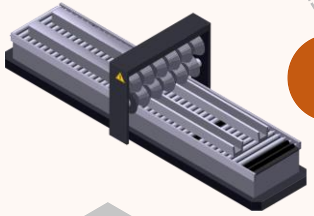
VATPAL™
ASPIRE TO INSPIRE

**01 DRAFTING**

Drafting Activities
+ Time + Co-ordination


**02 CFD REPORT DATA**

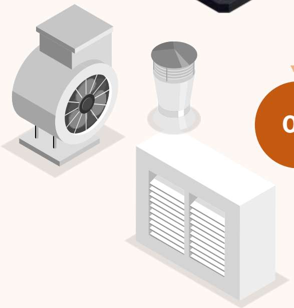
Mandatory Compliance requirement



**03 FABRICATION**

GI Sheets
(Site Fabricated / Factory fabricated)

Joints / Curvatures



**04 AIR DISTRIBUTION HARDWARE**

Grills / Diffusers / Nozzles

**05 LOGISTICS**

Material Transportation to site

**06 INSTALLATION**

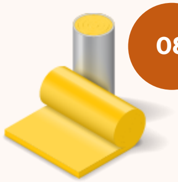
Structural Load and heavy mountings
Frames / Trusses and load bearing enclosures
Overhang mounts
Joint mounts
Carry-over mounts
Supporting brackets
Relay / Switch mounts


**07 INSTALLATION ANCILLARIES**

Volume Control Dampers
Nuts, Bolts, Fasteners, etc.
Sealants
Rubber Adhesive
PVC Tape

## CONVENTIONAL GI DUCTING

High logistics costs
Very high weight of ducting & trusses
Extremely labour-intensive process
Procurement ongoing till finishing
Lengthy, noisy & time-consuming process
Cleaning poses many challenges



**08 INSULATION**

Thermal
Acoustic

**09 FINISHING**

AL Cladding
Paint

## TEXTILE DUCTING

Minimizes or eliminates both cost and time across steps 03 to 09 of the conventional GI ducting process

# OUR SOLUTION WITH TEXTILE DUCTING & DIFFUSERS

**LOW WEIGHT**

Fabric can help you save weight.

**TAILOR-MADE**

All our products are made exactly for your needs in excellent quality.

**EASY MAINTENANCE**

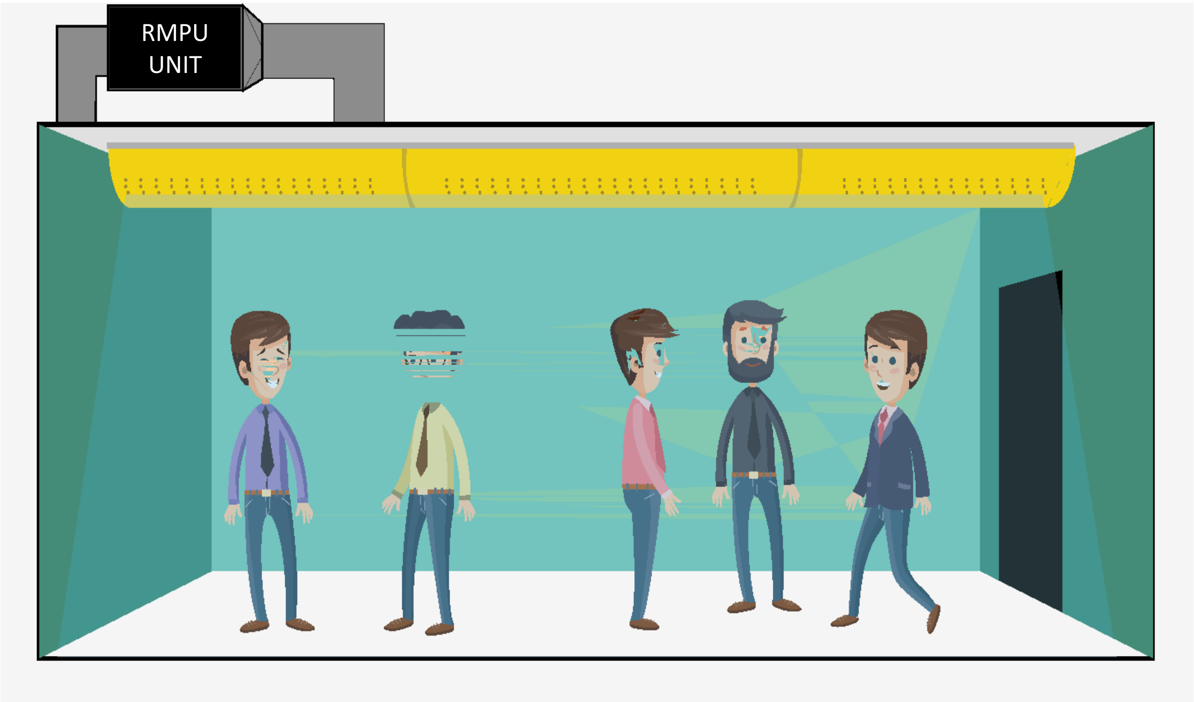
You can disinfect the ducts with ozone or use washing machine to clean them.

**AIR DISTRIBUTION DESIGN**

Precise design of the air distribution, including simulations (CFD).

**SIMPLE INSTALLATION**

Easy handling of our lightweight and flexible ducting & diffusers .



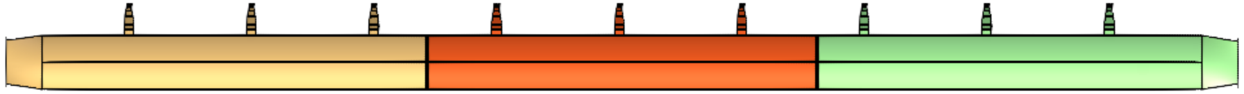
## IMPORTANT HIGHLIGHTS-

## Textile / Fabric Ducting for AC Coach

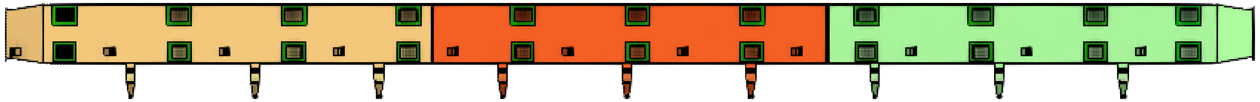
1. The ducting is **flame retardant 100% Polyester Textile material** with **EN 45545** certifications.
2. The mounting material is **corrosion resistant** material like anodised Aluminium OR SS304 with reinforced strip for holding Textile during even negative pressure.
3. The Textile ducting is **washable** in Washing Machine to keep the modularity concept of the existing ducts.
4. Total weight of Textile ducting is **47 KG** in comparison with Existing Aluminium Duct of **225 KG** per coach
5. Installation time is **6-7 Hrs** in comparisons with **12-15 hrs** of Aluminium ducting.
6. Entire coach Textile duct is Fitted with Aluminium C type channel facilitating easy assemble and dissemble process. Partitions are joined with special zip fasteners Comply with DIN 55350-18-4.1.2 to ensure zero leakage of air during operation.
7. **Anti-bacterial properties** to make hygienically certified solution for coaches.
8. **Anti-static properties** keep dust free surface of textile ducting.
9. **Best sound absorption** capacity due to less friction loss and smooth surface.
10. Polyester insulation Thermal comfort and **condensation free** operation

# INDIAN RAILWAY- LHB COACH DUCT DESIGN

- The Duct is made up of 100% polyester (Textile duct specifications), washable in Washing Machine. To keep the modularity concept of the existing ducts, the Prototype Textile duct is assembled/ Divided into 3 segments.
- All Three Segments/ Partitions are joined with special zip fasteners Comply with DIN 55350-18-4.1.2 to ensure zero leakage of air during operation.
- The duct is fitted with an Aluminium C-type channel facilitating easy installation & de-installation. No requirement for wires, cable ties, hangers, Velcro tapes, threads, etc.
- The total length of the duct is 18162 MM (18.1 Meters)
- The duct is divided into 3 parts for easy installation and operation



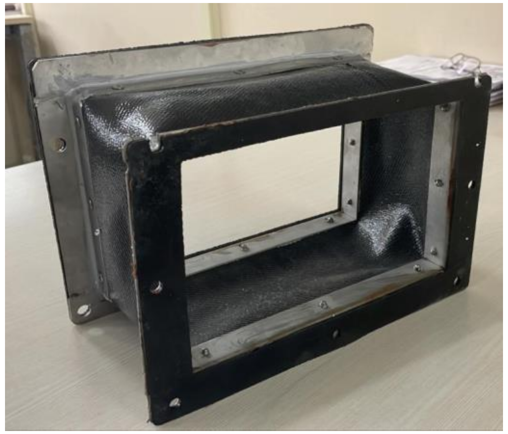
TOP VIEW OF DUCT



BOTTOM VIEW OF DUCT

| S.N | Parameter | Standard |
|---|---|---|
| 1 | Fire retardancy | EN 45545-2 |
| 2 | Textile Weight | ASTM D3776 |
| 3 | Textile Strength | ISO13934-1 |
| 4 | Textile shrinkage | ISO 6330-2000 |
| 5 | Classification of Air Cleanliness | EN ISO 14644-1 |
| 6 | Air tightness of Textile Material | EN 15727 (Minimum) |
| 7 | Antistatic properties of Textile (resistive value of Textile) | DIN 50014-23/50-2 (Max) |
| 8 | Permeability | ISO 9237 |
| 9 | Service Temperature | -30 to+110°C |

## TYPES OF PRODUCT / SOLUTIONS IN RAILWAY


Air Bellows / Compensators

Special tailor Made solutions for Air movement

Air Distribution system for Public Transport Vehicle.

# TYPES OF PRODUCT / SOLUTIONS IN RAILWAY

**Textile Compensators , Flexible Parts connecting with flanges**

**Gangway System – Textile**

VATPAL™
ASPIRE TO INSPIRE

# OUR PROCESS OF WORKING

**REQUEST**

specification of customer's requirements

**DEVELOPING**

- material selections
- consideration of all possible variants
- design

**PROTOTYPE**

- detailed analysis of airflow
- balancing details

**SUPPLY**

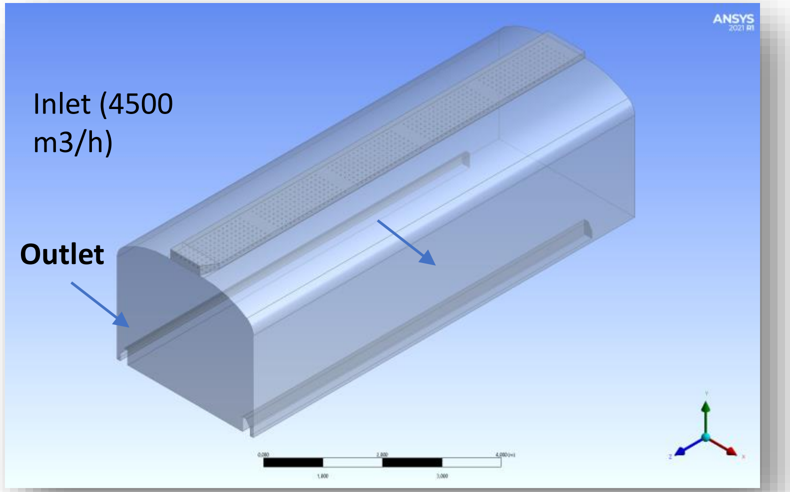
- manufacturing
- supplying final products to costumer

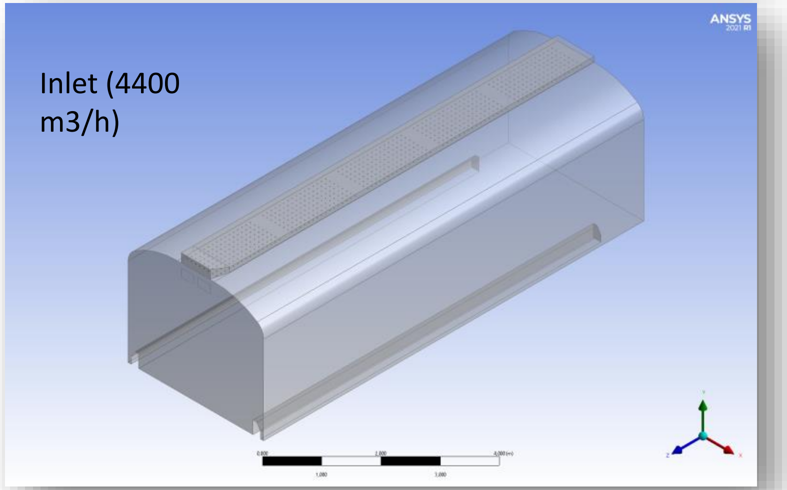
## To way forward we required below inputs

1. Technical Specifications
2. Coach Design – with SLD File
3. Total RMPU / AC Unit Capacity and Static Pressure
4. Air flow distribution parameters – to design textile diffusion system
5. Number of Free Flow and Fixed Flow Diffusion patterns.
6. Available Space / route information for Ducting

# CFD Simulation During Textile Duct Design

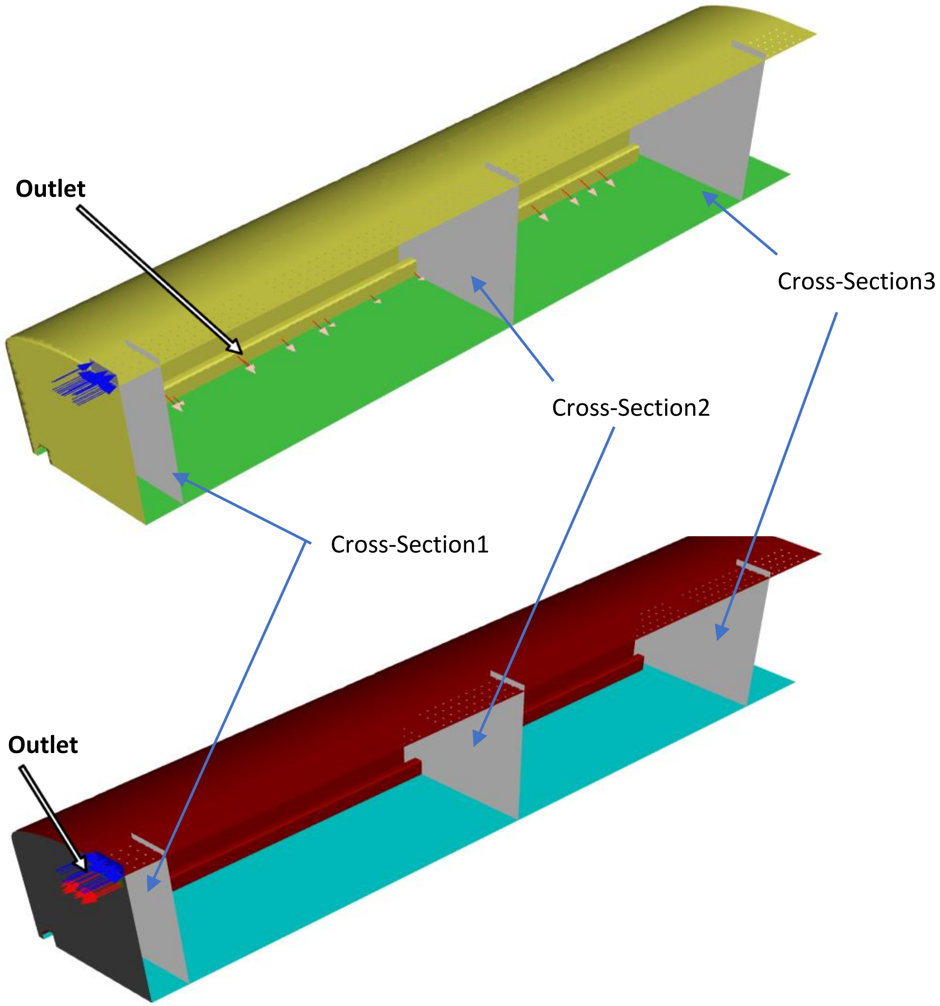
Models Comparison Model_1 has an outlet at bottom part of coach and the model_2 under the ceiling.




**Model_1**

**Model_2**



# Target CFD

To simulate air flow pattern for cooling mode and compare air velocity and temperature field between two models. Ceiling model needs to be incorporated in stimulation for achieving correct results.

The model_1 has the outlet in bottom part of coach and the model_2 below the celing.
For the correct display of air velocity we need to have 3D model of ceiling.

# Input Data

ACCNE Model

Inlet 4500 m3/h for one symmetric half of coach

Coach Initial Temperature : 30°C

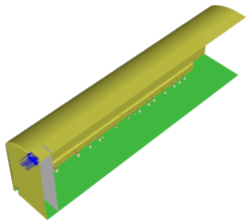
Intake Air Temperature : 25°C

*Computational fluid dynamics (CFD) is a branch of fluid mechanics that uses numerical methods and algorithms to solve and analyse problems that involve fluid flows and heat transfer. It could analyse and simulate what happened in the flow field to reach the best design effect with various parameters. CFD simulation would help to understand the principle of problems and allow to verify distribution system in the space during short time before real installation.*

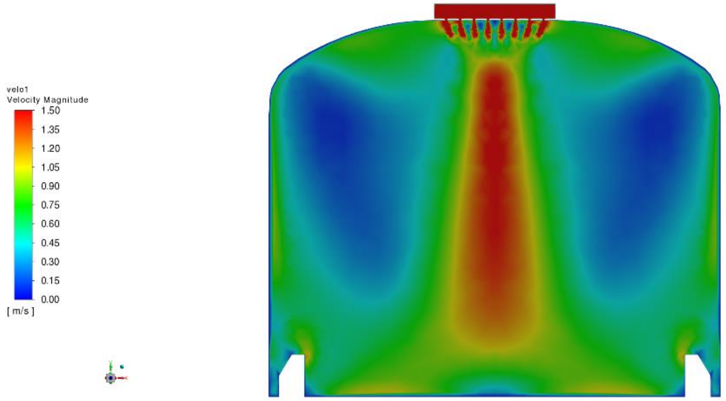
# CFD results for **Cross-section 1**

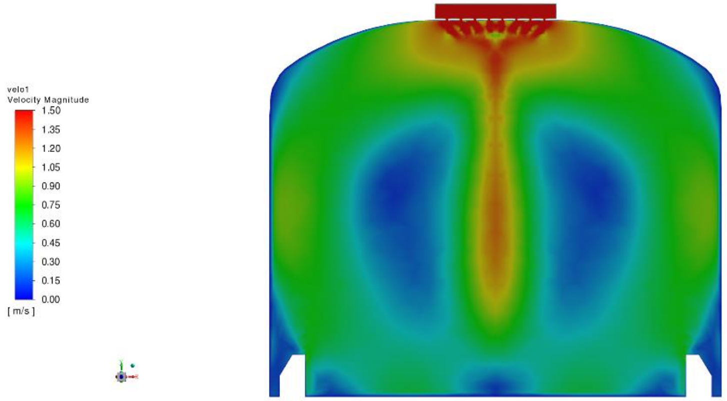
## Cooling dT = 5°C after 60s

model_1



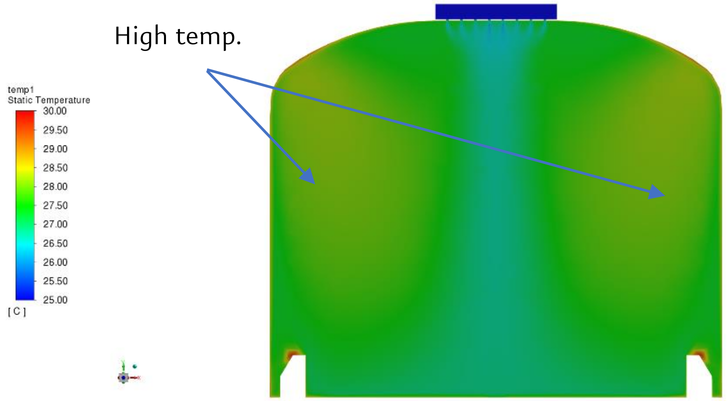
model_2

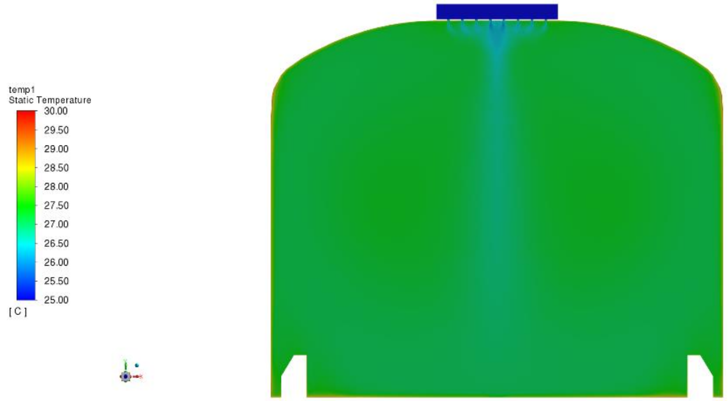



**Air velocity diagram**

**The model 1 shows Faster air flow in the middle of coach**




**Temperature field**

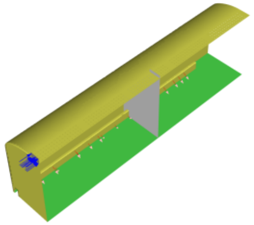
**The model 2 shows slighly lower temperature compared to the model 1**

**** The ceiling is necessary for correct display**

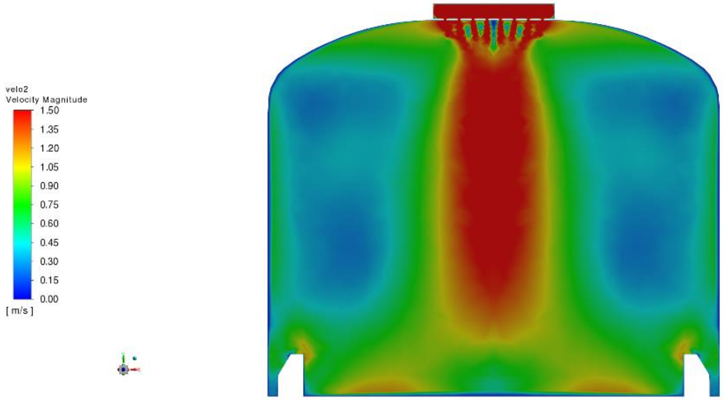
CFD results for **Cross-section 2**

Cooling dT = 5°C after 60s

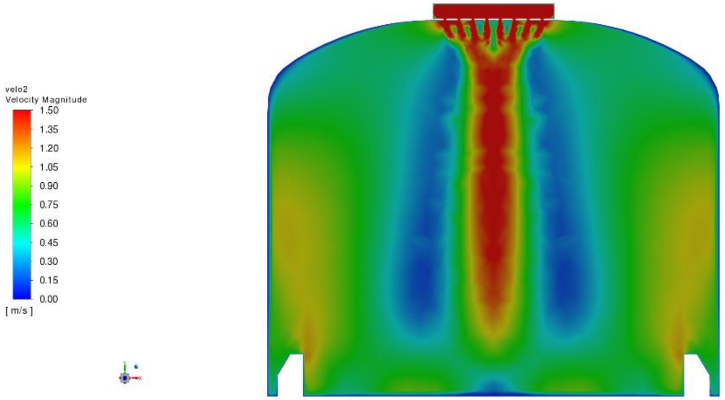
VATPAL™
ASPIRE TO INSPIRE



model_1

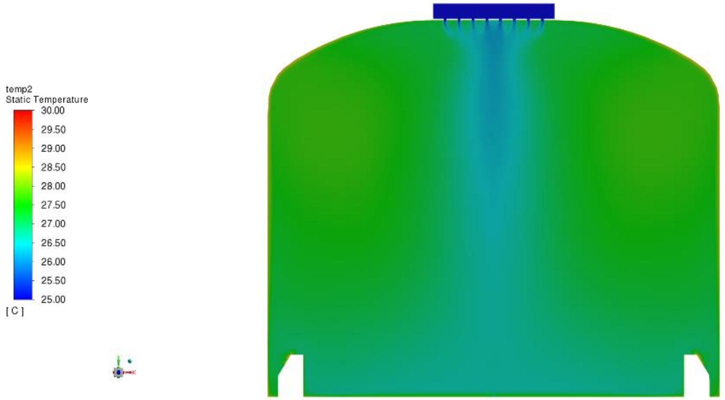


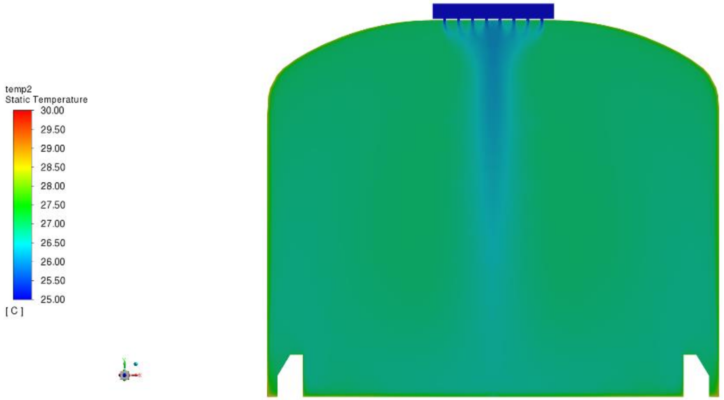

model_2




## Air velocity diagram

**The model_1 shows stronger wider air flow in the middle of coach compared to the model 2**



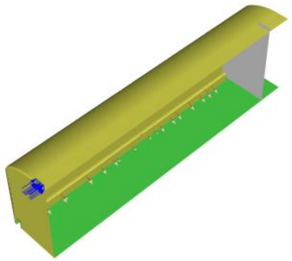

## Temperature field

**The model_2 shows slighly lower & more uniform temperature field compared to the model 1 in cross-section 2 .**

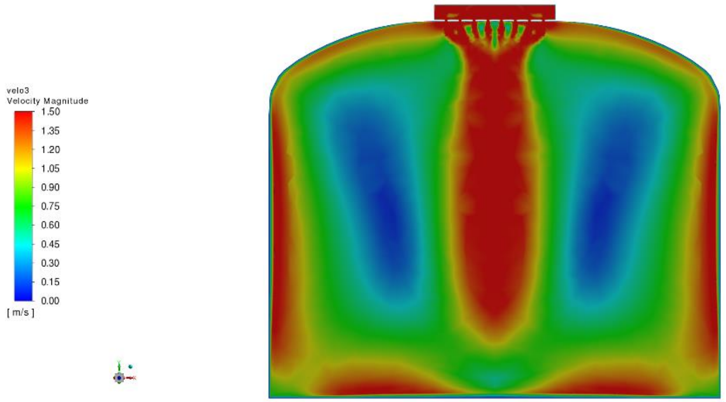
**** The ceiling is necessary for correct display**

# CFD results for **Cross-section 3**

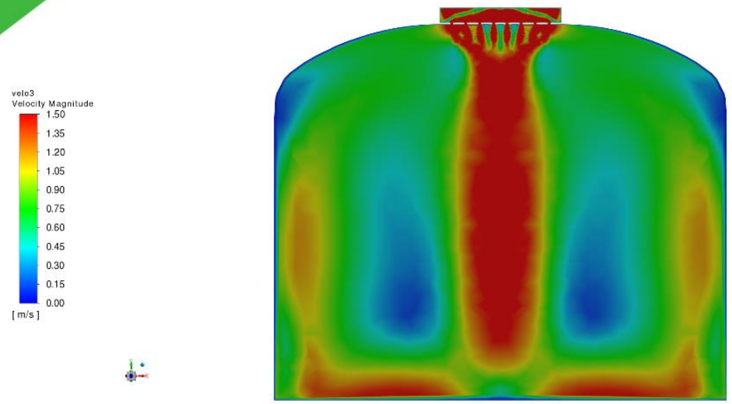
## Cooling dT = 5°C after 60s



model_1

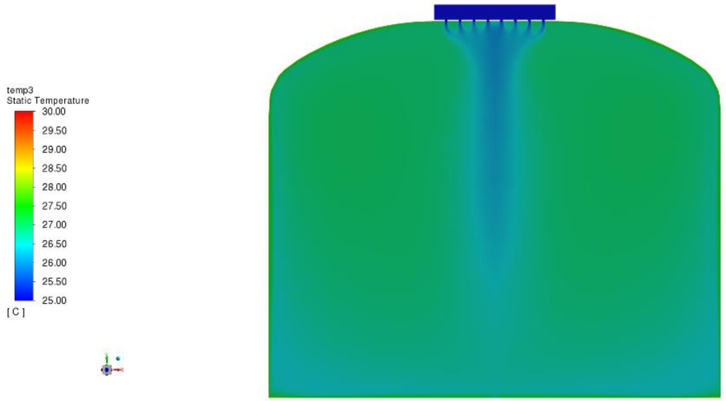


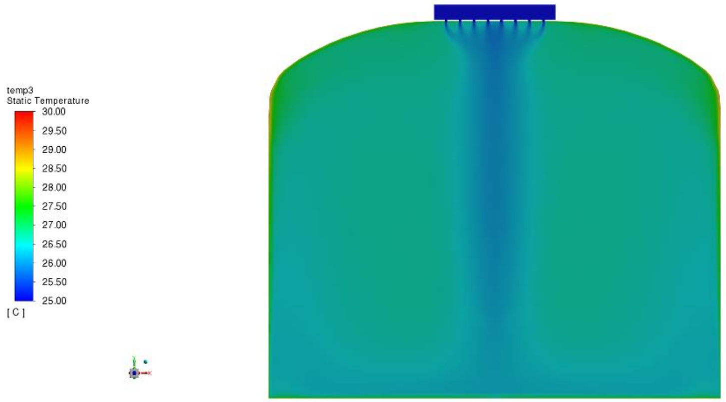

model_2




**Air velocity diagram**

**Faster air flow alongside of the coach walls in case of model 1.**




**Temperature field**

**In the temperature field of model 2 we can see slightly lower temperatures compared to model 1.**

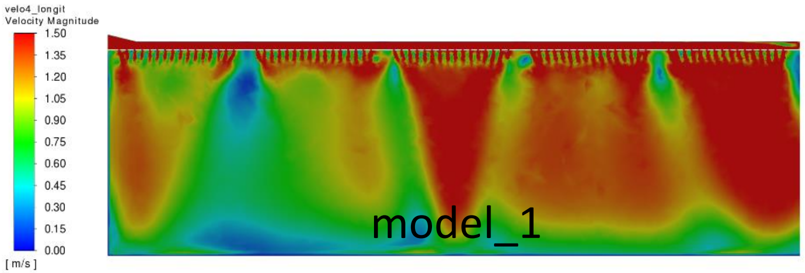
**** The ceiling is necessary for correct display**

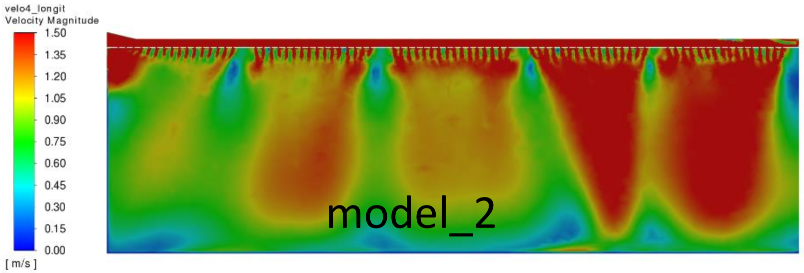
# CFD results for **Cross-section 4 (Longitudinal)**

## Cooling dT = 5°C after 60s

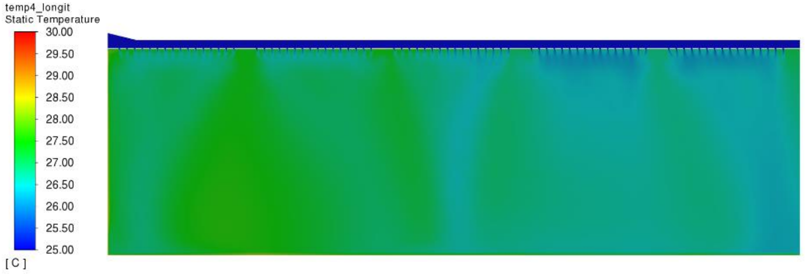
model_1

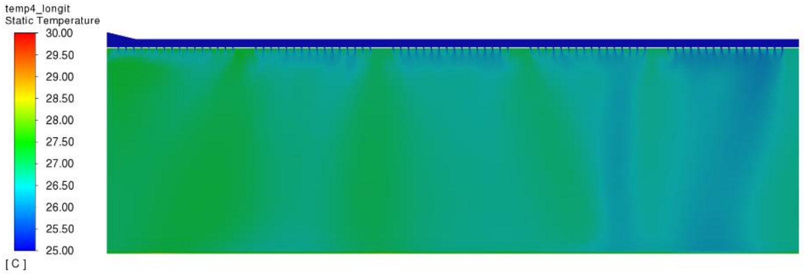
model_2




**Air velocity diagram**




**Temperature field**

The model_2 shows slightly lower temperatures compared to model_1.

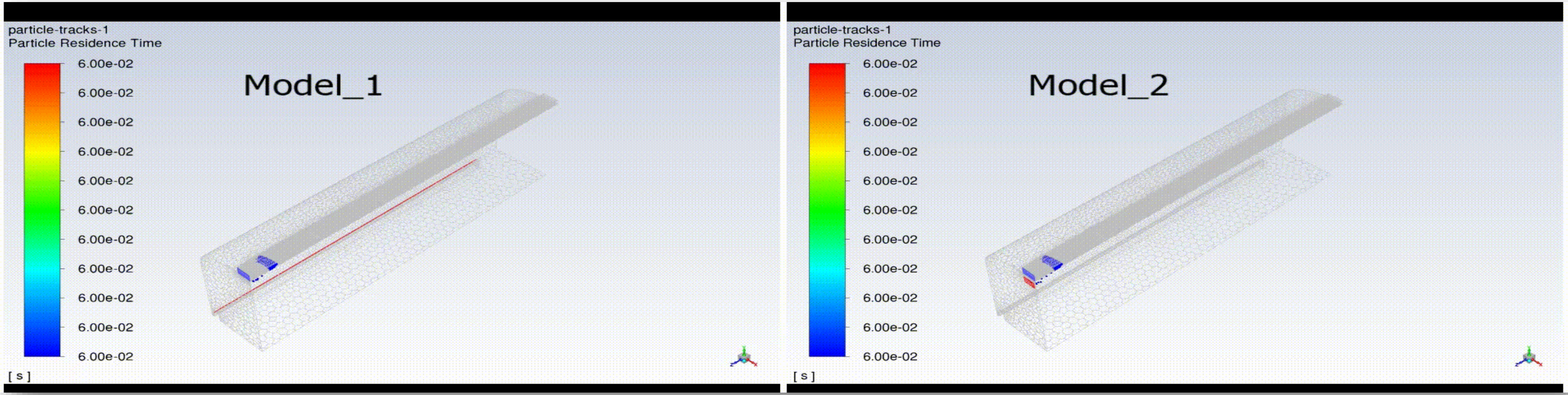
**** The ceiling is necessary for correct display**

## Appendix and Conclusion :

A video shows the comparison of particular residence time between model 1 and model 2 up to 60 seconds of cooling mode. In model 2 the air particles flow easily to near outlet in upper part of coach which leads to non-uniform flow in longitudinal direction.

### Conclusions

- CFD simulation shows air velocity and temperature field inside the coach between two models.
- The air particles stay in the coach longer time in case of the model 2 so that the temperatures are slightly lower here.
- The model 1 has the outlet at the bottom part of the coach and the model 2 under the ceiling.
- Based on the results we can see slightly lower temperatures in case of model 2.



VATPAL™

ASPIRE TO INSPIRE

**VATPAL Industries Pvt Ltd ,** C 403, Mantri Eternity (Plus), Old Mumbai-Pune Highway, Kundan Nagar, Dapodi, Pune 411012, Maharashtra, India

**+91 7777093577 info@vatpalgroup.com www.vatpalgroup.com**