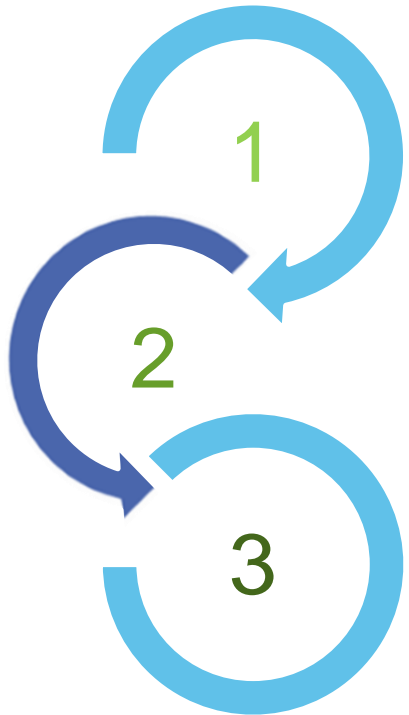




A new concept in
diffusion...pulsion



1. SINTRA OVERVIEW

- SINTRA – Innovation
- Metal Micro perforated Air Ducts
- On going research and developpement

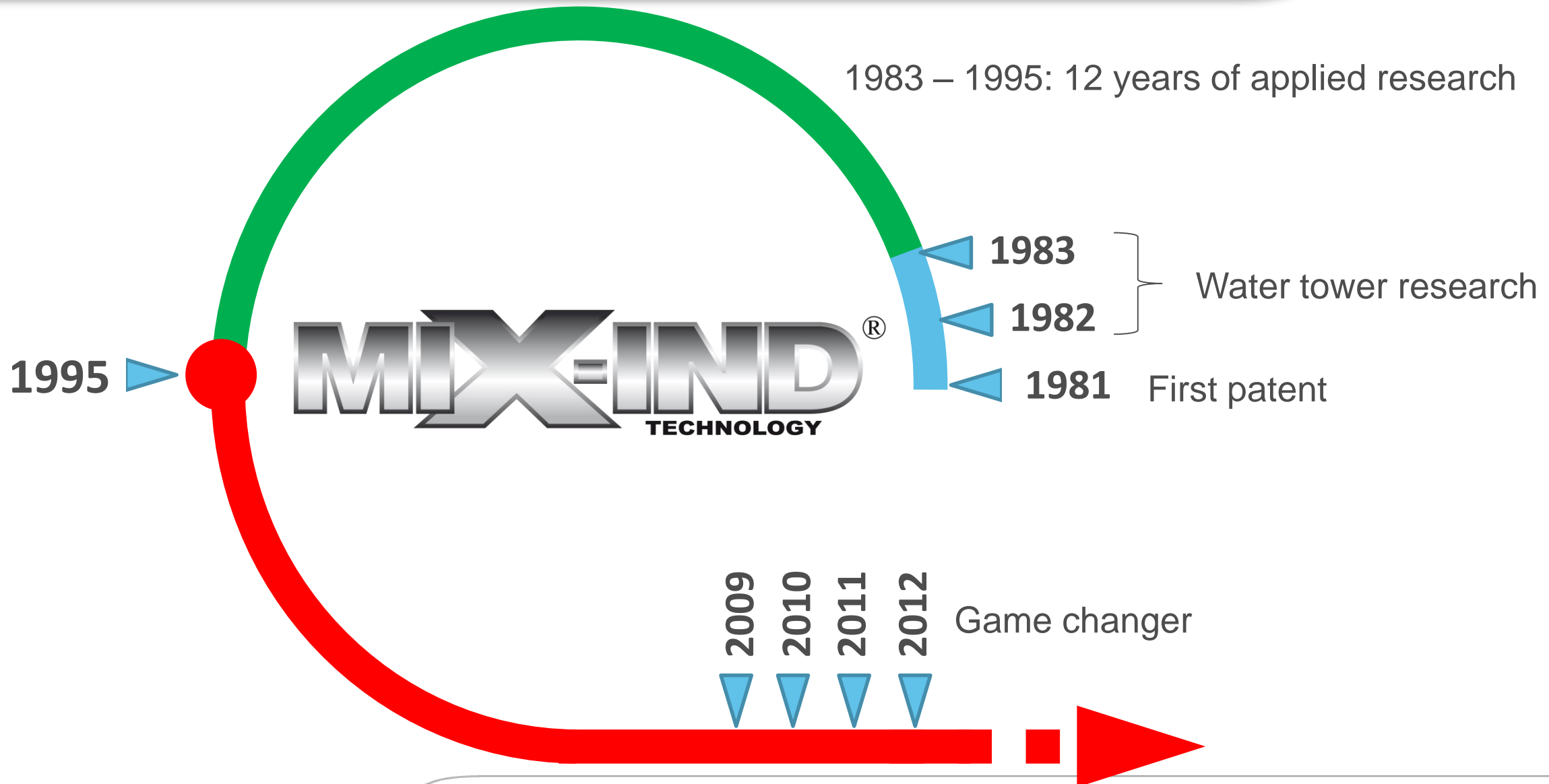
2. SPIROJET & MIX-IND® technology

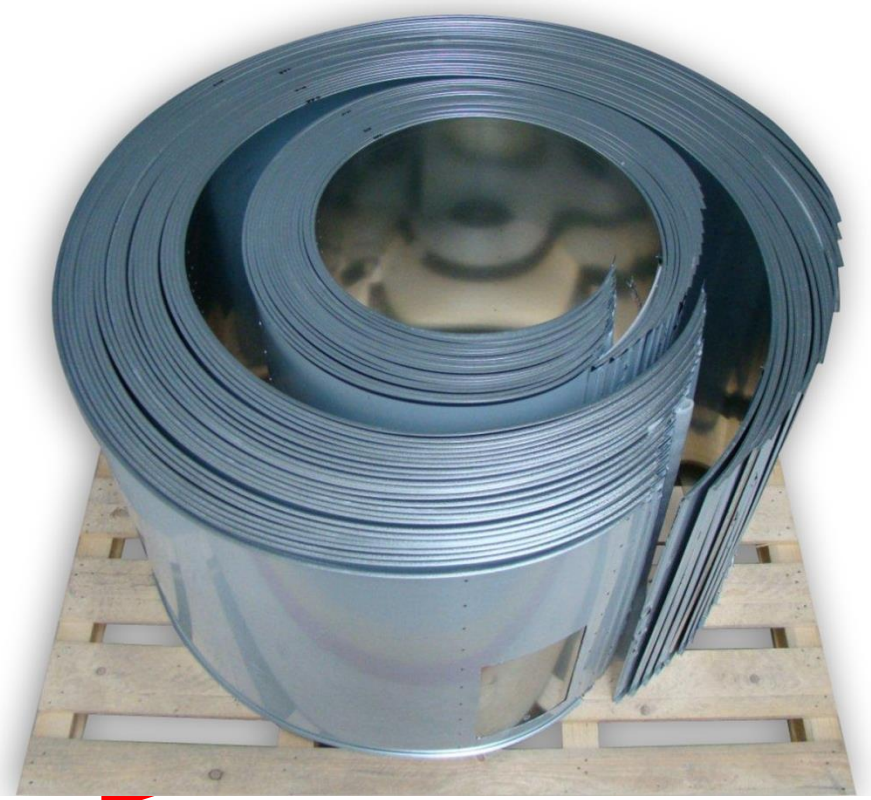
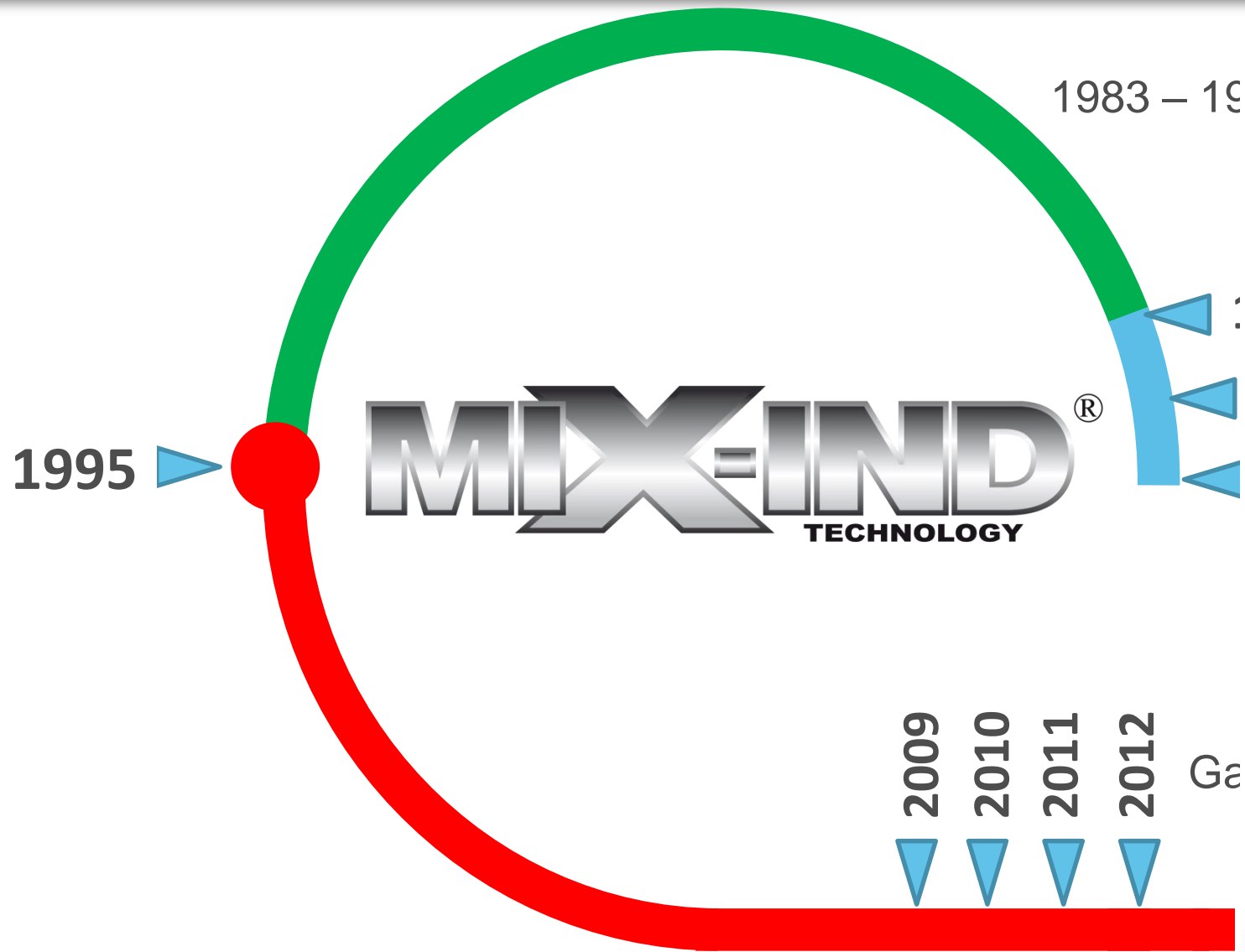
- New confort standards
- Understanding PULSION VS traditional diffusion
- Green technology - not just a label

3. REFERENCES

- Amazon
- Exhibition center – Milan
- U arena stadium – Paris France

Overview – an unusual story







Innovative solutions for air diffusion

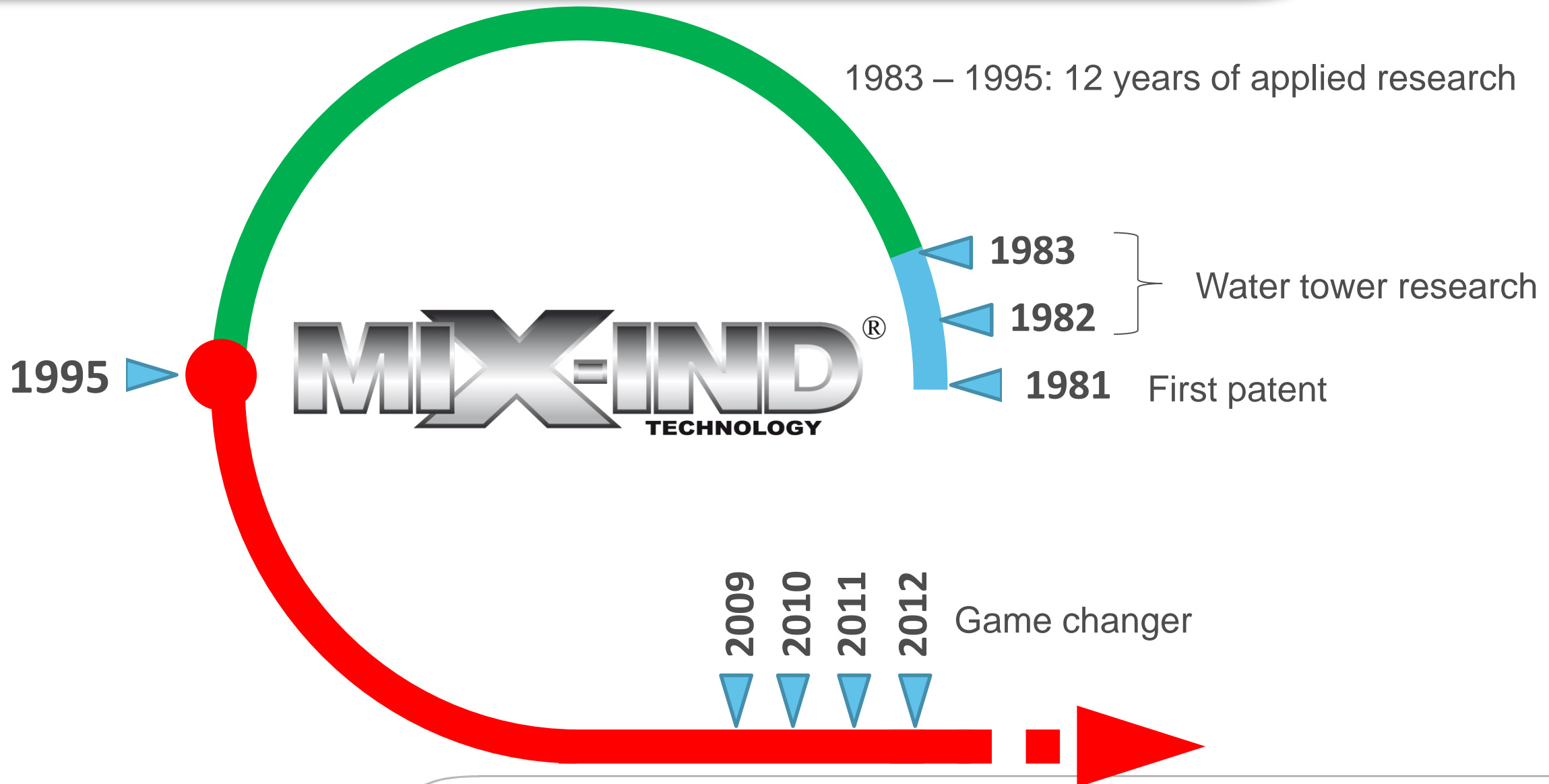


54 000 ft²: Ø630, 2300 ft long

1983 – 19



Overview – an annusual story



Overview – an unusual story

➤ **SPIROPACK™** manufacturing line

- Ø 670 inch
- 400 ft per hour











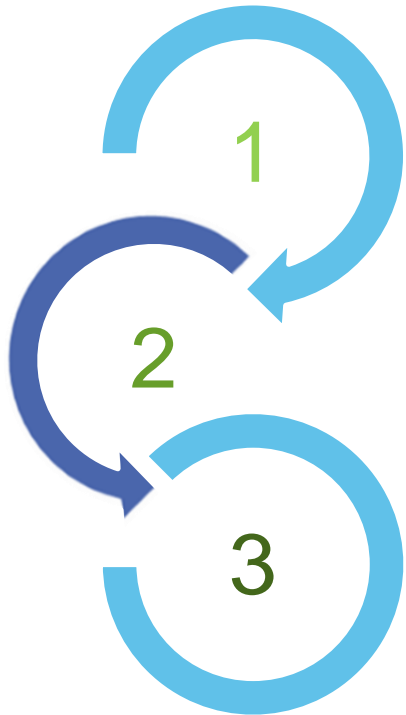
MIX-IND® technology – CONCLUSION

Key benefits

- Homogeneity of temperatures, both vertical and horizontal, $\pm 2^{\circ}\text{F}$
- Air throw range: up to 330 ft
- No duct insulation required /No condensation
- Variable comfort / Air speed control
- No return air ducting /Weight reduction on structure
- Minimize global project costs and on-site maintenance
- Industrial safety: MCO
- Simple and flexible design
- Lengthening HVAC equipment life span due to variable air flow

Gain

- Fan Power consumption: up to 80% due to variable air flow
- Heat and AC consumption: up to 50% due to:
 - Total destratification
 - Start-up temperature recovery
 - Extreme free-cooling
 - Cold air barrier
- Up to 50% of maintenance costs
- Up to 80% on filter replacement
- Return air duct: 100% gain cost
- Free Technical support appointment



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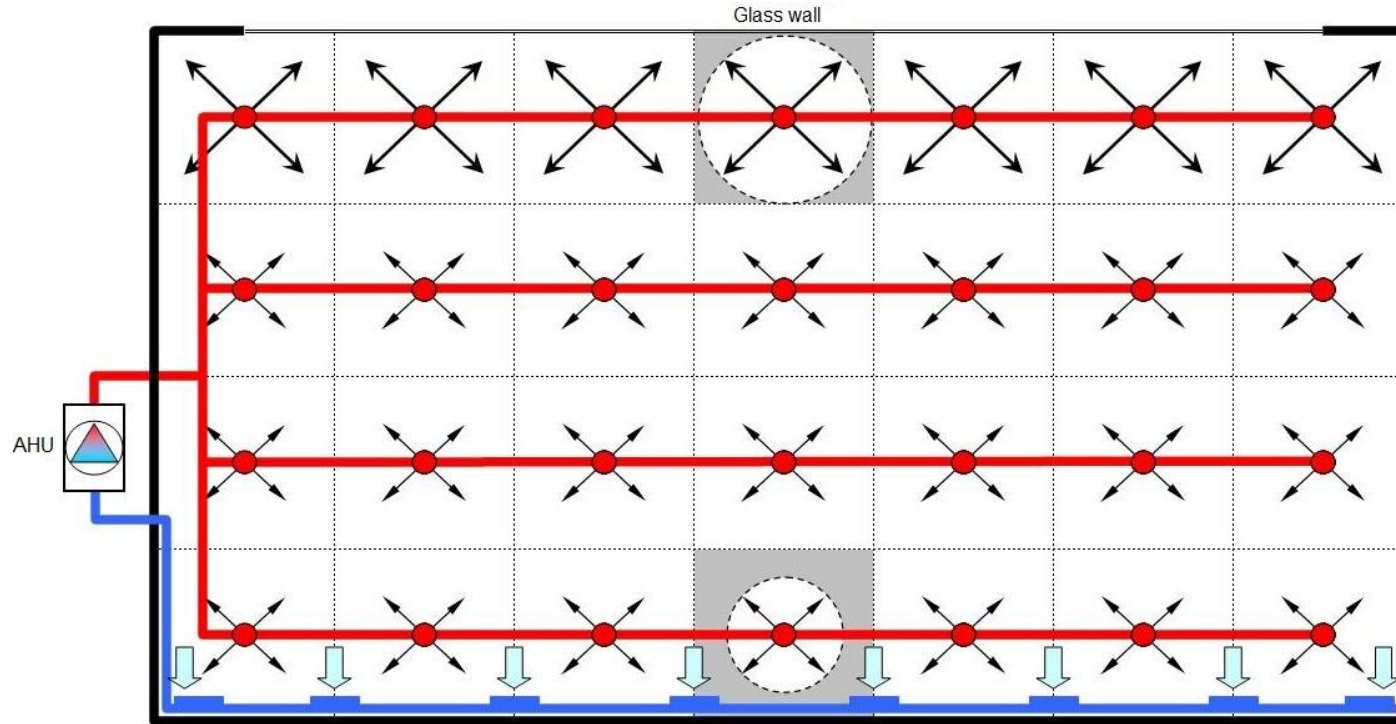
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SPIROJET & MIX-IND® technology – Diffusion VS Pulsion

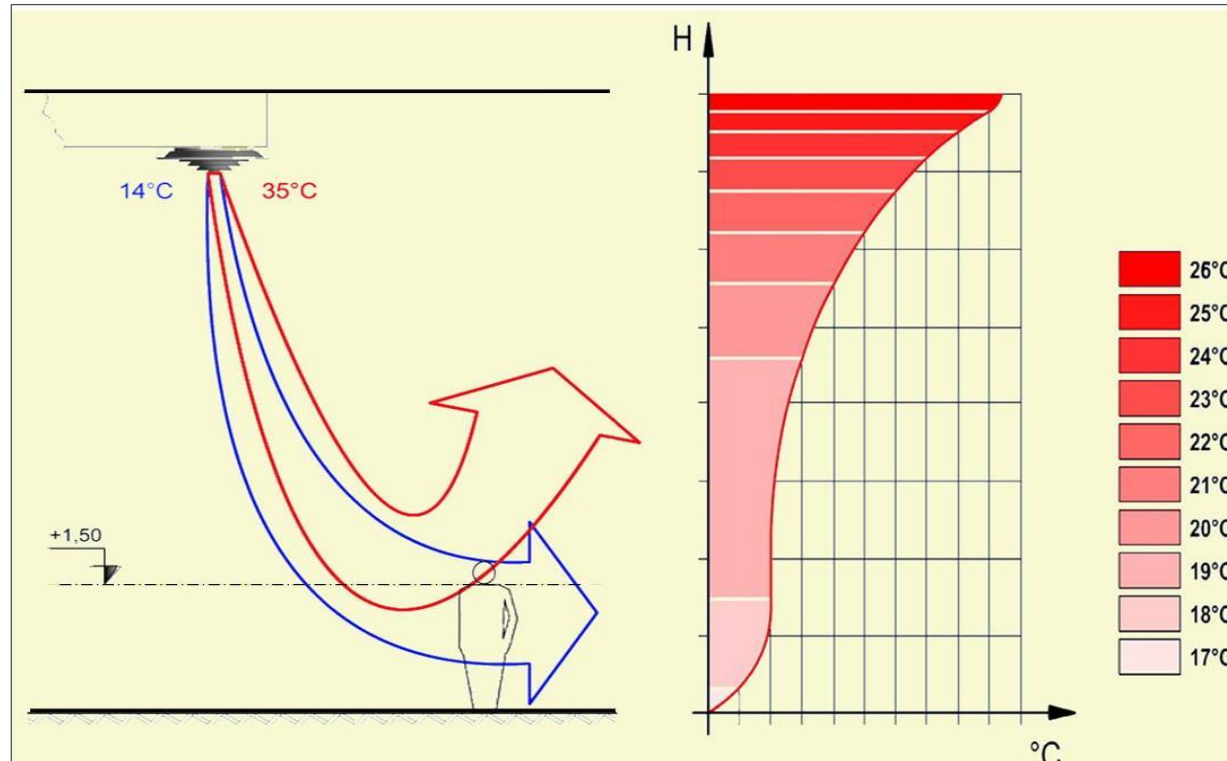
Tradition layout of air diffusion



- Thermal loads unevenly distributed
- Thermal loads evolve as the day goes by
- Ideally, every air diffuser would adjust its airflow
- Residual air speed,
- High heat stratification
- Long temperature recovery

SPIROJET & MIX-IND® technology – Diffusion VS Pulsion

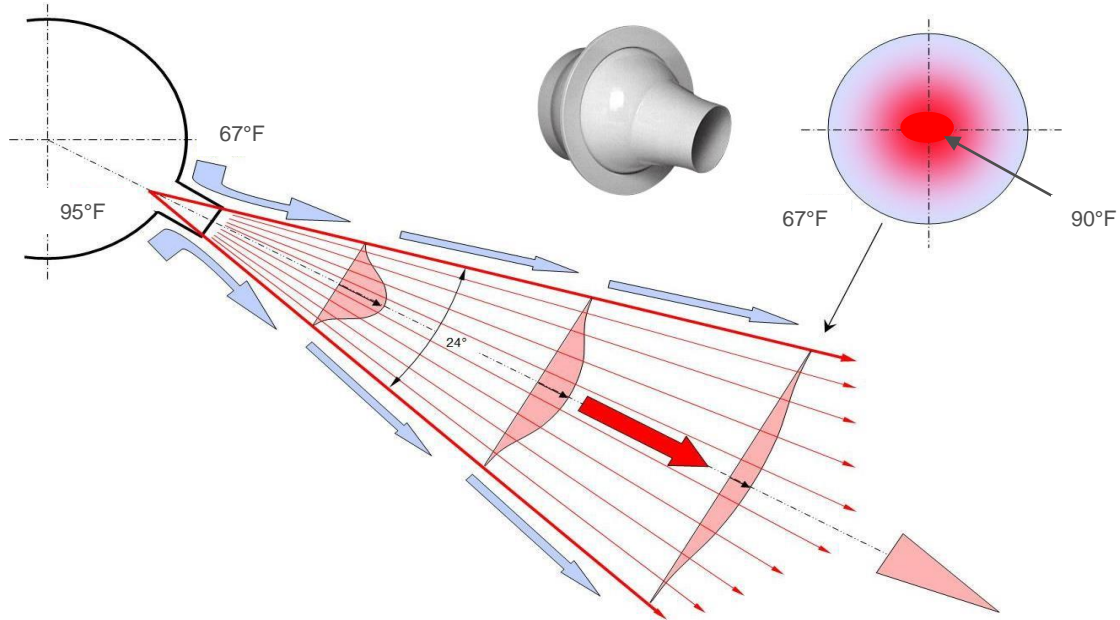
Know problems with traditional air diffusion



- Air flow range changes with temperature
- Variable air flow is a dream
- Starting at 15ft high stratification adds 2°F every 3.3 ft ($\approx +2\%$ energy consumption)
- Variable geometry air systems reduce the problem but can be expensive and complex to run

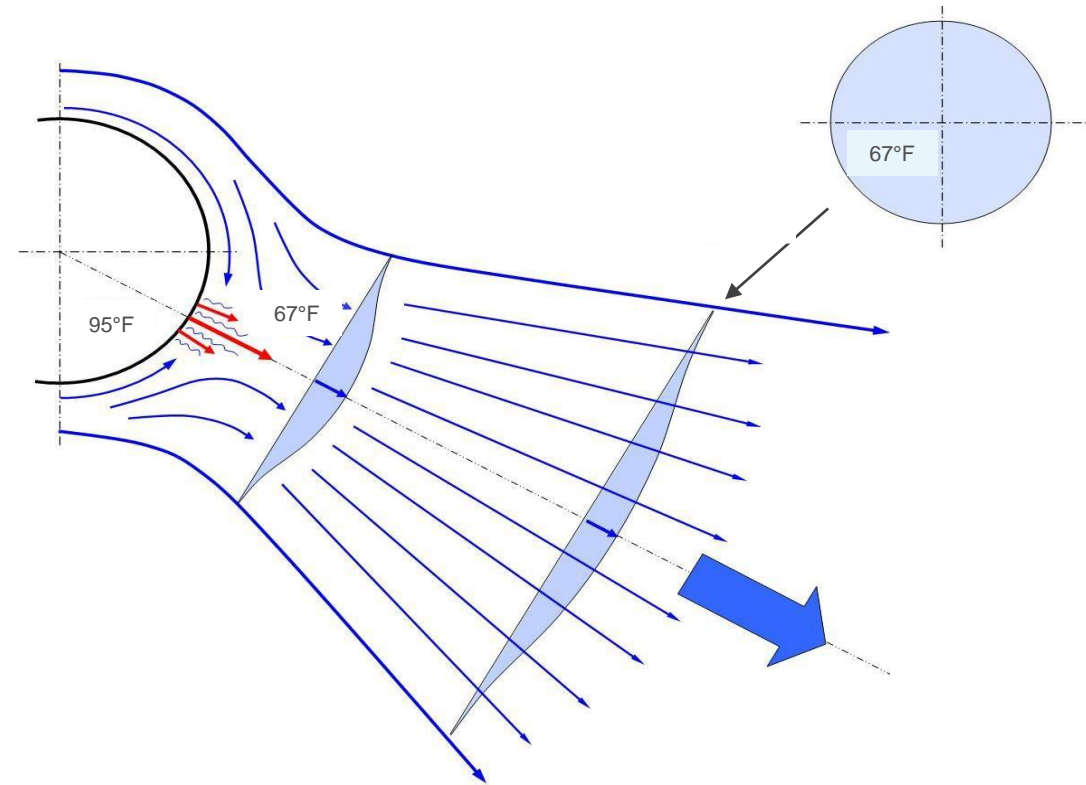
SPIROJET & MIX-IND® technology – Diffusion VS Pulsion

Tradition diffusion: linear threads



- High air speed creates 'friction' which create a low induction rate (1-6)
- High range air throw means more problems (trajectory distortion, heat stratification, residual speed)

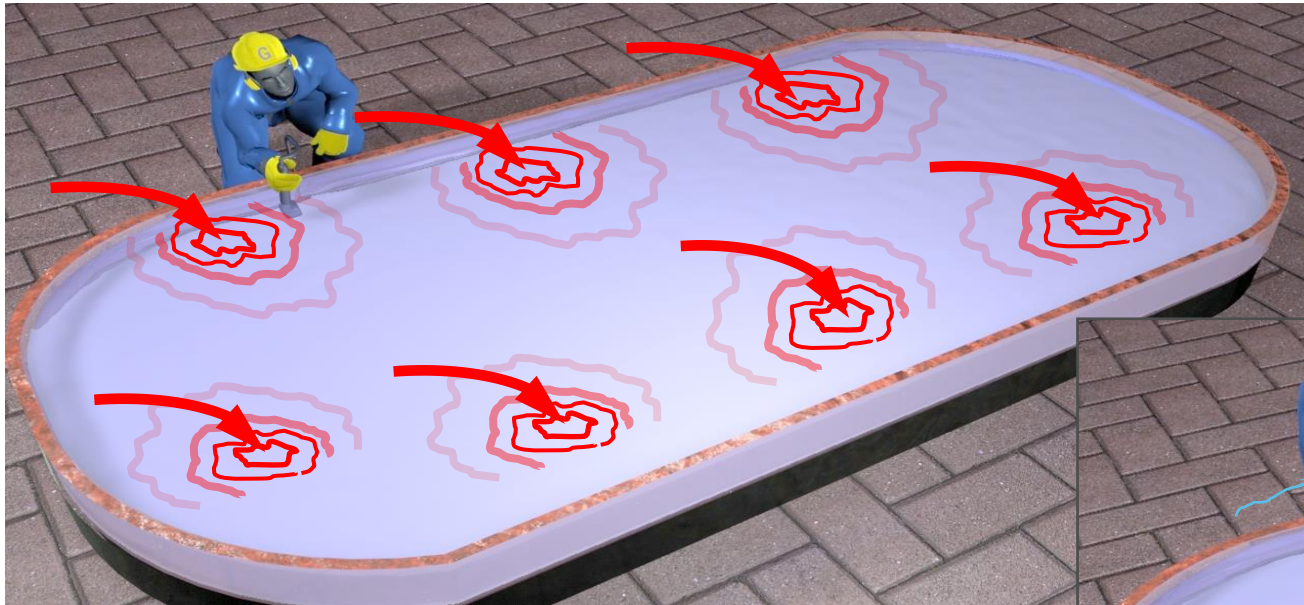
Pulsion : micro turbulent threads



- Micro turbulents threads creat vortexs that 'vacuums' high quantity of air; up to X30
- Speed and temperature declines rapidly

SPIROJET & MIX-IND® technology – Diffusion VS Pulsion

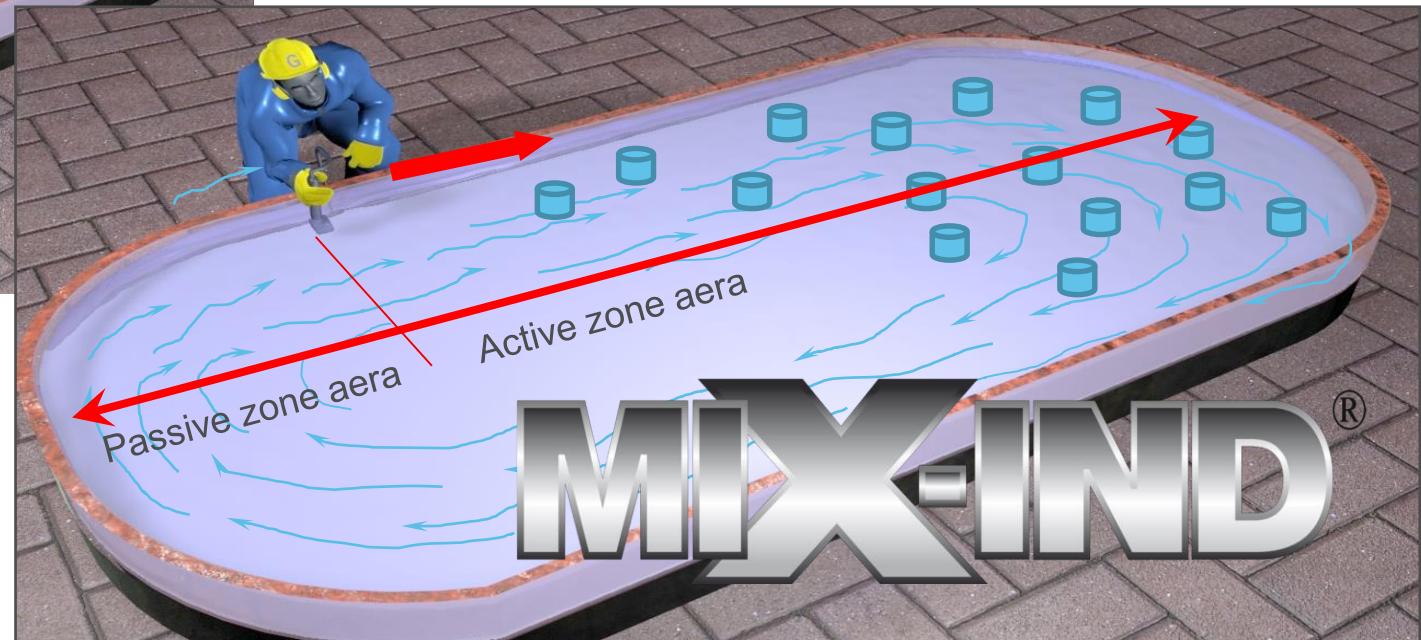
Traditional diffusion: linear threads

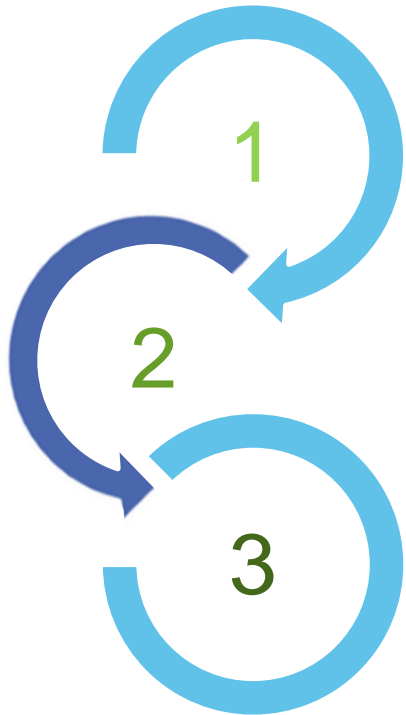


- In order to heat the tub, it requires 7 shower heads to evenly distribute heat (not talking about return air ducts)
- Every shower head has its own range, temperature, influence zone

Pulsion : micro turbulent threads

- Plunge the shower head in the water and create a permanent movement
- Obstacles are no longer a problem
- Heat distribution is no longer a problem
- Perfect balance between air flow, diameter, air speed, range





1. SINTRA OVERVIEW

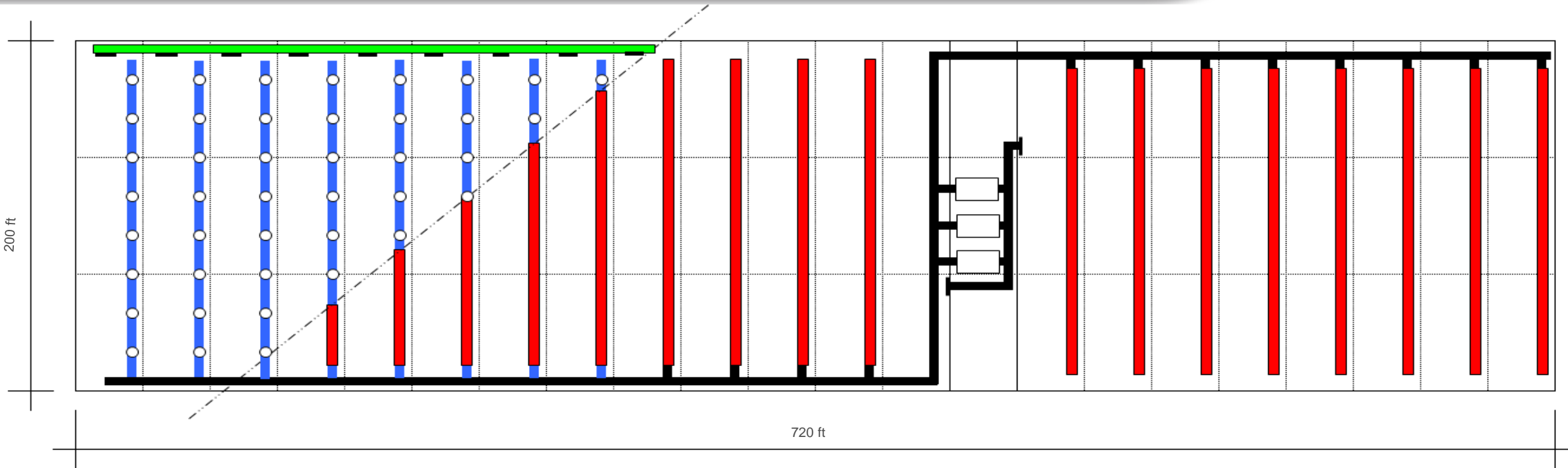
- SINTRA – Innovation
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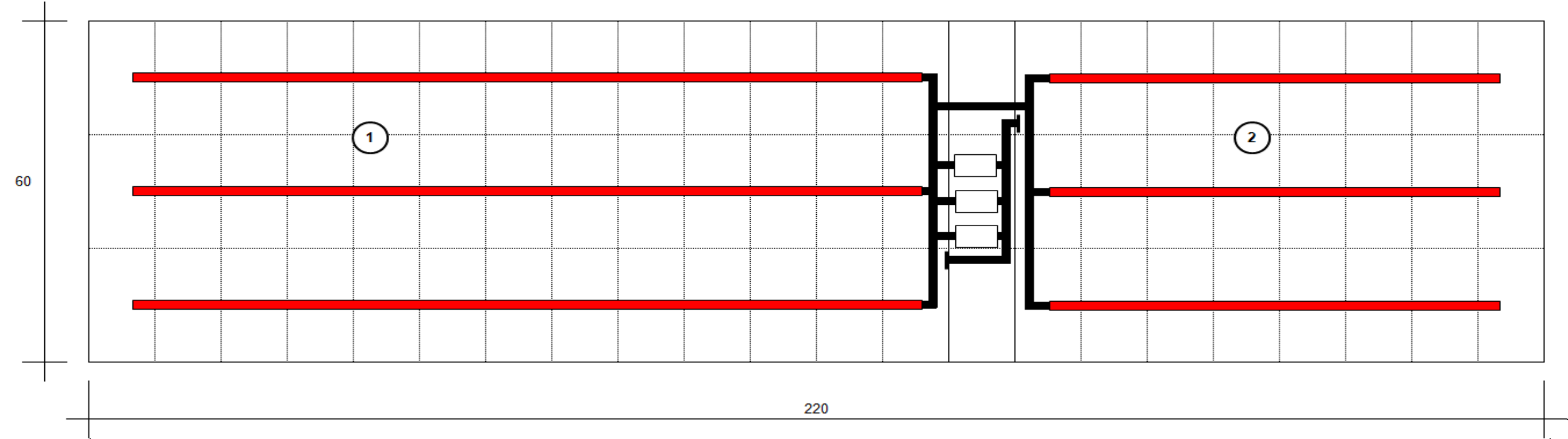
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BUILDING'S CHARACTERISTICS

Surface	140,000	ft ²
Height	82	ft
Volume of the room	11,100,000	ft ³

Ideal solution but impossible due to duct diameter



BUILDING'S CHARACTERISTICS

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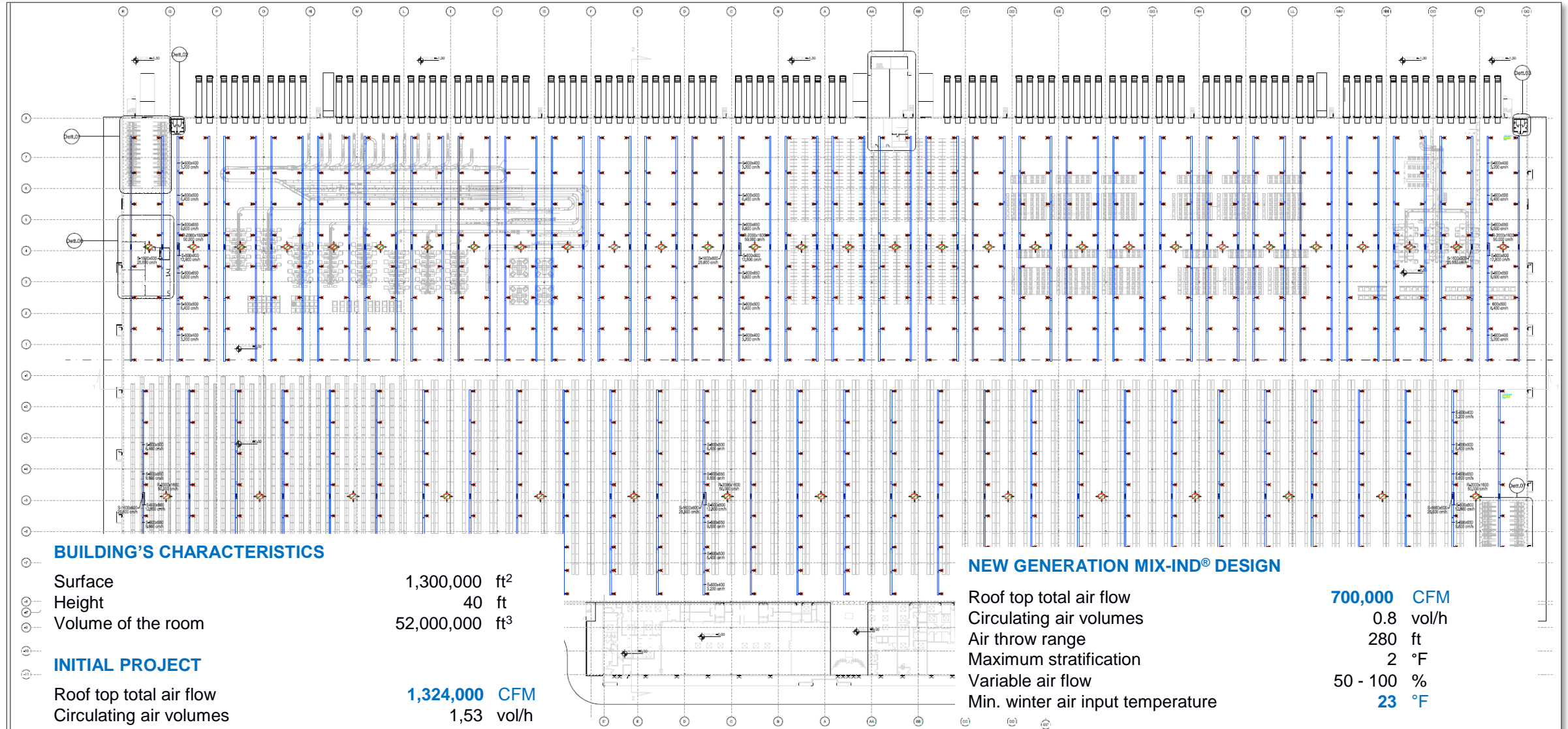
REFERENCES – THEATER



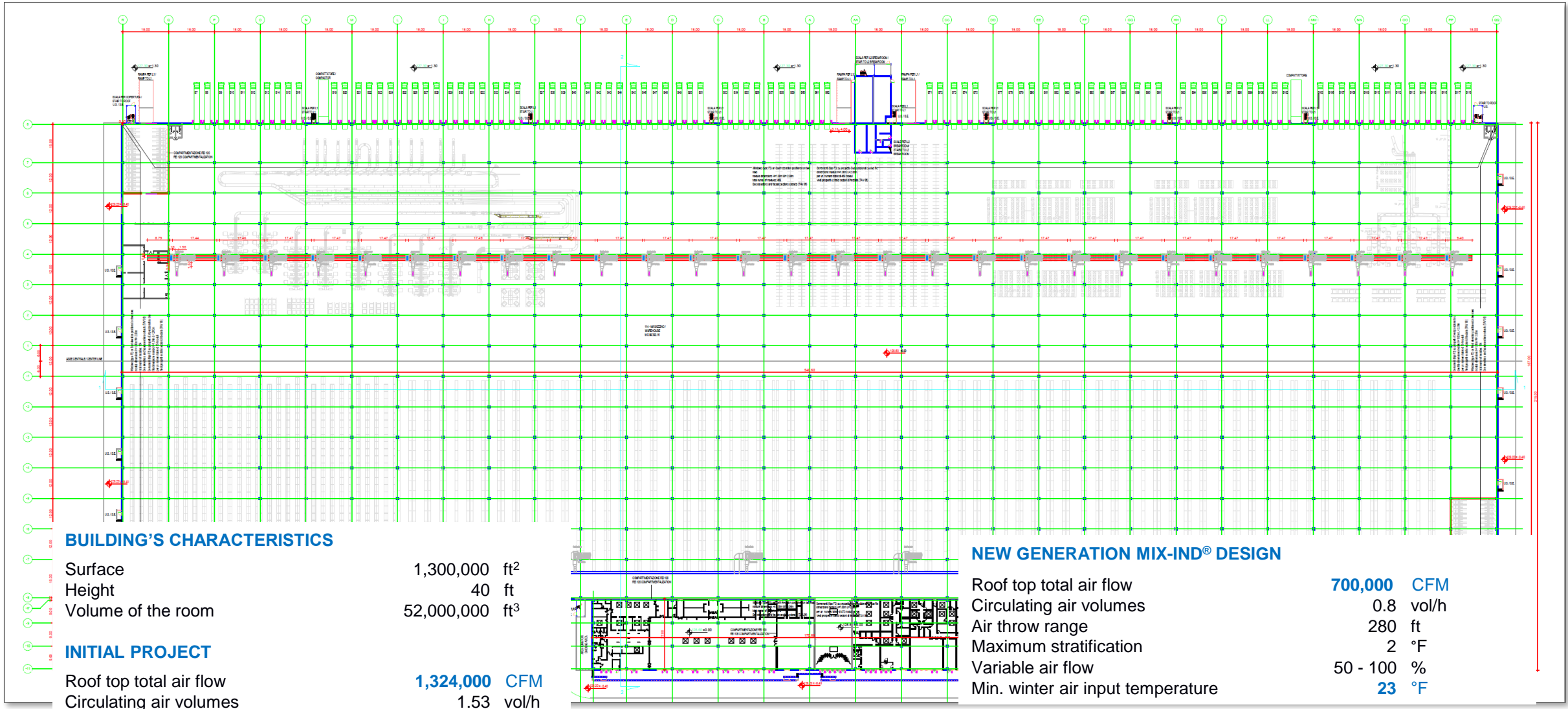
**Telescopic building mounted on tracks,
closed in winter and open in summer**

AHU air flow	20,000	CFM
Stratification	2	°F
Air throw range	164	ft
Min. winter air supply temperature	23	°F
Building height	26	ft
Ductwork height	11.5	ft
Variable air flow	20 -100	%

REFERENCES – AMAZON



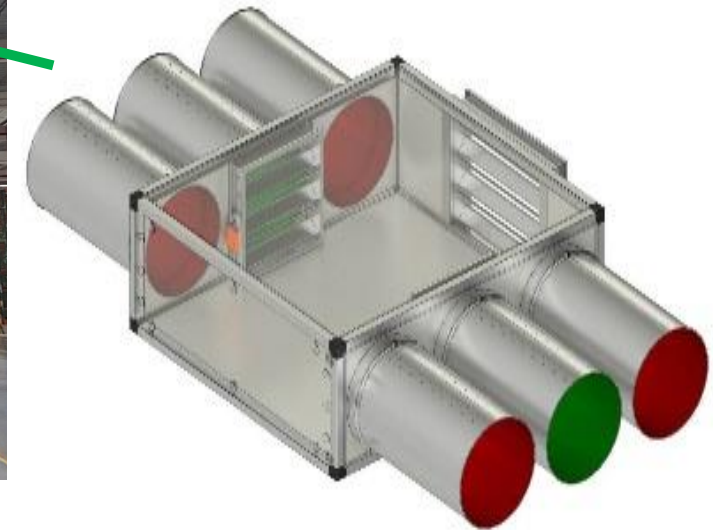
REFERENCES – AMAZON



REFERENCES – AMAZON



Plenum



NEW GENERATION MIX-IND® DESIGN

Roof top total air flow	700,000	CFM
Circulating air volumes	0.8	vol/h
Air throw range	280	ft
Maximum stratification	2	°F
Variable air flow	50 - 100	%
Min. winter air input temperature	23	°F

REFERENCES – U ARENA (40 000 seats indoor stadium)



BUILDING'S CHARACTERISTICS

Surface	260,000	ft ²
Height	145	ft
Net Volume	26,800,000	ft ³

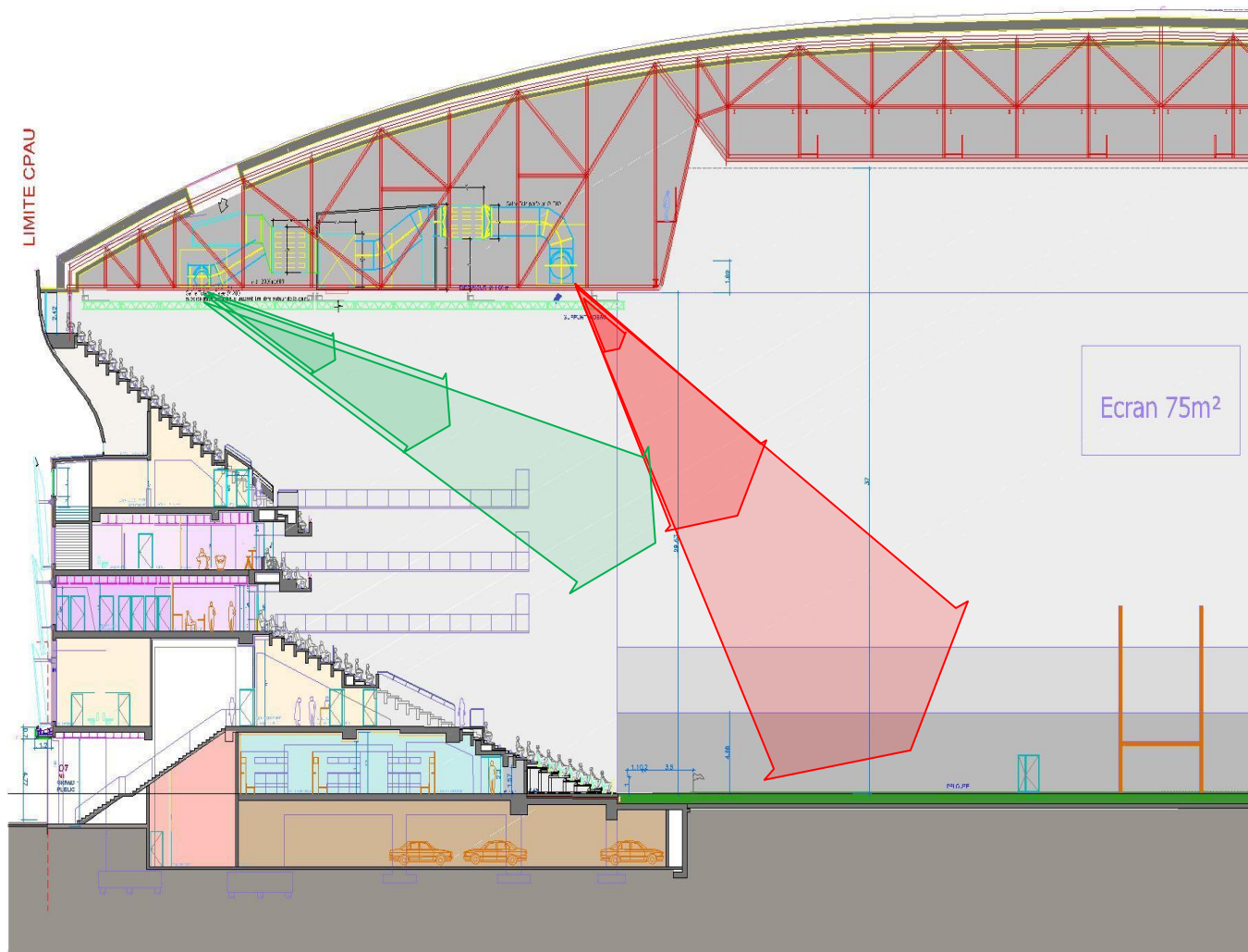
INITIAL PROJECT

AHU's total air flow	1,400,000	CFM
Min. supply air temperature	54	°F
Circulating air volumes	3	vol/h

MIX-IND® NEW GENERATION DESIGN

AHU's total air flow	424,000	CFM
Circulating air volumes	1	vol/h
Maximum stratification	2	°F
Variable air flow	40 - 100	%
Min. supply air temperature	20	°C
Air throw range	328	m
Refrigeration power saved in winter	6,600	kW

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BUILDING'S CHARACTERISTICS

Surface	260,000	ft ²
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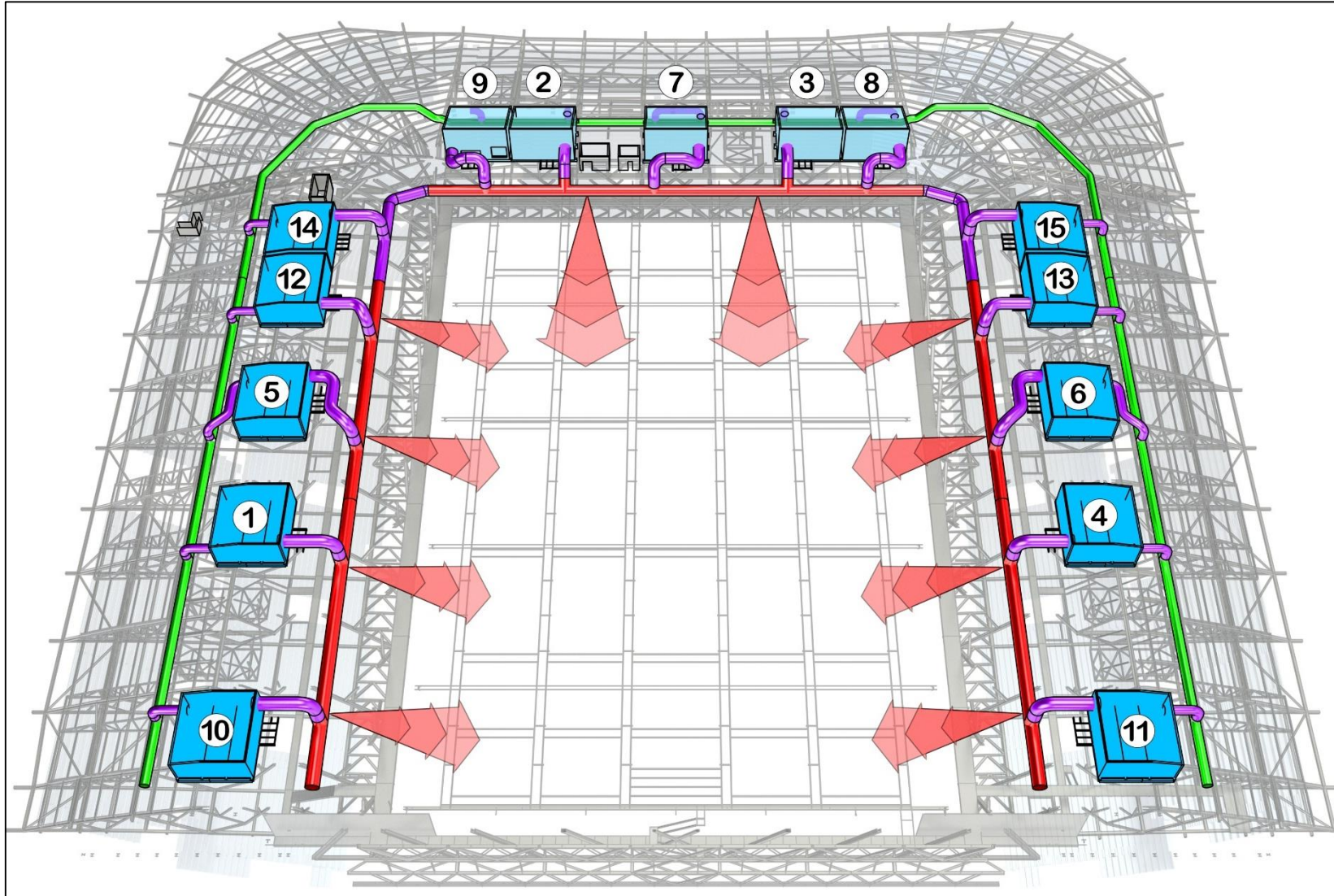
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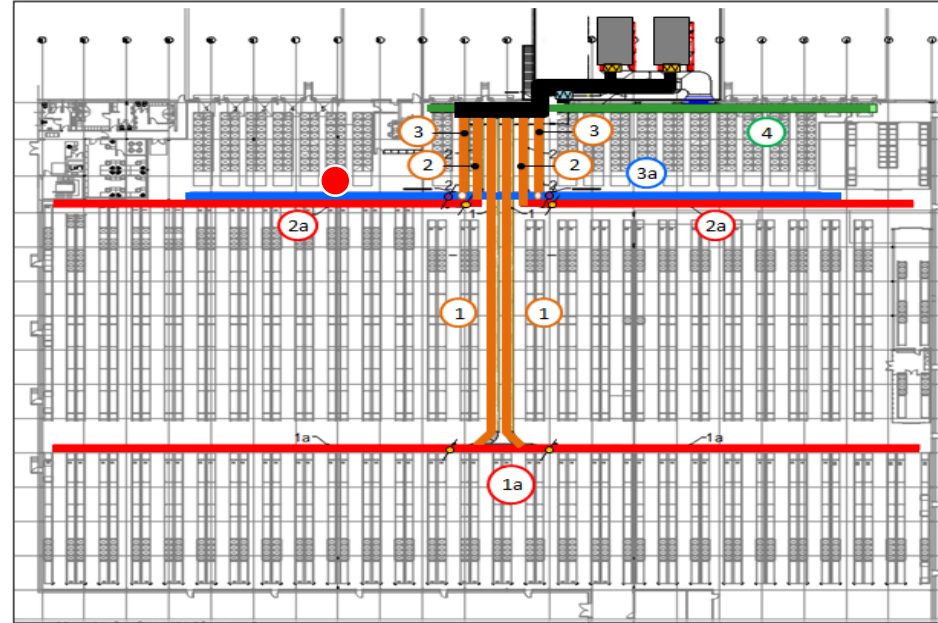
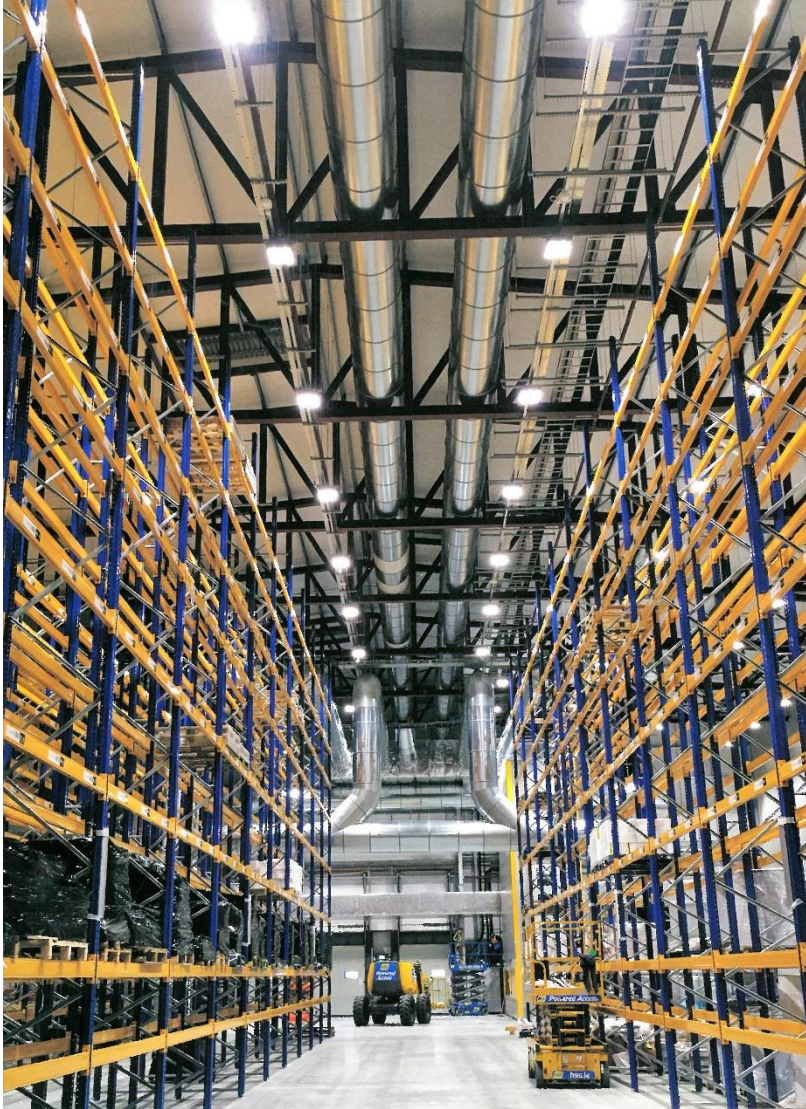
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REFERENCES – PHARMACEUTICAL WAREHOUSE



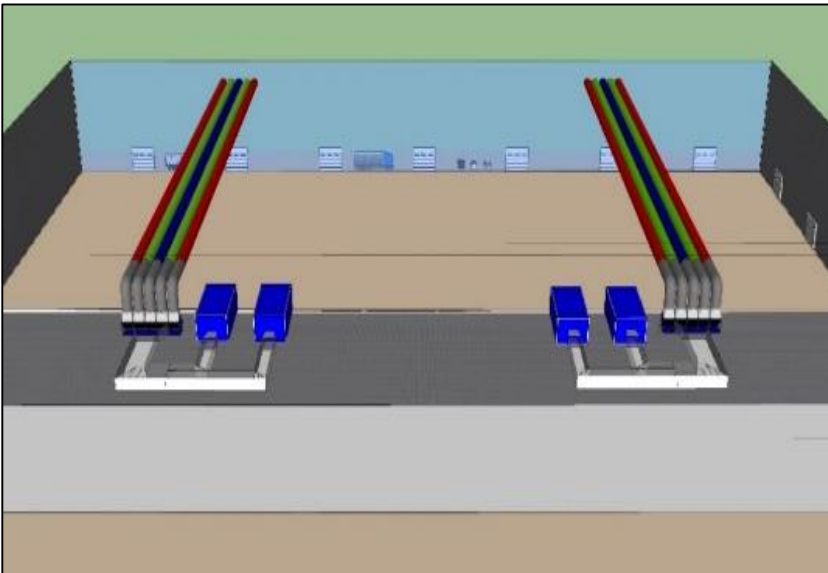
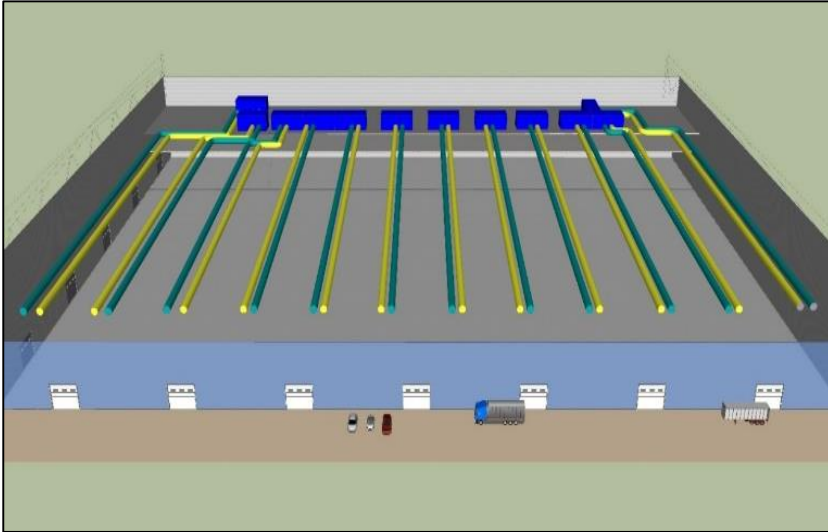
BUILDING'S CHARACTERISTICS

Surface	108,000 ft ²
Height	40 ft
Volume	430,000 ft ³

MIX-IND® NEW GENERATION DESIGN

AHU's total air flow	93,000 CFM
Circulating air volumes	1.3 vol/h
Stratification	1 °F

REFERENCES – EXHIBITION CENTER



BUILDING'S CHARACTERISTICS

Surface	150,600	ft ²
Height	66	ft
Ductwork height	46	ft
Volume of the room	9,900,000	ft ³

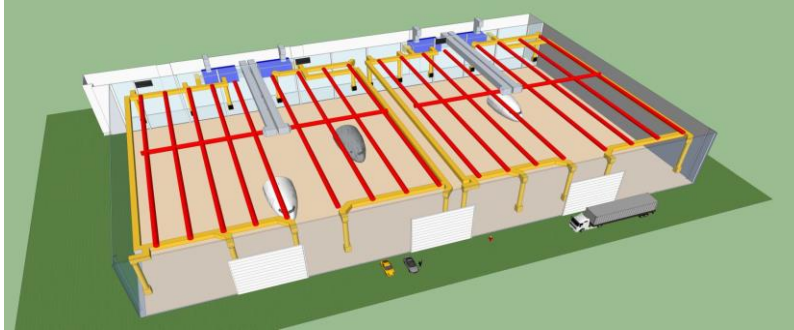
INITIAL PROJECT

AHU's total air flow	254,000	CFM
Circulation air volume	1.55	vol/h
Max. winter supply air temperature	86	°F
Min. summer supply air temperature	54	°F

NEW GENERATION MIX-IND® DESIGN

AHU's air flow	164,000	CFM
Circulating air volumes	1.1	vol/h
Maximum stratification	2	°F
Variable air flow	40 - 100	%
Min. winter air input temperature	23	°F

REFERENCES – Airbus A350 ISO8 cleanroom



INITIAL PROJECT

AHU's total air flow
Fan power
Estimated stratification

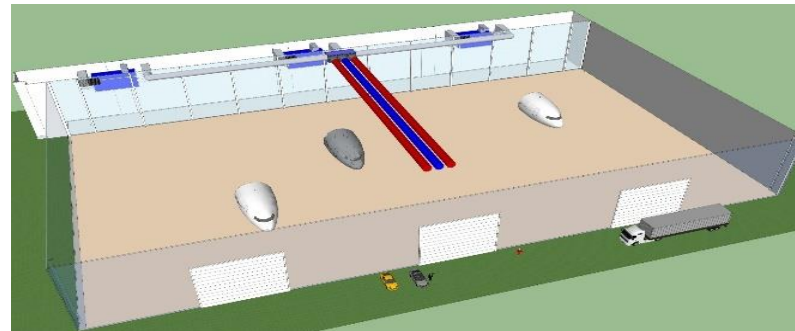
200,000 CFM
300 kW
3.5 °F



MIX-IND® DESIGN

AHU's total air flow
Fan power
Estimated stratification

88,000 CFM
90 kW
1.5 °F



NEW GENERATION MIX-IND® DESIGN – new features

Variable Air Flow 40 – 100%	=> 80% gain on fan consumption
AHU redundancy	=> industrial safety MCO
Variable confort	=> employees satisfaction
Temperature recovery	=> high energy savings
Extrem freecooling	=> Supply air a low as 32°F

BUILDING'S CHARACTERISTICS

Surface	150,600	ft ²
Height	50	ft
Volume of the room	10,000,000	ft ³

REFERENCES – IKEA



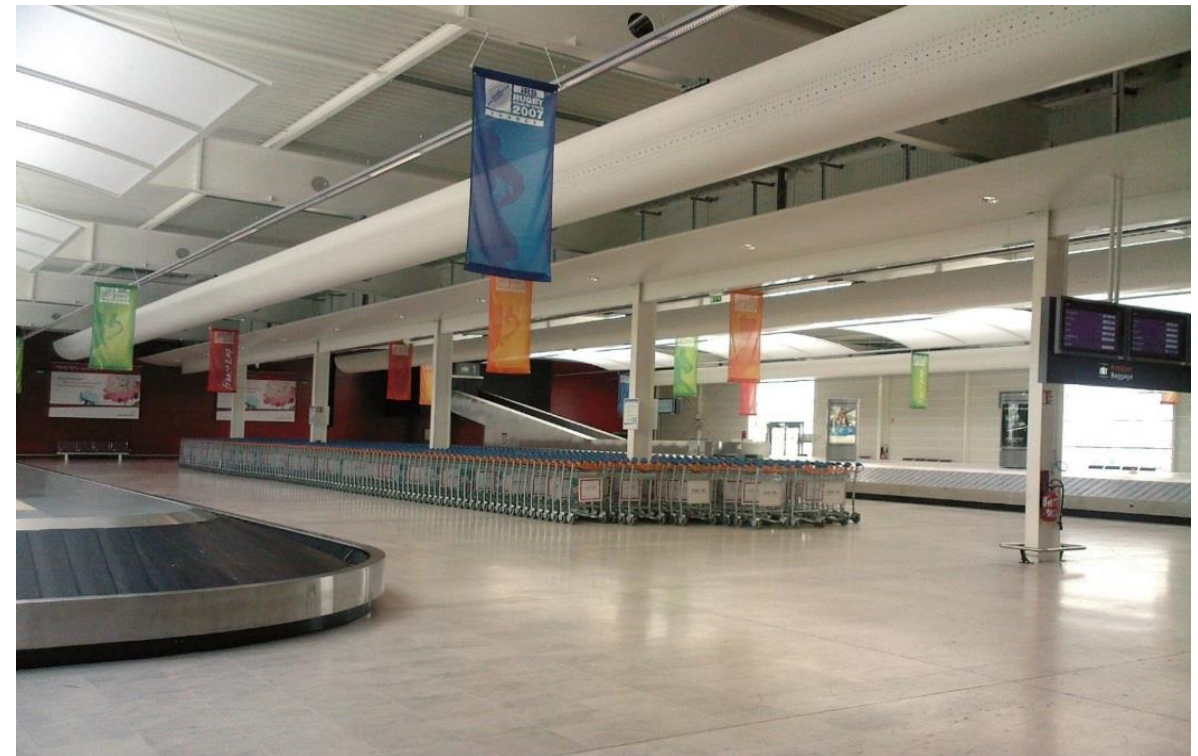
REFERENCES – RETAIL



REFERENCES – AIRPORTS CDG Paris



Half moon design for Architech



REFERENCES – POOLS



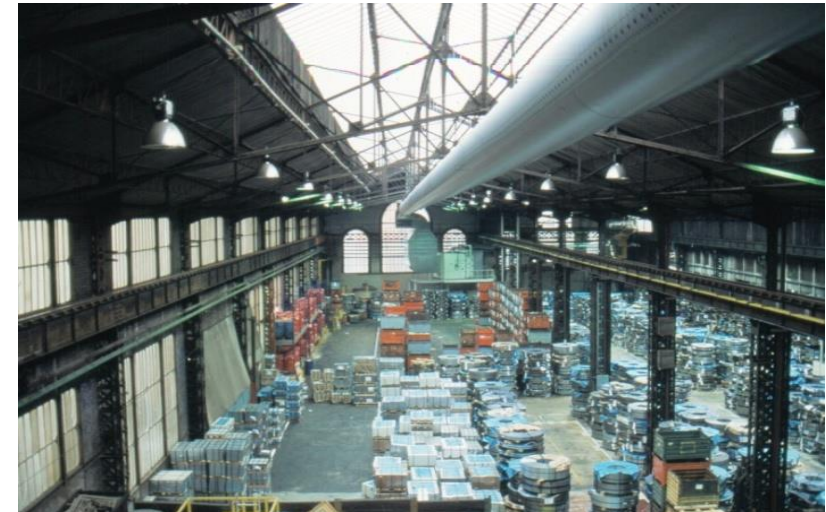
REFERENCES – MUSEUMS



REFERENCES – CAR INDUSTRY



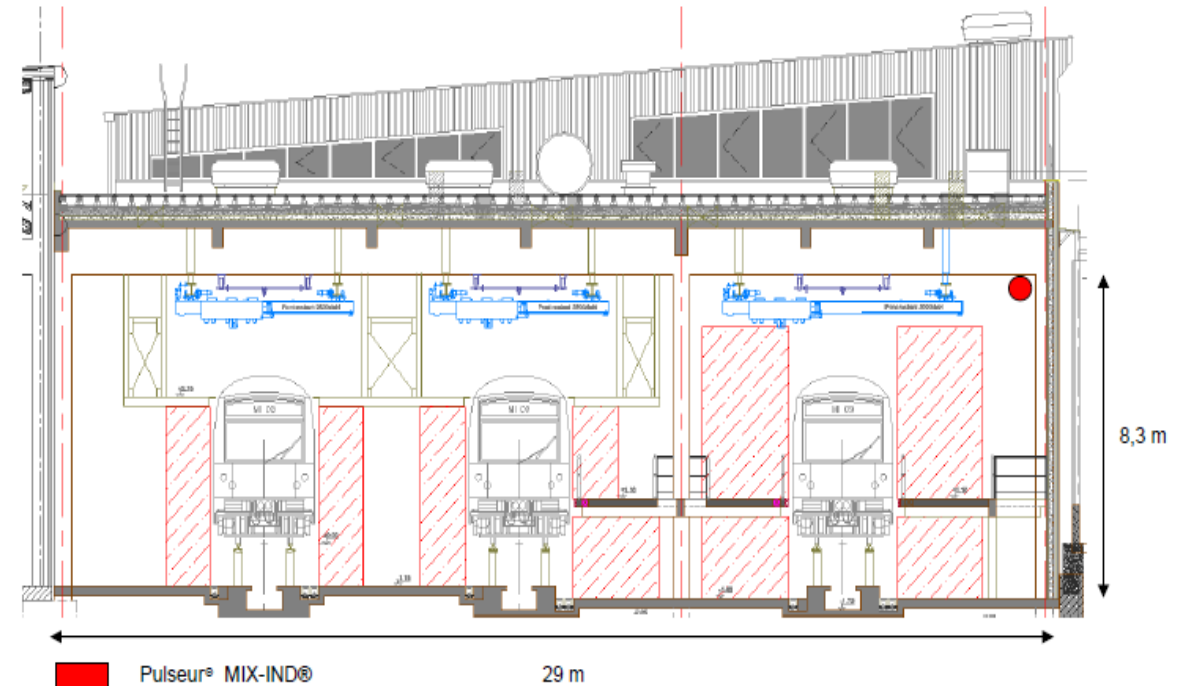
REFERENCES – CAR INDUSTRY



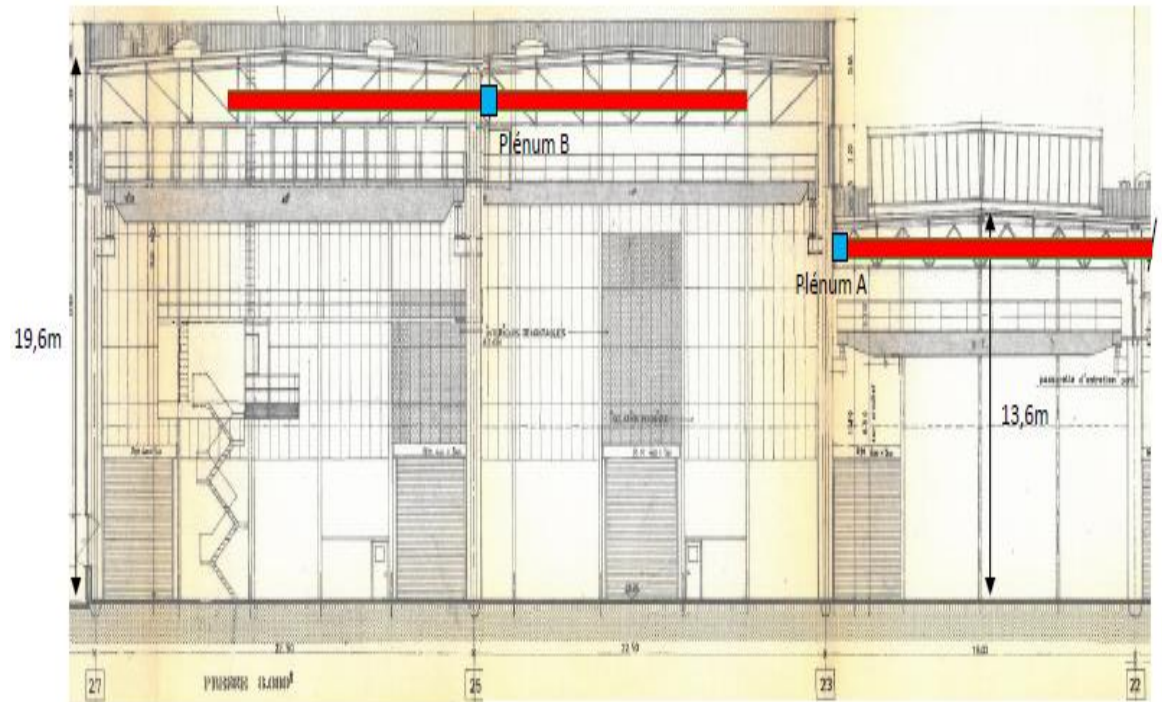
REFERENCES – TRAIN & FOOD INDUSTRY



REFERENCES – TRAIN MAINTENANCE



REFERENCES – AIRCRAFT INDUSTRY





Extrem free cooling (5°F)

REFERENCES – EXTERNAL HOT COLD BARRIER



VARIWIND

SIMPLE - POWERFUL - EFFECTIVE

- ☐ Competitive price
- ☐ No thermal power installed
- ☐ Energy saving > 40 %
- ☐ More comfort for the users:
 - less air drafts
 - less dust lifting
 - Greater temperature homogeneity
- ☐ Adptable for doors up to 100 ft high
- ☐ Stainless steel built with no welding
- ☐ No service and maintenance required
- ☐ High efficiency EC motors
- ☐ Variable air flow according to climate

MIX-IND® technology – CONCLUSION

Key benefits

- Homogeneity of temperatures, both vertical and horizontal, $\pm 2^{\circ}\text{F}$
- Air throw range: up to 330 ft
- No duct insulation required /No condensation
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- No return air ducting /Weight reduction on structure
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- Industrial safety: MCO
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- Lengthening HVAC equipment life span due to variable air flow

Gain

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- Heat and AC consumption: up to 50% due to:
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 - Cold air barrier
- Up to 50% of maintenance costs
- Up to 80% on filter replacement
- Return air duct: 100% gain cost
- Free Technical support appointment