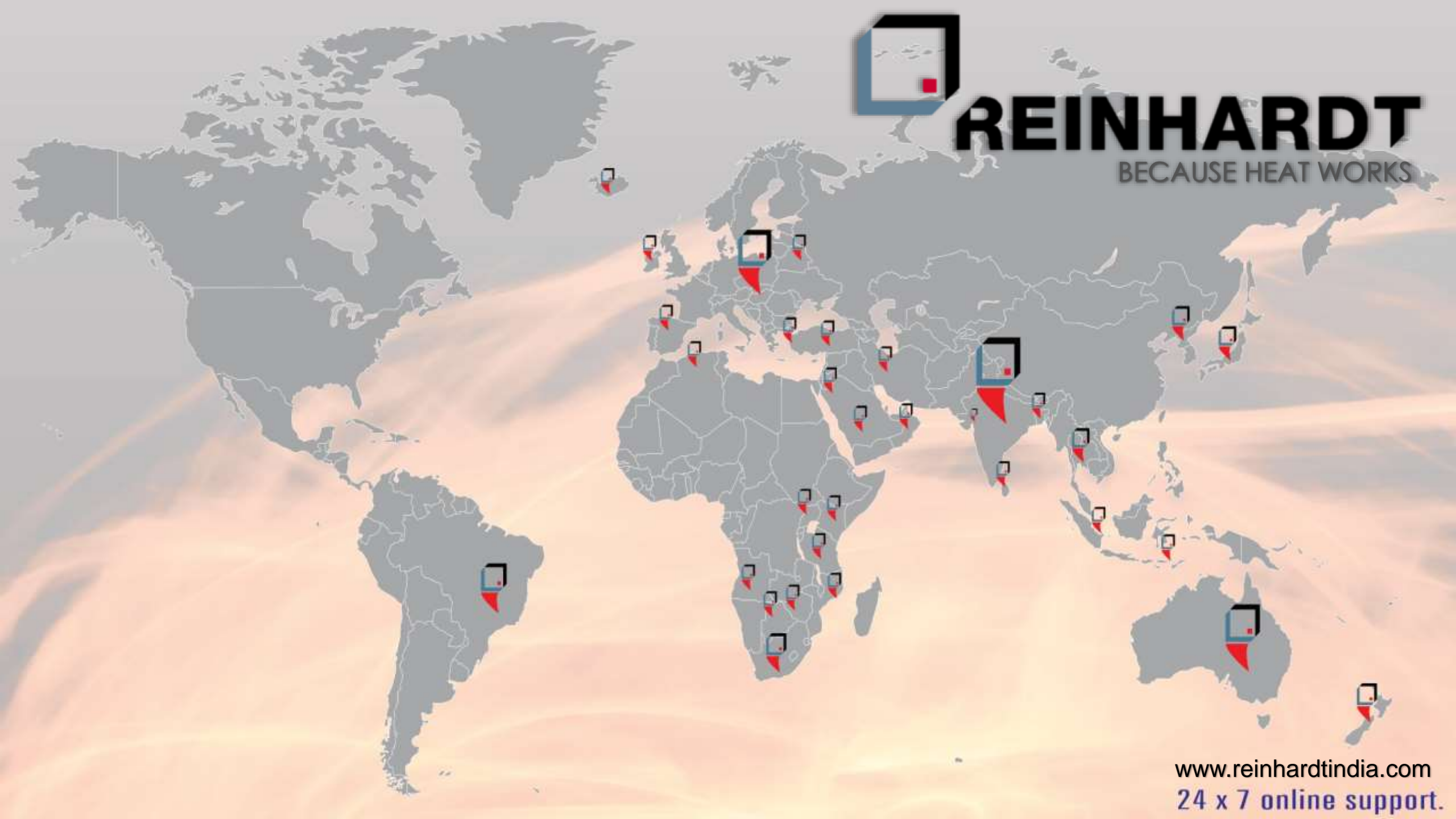




# REINHARDT

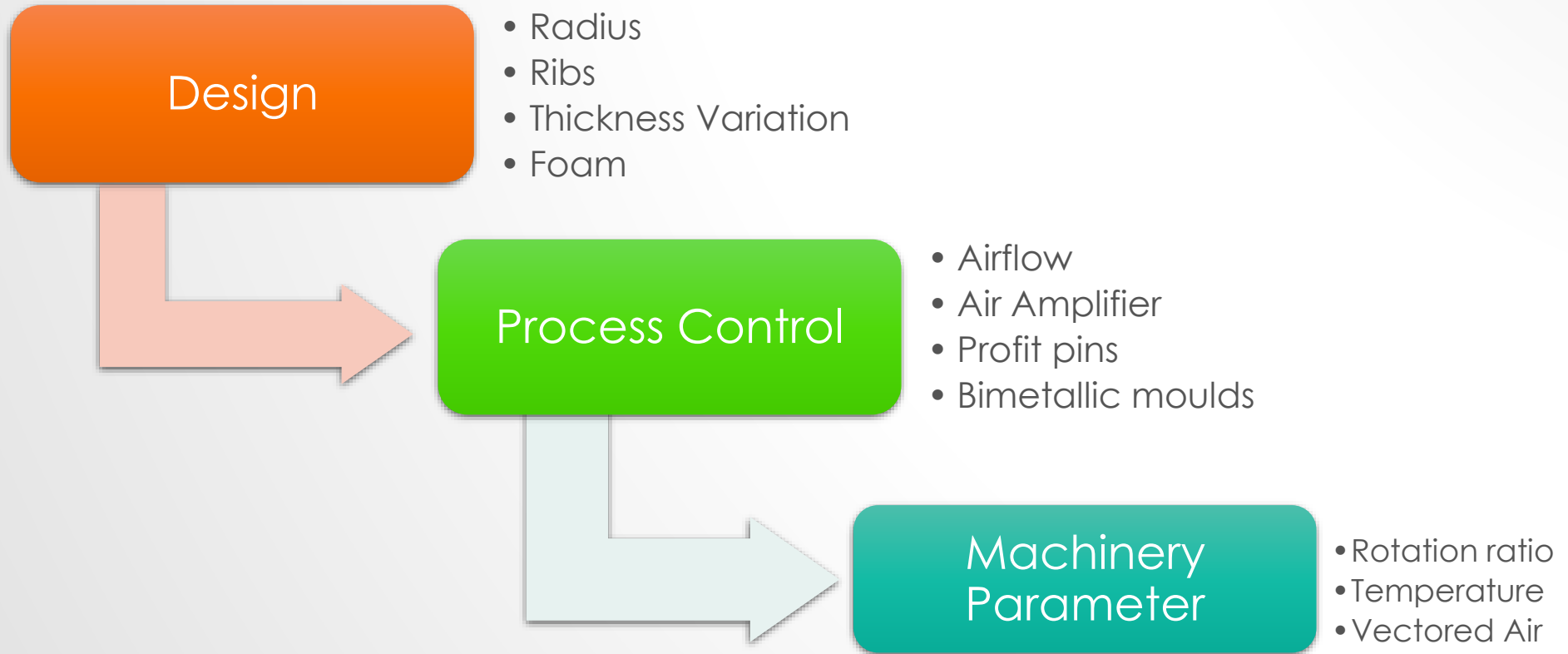
BECAUSE HEAT WORKS



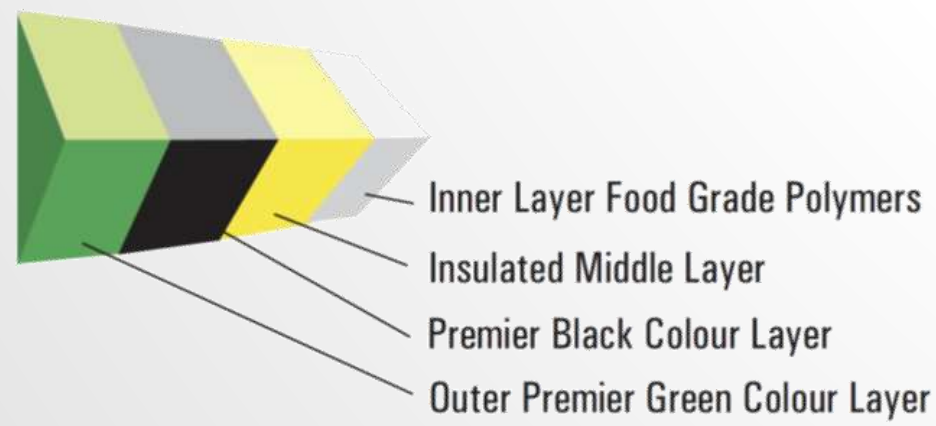
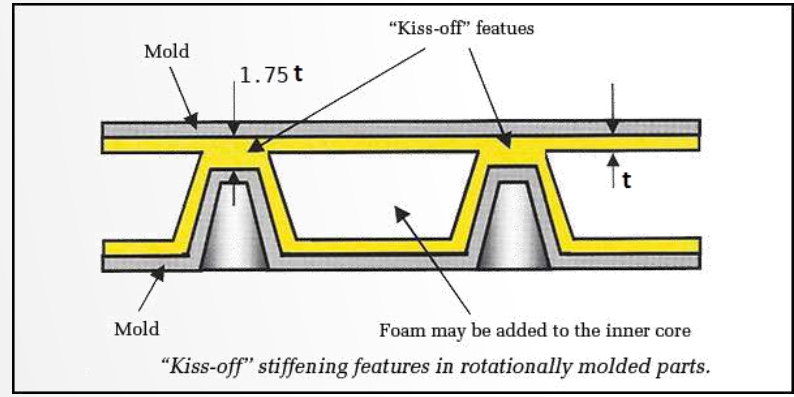
[www.reinhardtindia.com](http://www.reinhardtindia.com)  
24 x 7 online support.

***Nominal thickness is the average thickness of the part with a tolerance of 10% for technical parts and 20 % of commercial parts subject to a minimum wall thickness.***

# WALL THICKNESS



- Radius
- Rib
- Thickness Variation
- Foam



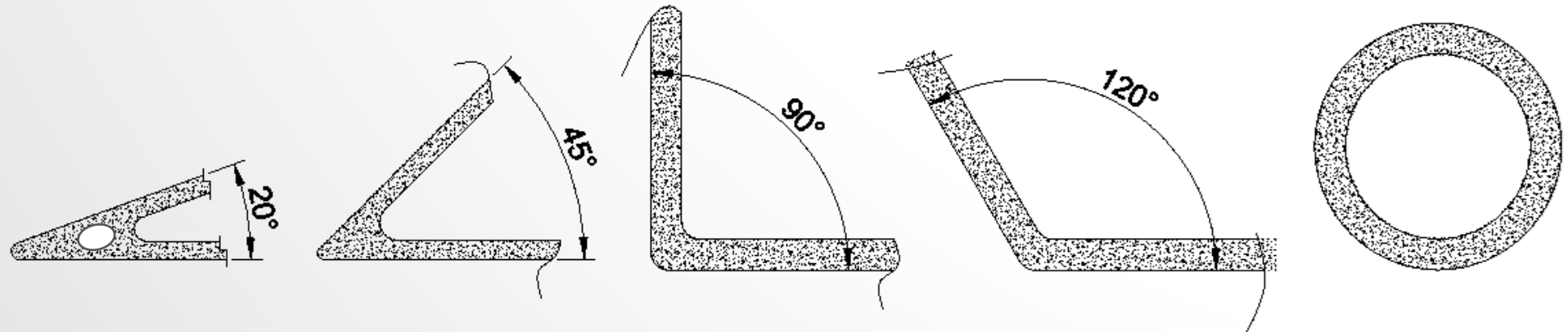
DESIGN

# PE FOAM WITH KISS OFF



- Angle between two intersecting walls affects the flow of the powder and wall thickness uniformity.
- As the angle between two walls becomes less than  $90^\circ$ , the open space between them is reduced. At a  $45^\circ$  angle, the two walls begin to act like closely spaced parallel walls. These converging walls violate the minimum allowable space between parallel walls before they meet at the corner of the part. This makes it difficult, or impossible, for the powdered plastic to uniformly coat the corner, which often contain thick sections, internal voids and sink marks.

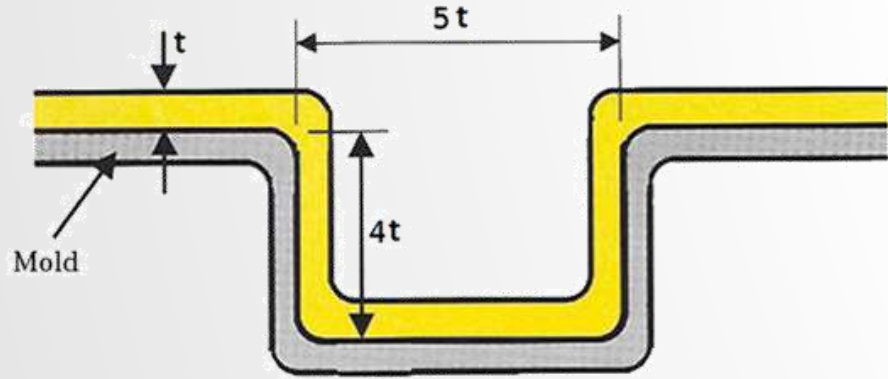
DESIGN



# RECOMMENDED RADII

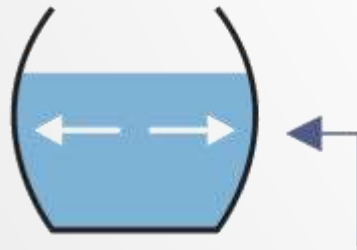
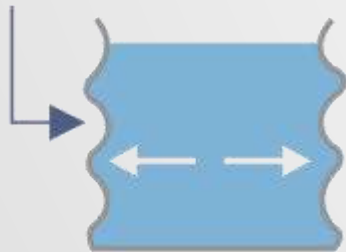
Plastic Material	Outside Radii		Inside Radii	
	Min. mm	Better mm	Min. mm	Better mm
PE	1.52	6.35	3.20	12.70
PP	6.35	12.70	6.35	19.05
PVC	2.03	6.35	3.20	9.53
Nylon	4.75	12.70	6.35	19.05
PC	6.35	19.05	3.20	12.70

# RIBS & THICKNESS VARIATION



*Typical dimensions of stiffening corrugations in rotationally molded parts.*

Extra ribs for extra strength

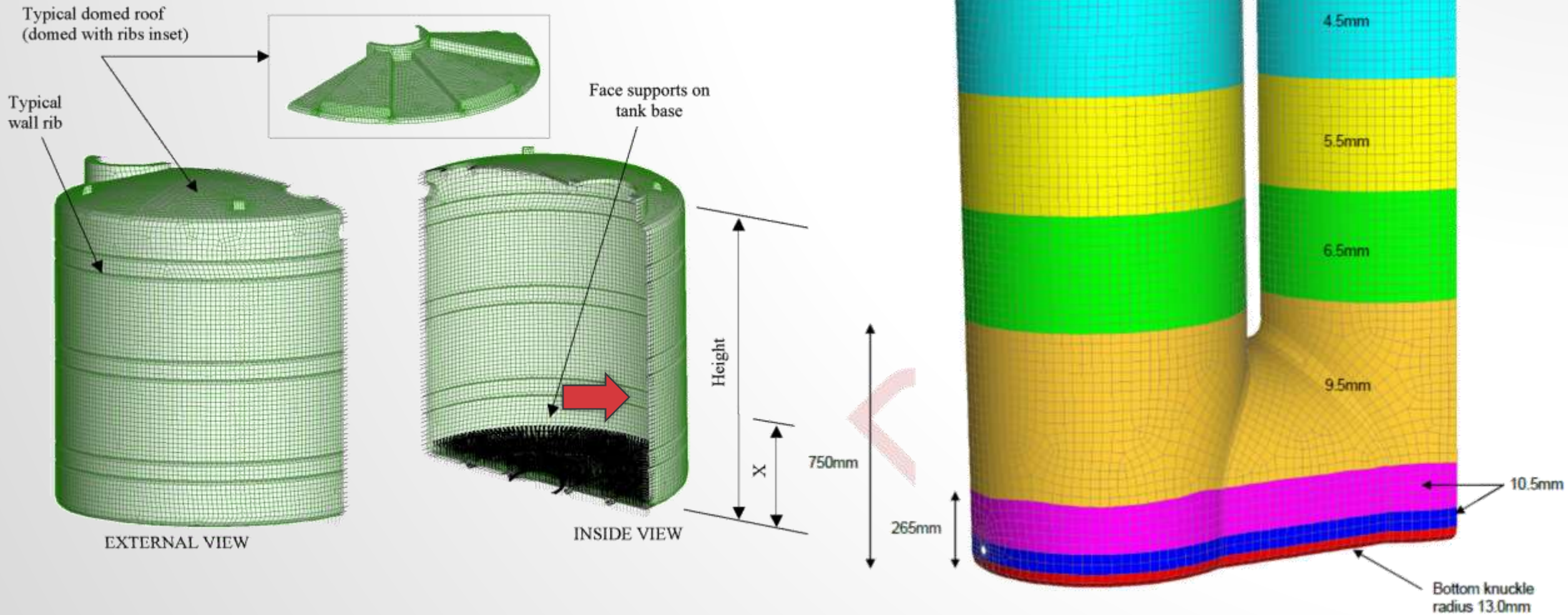


Other tanks bulge due to lack of ribs

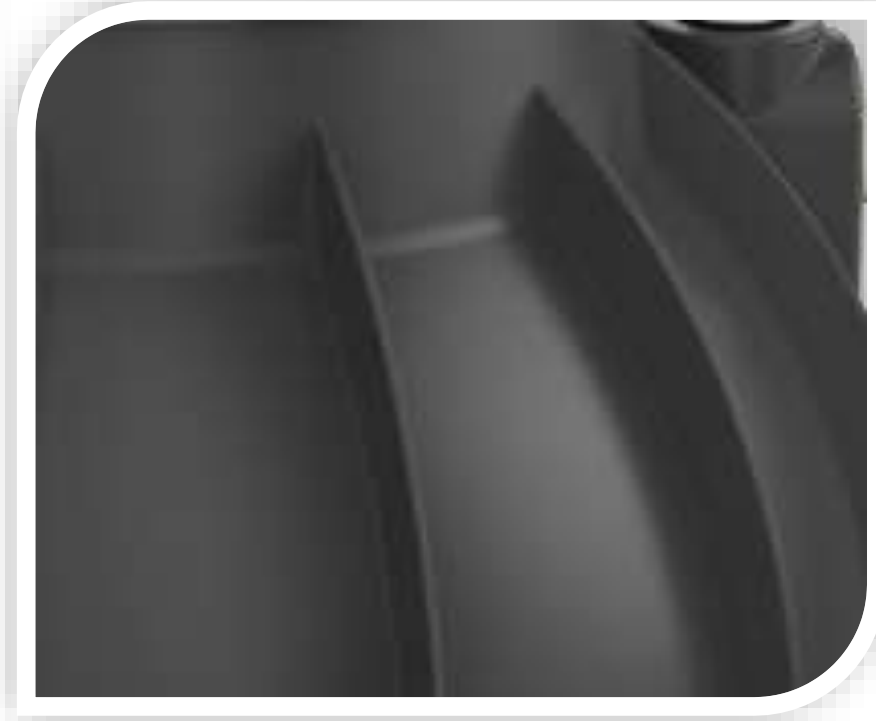




# MAX STRESS POINT ON THE TANK WALL



# SOLID RIBS



**GLOBAL**  
Rotomoulding

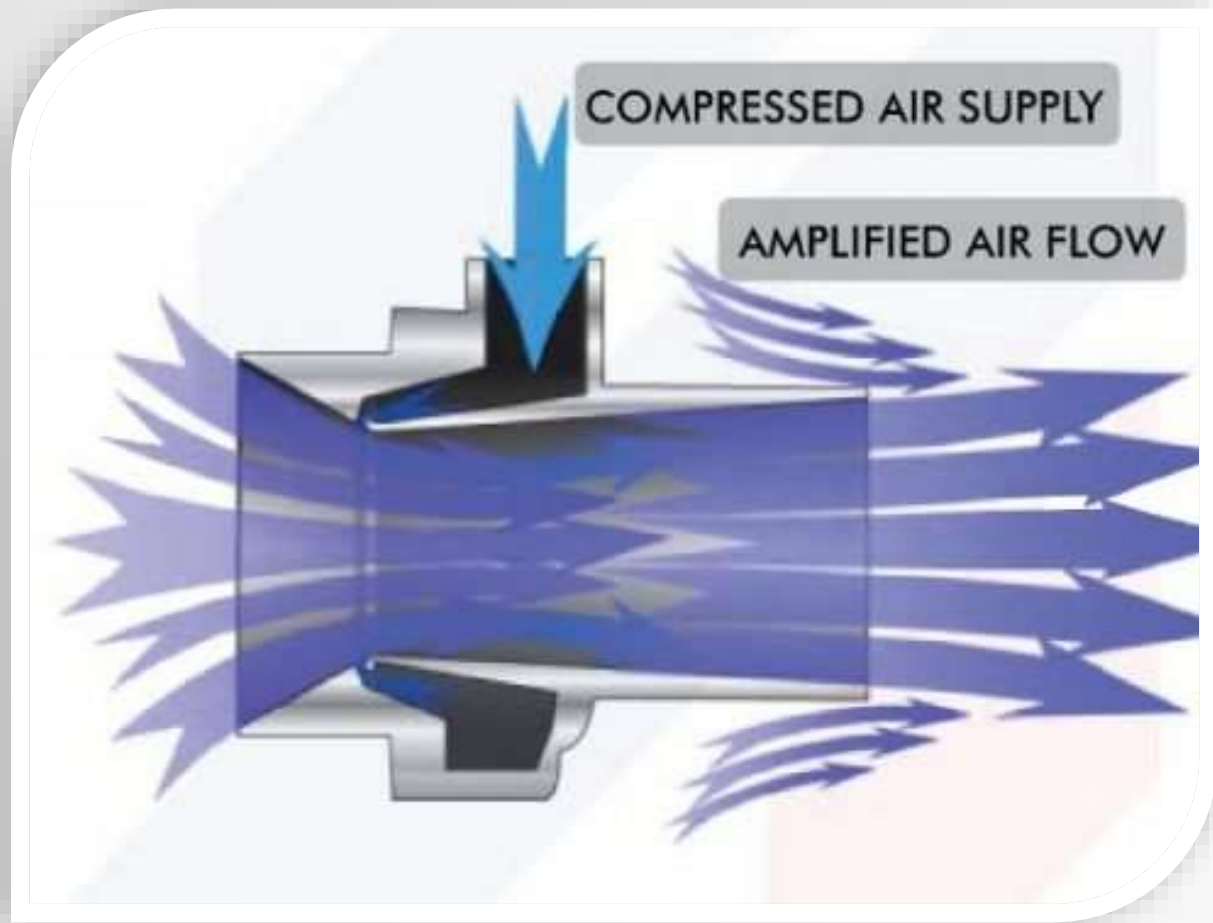
Comes with sink marks and warpage but give tremendous strength to UG

- Airflow
- Air Amplifier
- Profit pins
- Bimetallic moulds
- Heat pipes

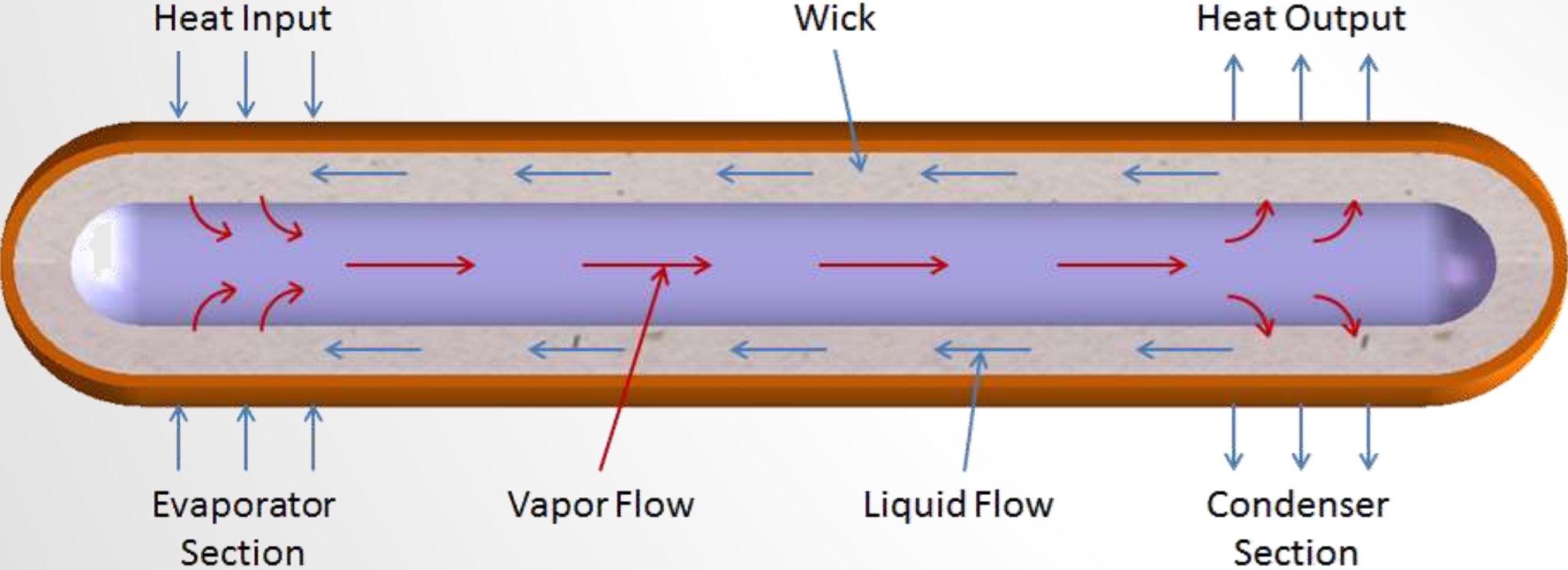


PROCESS CONTROL

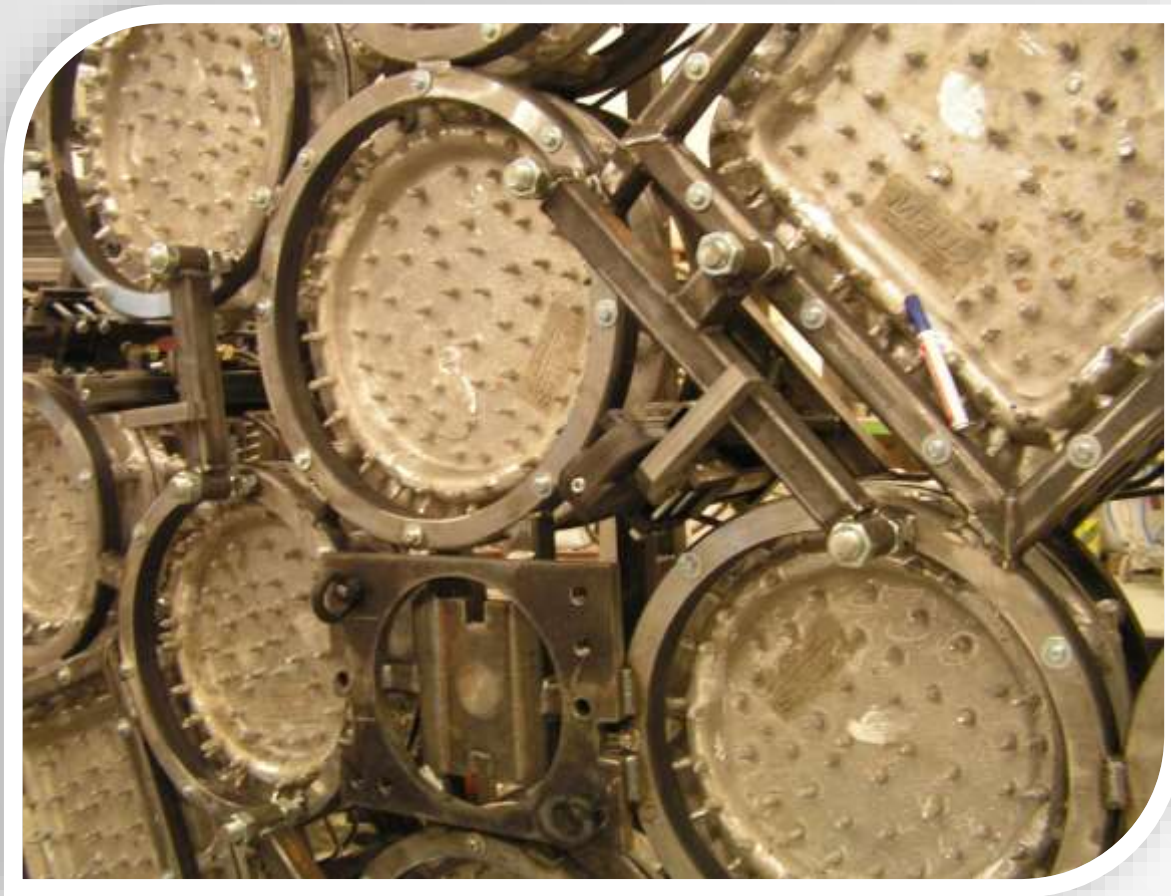
# AIR AMPLIFIER



# HEAT PIPES

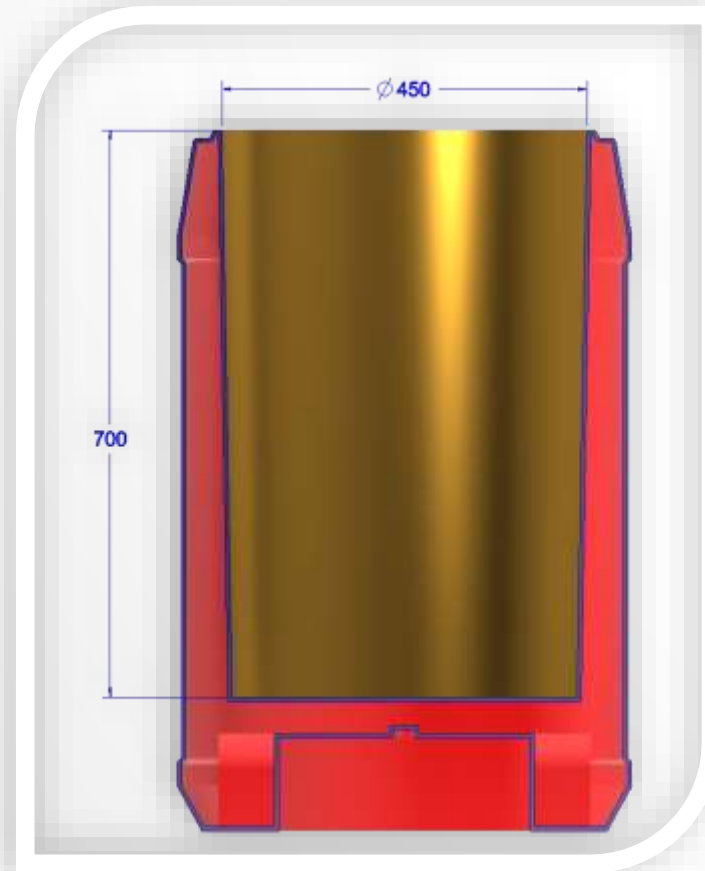
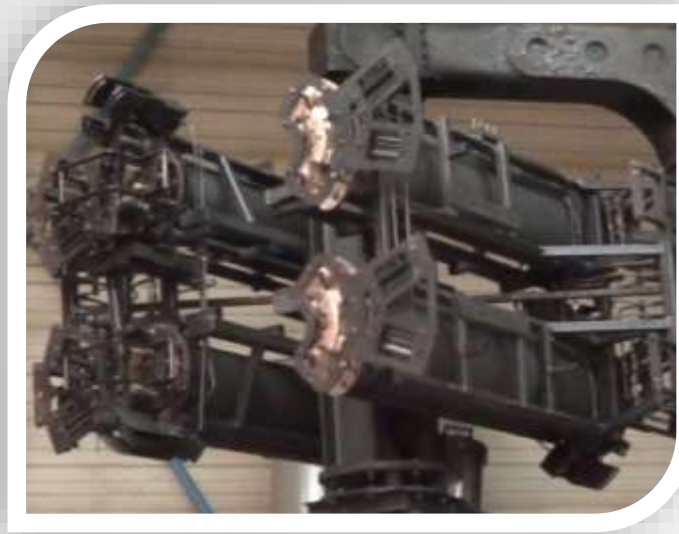


# PROFIT PINS

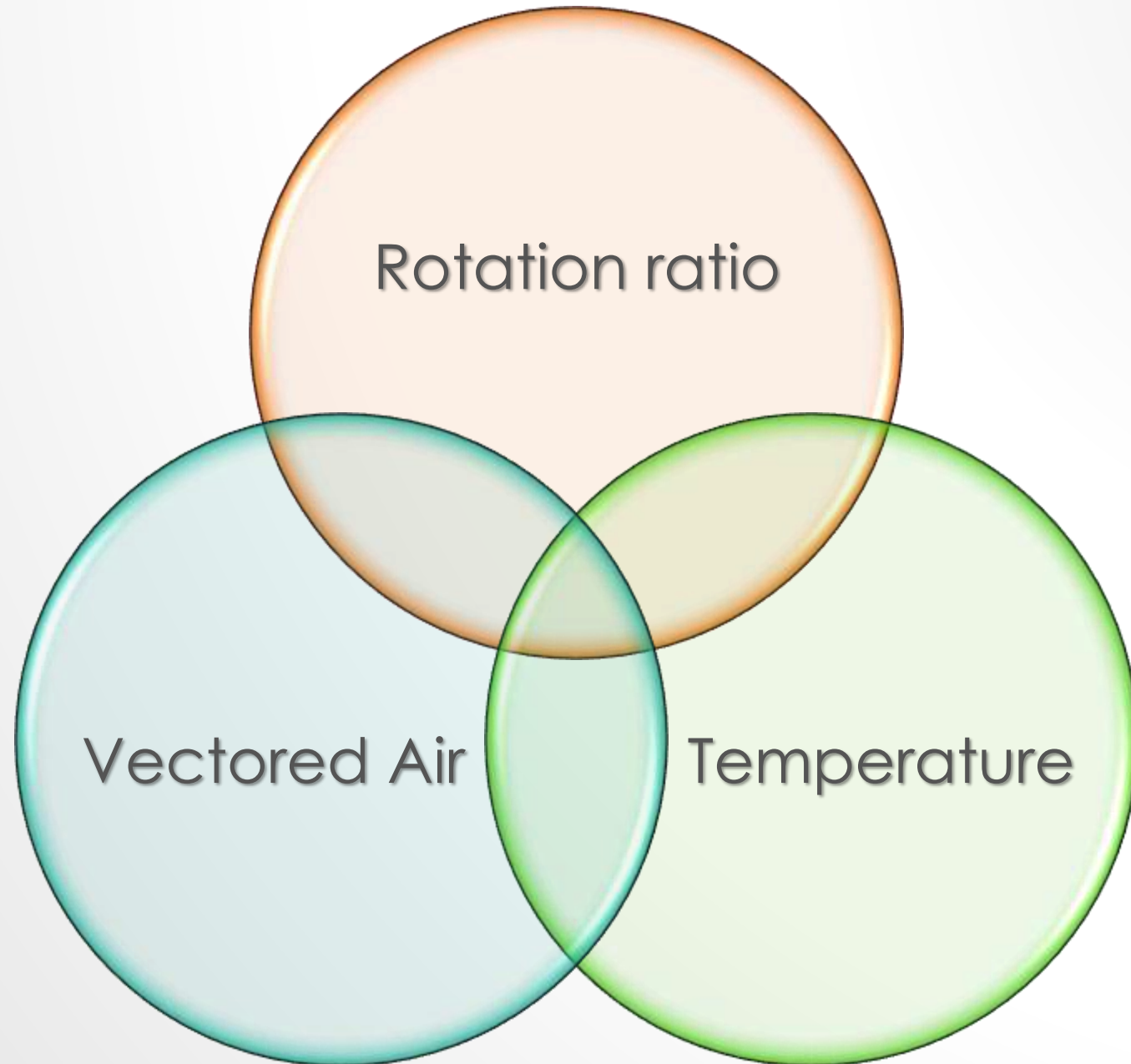


Moulds by **MAUS**

# BIMETALLIC MOULDS



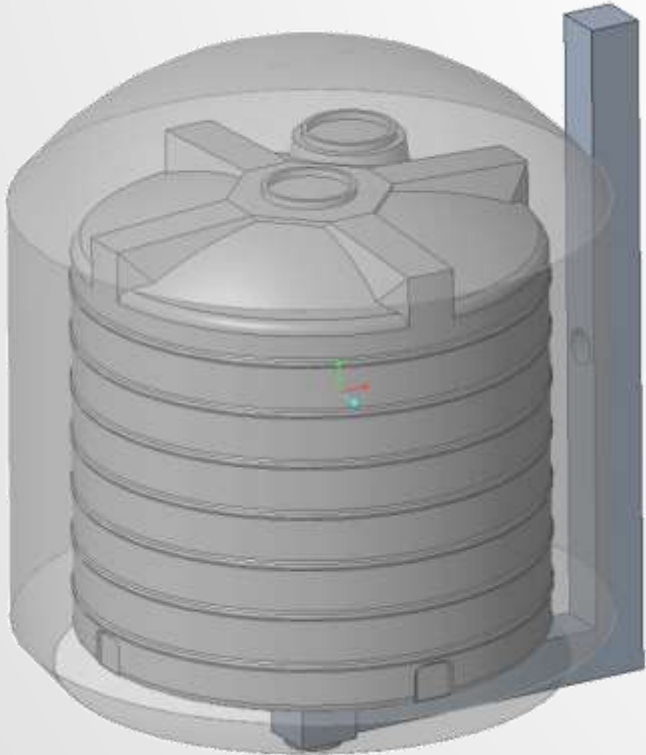
# MACHINERY PARAMETER





# ROTATION RATIO

DEPENDS ON GEOMETRY  
& ORIENTATION OF MOUNTING  
4:1



Ratio	Shapes
8 to 1	Oblongs (Horizontal mounted) Straight tube (Horizontal mounted )
5 to 1	Ducts
4.5 to 1	Balls
3.3 to 1	Any shape showing overlapping lines of rotation at 4 to 1
4 to 1	Cubes – Balls – Odd shapes Rectangular boxes
2 to 1	Rings, Tires, Balls Any rectangle which shows two or more thin sided when run at 4 to 1, Mannequins Round flat shapes, Auto crash pads ( vertical mounted)
1 to 2	Parts which should run at 2 to 1 but show thin side walls
1 to 3	Flat rectangles ( Gas tanks suit cases -tote bin cover )
1 to 4	Tires - Curved Air ducts Pipes angles - Flat Rectangles Balls Whose sides are thin at 4 to 1 ration (vertical mounted cylinders)
1 to 5	Cylinders ( vertical mounted )

# ROTATION RATIO

# The variables that control local wall thickness can be simplified to only two:

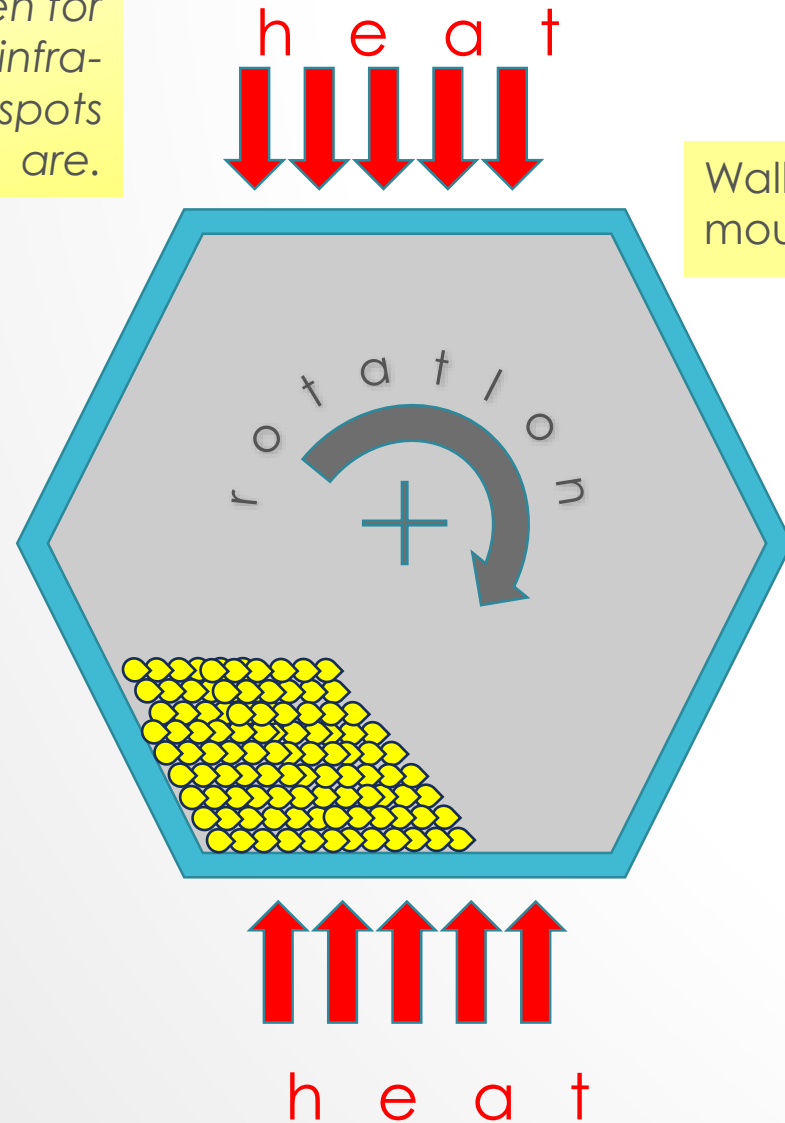
*TIP: Heat the empty mould in the oven for 2mins. Remove it and view with an infra-red camera where the natural hot spots are.*

*NB: Parts will be thinner in those areas that pass through the powder pool less frequently .*

*NB: Powder lays down on the mould somewhere between 85C and 130C IAT. This is when the rotation speed & ratio counts!*

*Parts will be thinner in places where geometry inhibits powder flow (dry under the waterfall).*

*TIP: Process a 2mm part in the mould & easily spot the holes or thin sections.*



More even oven temperatures reduce the likelihood of uneven wall thicknesses.

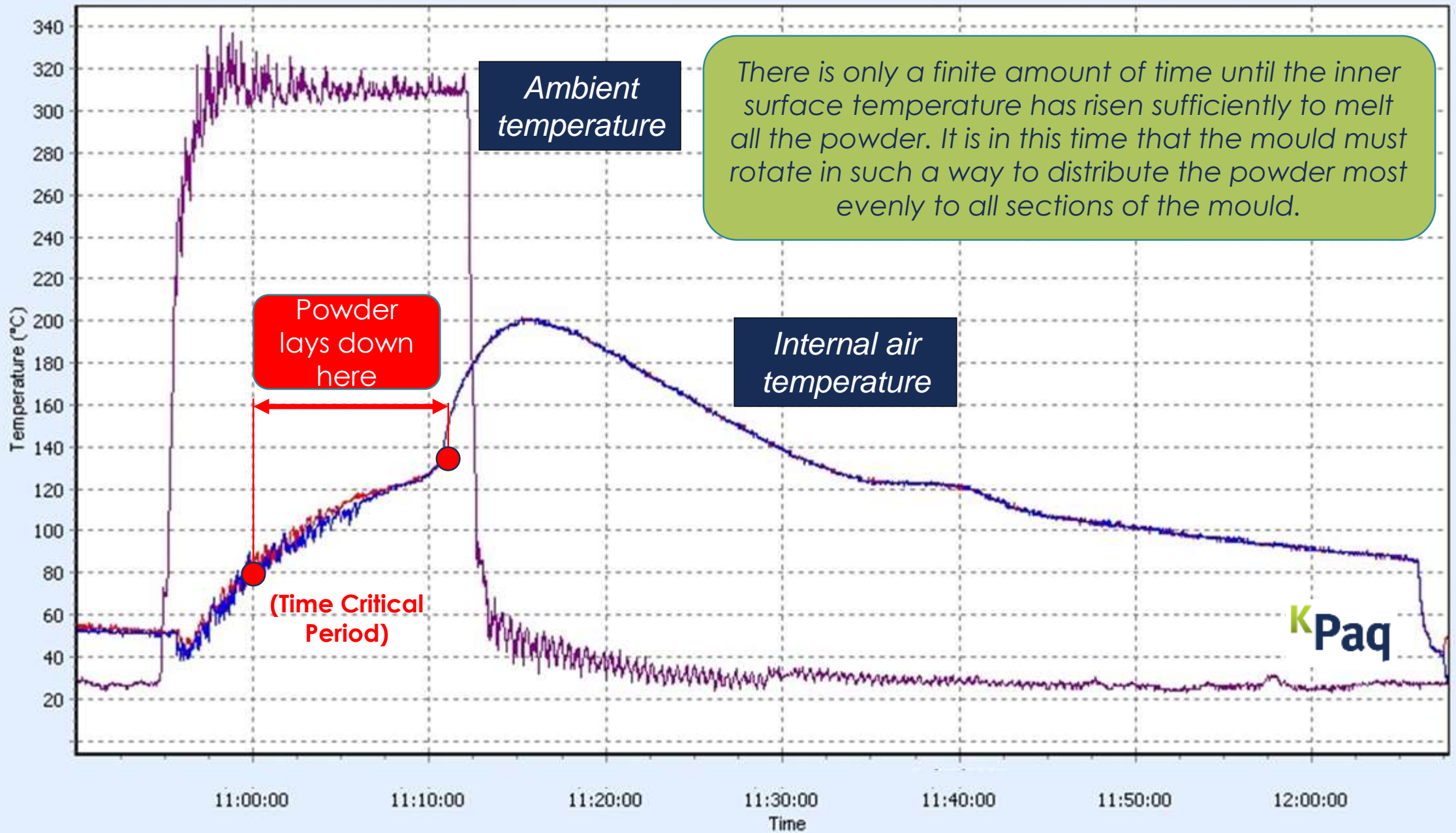
Walls are thicker at the hottest parts of the mould.

Stalling rotation can cause areas of variable temperature – useful to heat up cold sections!

*TIP: Increase rotation speeds to increase the number of powder pool passes on each section of the mould.*

*NB: Part walls will be thinner at colder parts of the mould (e.g. shielded areas, deep ribs, flanges)*

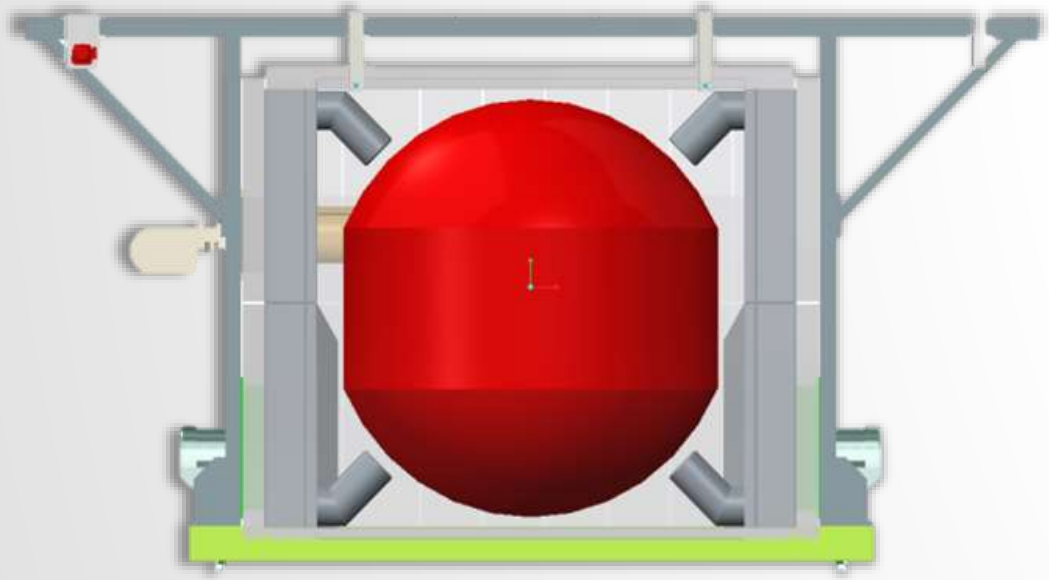
Correctly adjusted rotation ratios provide the biggest improvement to wall thickness uniformity.



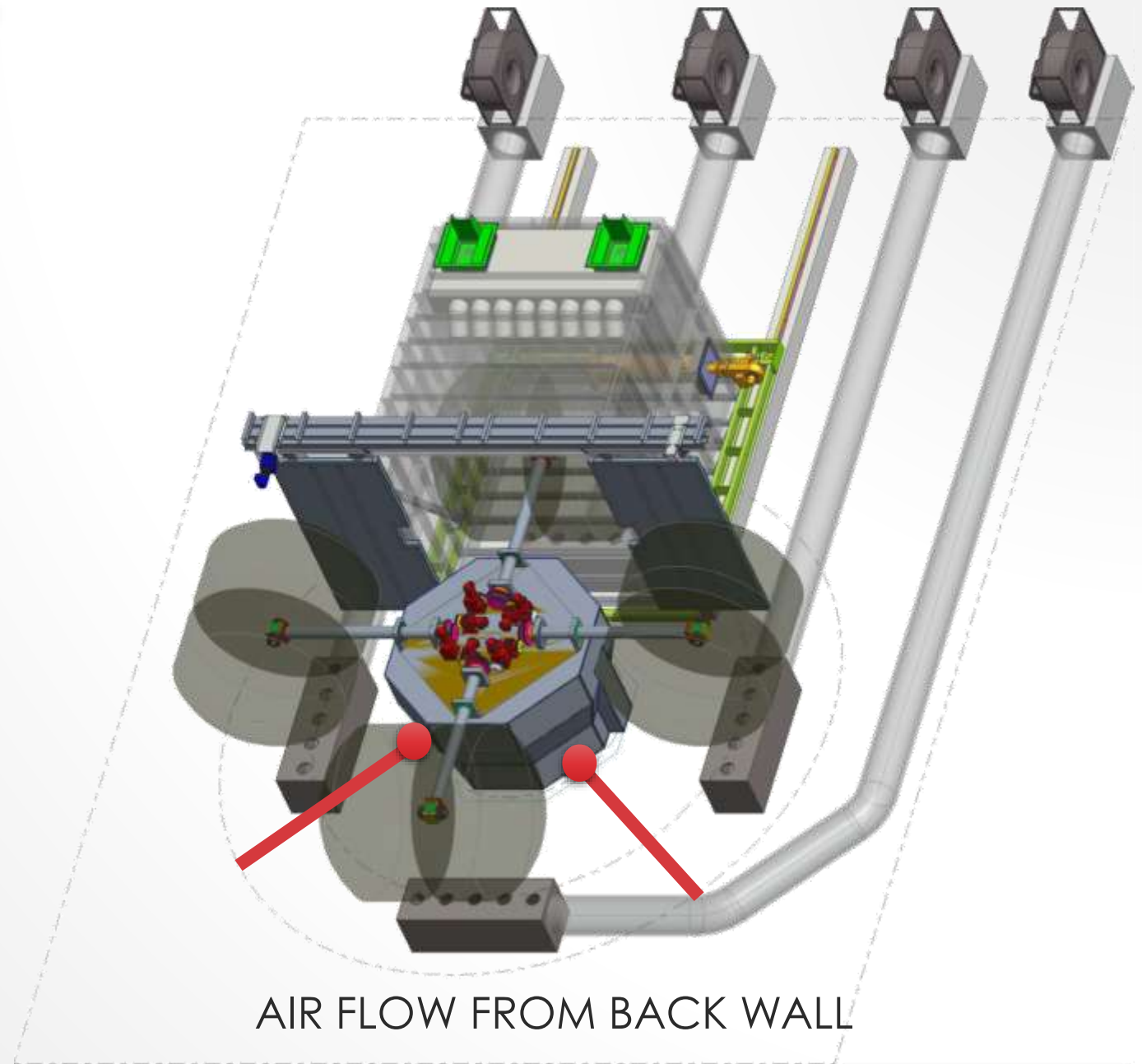
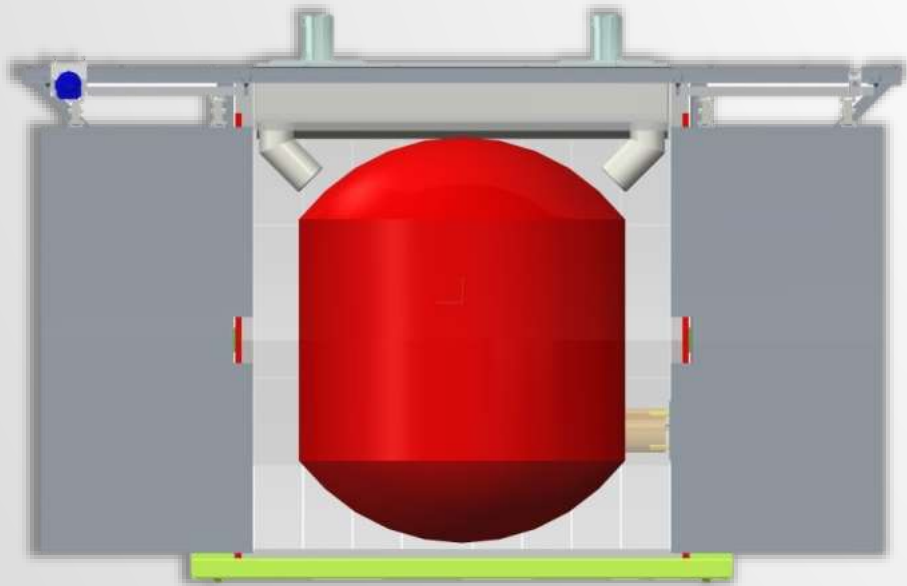
VECTORED  
AIR FLOW



AIR FLOW ON FOUR SIDE



AIR FLOW ON TWO SIDE



AIR FLOW FROM BACK WALL

Open File

Save File

Print

Zoom

Slope

1 2

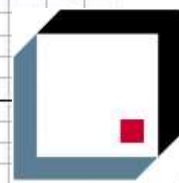
3 4

5 6

Smooth

Return

Close



# REINHARDT

BECAUSE HEAT WORKS

**F I** OF THE INDUSTRY!

Graph	Temp	Description	Graph	Temp	Description	Run Time
1	< 0 >	1 10/10/19 18:49:00 p5002 Internal Mould	4	< 0 >		
2	< 0 >	1 10/10/19 18:49:00 p5002 Oven Inner	5	< 0 >		
3	< 0 >		6	< 0 >		

Thin line

Thick line

5000 L 95KG. FROM MATRIX  
**TEMPERATURE**

*Trace By  
 TempLogger*

Electrically Heated



Smart but very expensive

LOCALIZED  
HEATING



TOUGH  
MOULDINGS  
NEED SPECIAL  
MACHINES





# REINHARDT

BECAUSE HEAT WORKS

## KEEP WALKING



## Keep Moulding



# THANK YOU