

The Mplast logo features a stylized red 'M' followed by the word 'plast' in a white, sans-serif font, with a registered trademark symbol (®) to the upper right.

**Mplast®**

HEATING - CHAMBER

HOLDING - STATION

HEATING - CHAMBER

LOADING - STATION

# ROTATIONAL MOULDING

MACHINES | MOULDS | DESIGN | SOLUTIONS

**StAR**  
SOCIETY OF ASIAN ROTOMOULDERS

**CE**



**ARMO**  
ASSOCIATION OF ROTATIONAL MOULDING ORGANISATIONS



We at M PLAST, feel honoured to have led the rotational moulding revolution in the subcontinent. Over the past 25 years, we have dedicated ourselves towards providing our esteemed customers with services and equipments of unmatched value.

With customers in over 40 countries and more than 250 installations over the years, we have gained a deep insight into industry's requirements.

We believe that rotational moulding is not just a process, but a means to serve the society with products of unmatched value. Hence we are committed towards building efficient solutions, pushing the boundaries of the process and its applications.

Over the years, our never ending quest to improve efficiency of our machines has led to a Research and Development Center which complements our state of the art manufacturing plant. Our in-house CAD, CAM and CAE capabilities have allowed us to build thermo-mechanical solutions of unmatched value for the rotational moulding industry.

Located just 20 Kms from New Delhi, the capital of India, we support our clients with the expert knowledge, skills and experience needed to facilitate and implement their most ambitious goals.

*Come ! Let's Explore Ideas and Possibilities.*

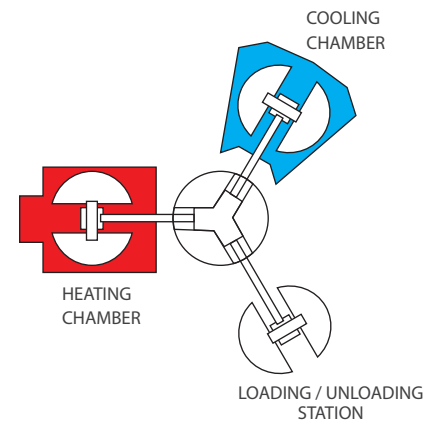
# Rotational Moulding

Rotational Moulding has literally reshaped the entire plastics industry. Without it, neither would we have many of the products we have today, nor would we enjoy the quality, durability, and versatility we have come to expect from plastic products.

## The Process:

There are four steps in the rotomoulding process:

- Mould is charged with a predetermined amount of polymer and clamped.
- The charged mould is moved into an oven where it is heated and simultaneously rotated around two axes in two perpendicular planes. During the heating cycle the polymer melts, fuses and then takes on the shape of the mould.
- When all the powder has fused into a homogenous layer on the walls of the mould cavity, mould is moved into the cooling chamber where it is cooled by air.
- The mould is removed from the cooling chamber, opened and the finished part is removed. The mold is then prepared for the next cycle.

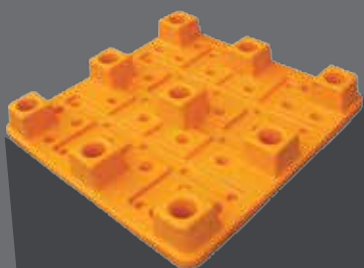


## Advantages in comparison to other Moulding Techniques :

- Cost for moulds and tooling is relatively low.
- There is little or no waste due to resin scrap.
- Wall thickness and piece weight can be easily controlled/ modified.
- Assures uniform wall thickness.
- Pieces with intricate contours and undercuts can be easily moulded.
- Virtually any size piece can be rotationally moulded.
- Yields pieces with excellent surface detail and finish.
- Products are virtually stress free, except for slight shrinkage forces.
- Identical or similar items or different sections on one piece can be moulded at the same time in different colors on a single arm.
- Plastic or metal inserts can often be moulded as integral parts of the item.
- Double wall construction is feasible.

## Typical applications :

- Commercial, industrial and agricultural storage tanks
- Material handling and construction equipments
- Automotive accessories
- Garbage bins and containers
- Ice-boxes, coolers, food trolleys, medical storage boxes
- Playground equipments, furniture items, toys
- Portable outhouses and toilets
- Boats, canoes and kayaks etc.



Pallet



Fuel Tank



Septic Tank



## ROTAPLAS® Turret Machines

*Being the most common type of rotational moulding machine, ROTAPLAS Turret Machine is an ideal machine to produce different parts with similar working cycle times at high production rates.*

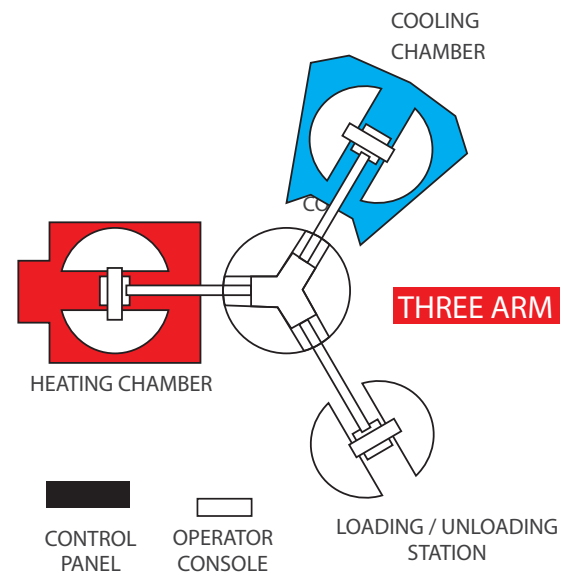


Three Arm Turret Machine

## Standard features of ROTAPLAS Turrent machines

### Turret

- Sturdy and Most Reliable Design.
- Choice of Three Arm/Four Arm Models.
- Choice of Straight/Offset Arms.
- Three/Four direct drives interchangeable arms.
- Direct drive geared motor for indexing mechanism with variable speed frequency converter having dynamic braking, Acceleration/deceleration features to reduce shock & accurate positioning.
- Reverse indexing of Turret.
- Pneumatic brake at loading/unloading station.
- Gas/ Air injection in mould during heating /cooling.



### Heating Chamber

- A moveable chamber heated by a gas burner having modulating control (Heating by oil, Electricity or dual fuel burner on request).
- Due to unique design of heating chamber fast heat transfer is possible due to high velocity recirculating fans and baffles.
- Short heating time and very low fuel consumption.
- Heating Chamber doors operated by electric motor.
- Fail Safe Burner Control.
- Pneumatic door clamping.

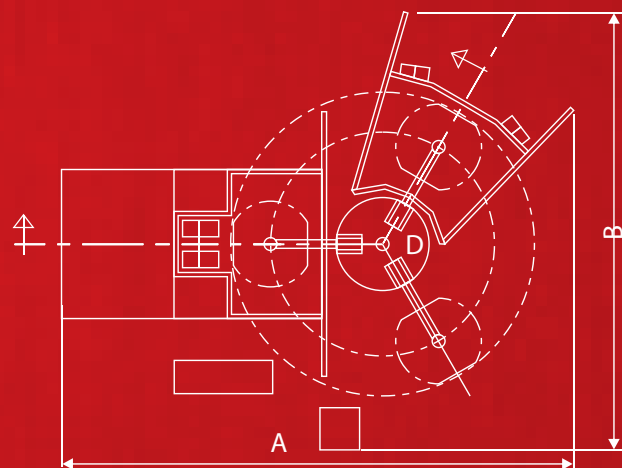
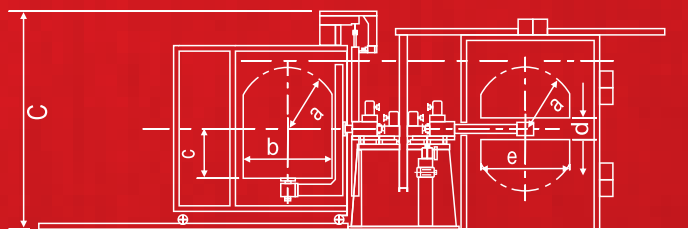
### Control

- Control to provide Jog positioning of arm and plate at Loading/Unloading station.
- Variable speed A.C. Drives (Frequency Converter) for all the arms and plate drives the indexing motor drives.
- Auto reversal facility of Arm & Plate drives with timers for both directions.
- Timers for Programmable cooling to set air cooling.
- Separate Temperature Controllers for each arm.
- Equipped with Required interlocking, Safety & emergency alarms.

## Cooling Chamber

- Semi-Enclosed cooling chamber covered with aluminium sheets.
- Automatically timed cooling cycle utilising forced air.
- High volume-cooling fans.
- High Efficiency cooling chamber exhaust fan.

## Technical Data



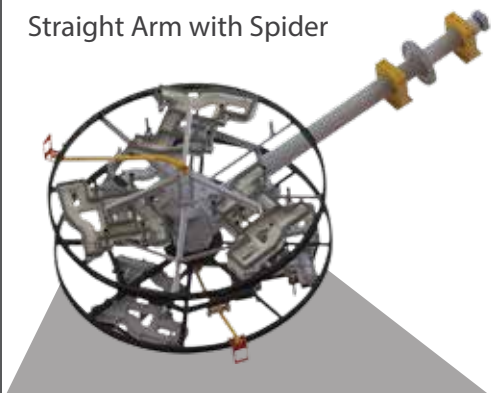
Heating Chamber



Offset Arm



Straight Arm with Spider



THREE ARM TURRET MACHINE								
MODEL NO.	a	Øb	c	d	Øe	A	B	C
3 A -1400	700	900	300	400	1100	9000	6250	2750
3 A - 1800	900	1400	450	450	1600	10750	8000	3500
3 A - 2200	1100	1800	560	450	1900	13000	8750	4000
3 A - 2700	1350	2250	800	450	2400	15250	10250	4500
3 A - 3200	1600	2750	975	625	2950	19250	12250	5200
3 A - 3600	1800	3100	1080	675	3250	20000	13500	5750
3 A - 4000	2000	3550	1300	775	3700	22500	15500	6350
3 A - 5000	2500	4550	1750	800	4700	27000	19000	7500

\*Approx Dimensions in mm  
\* Dimensions are subject to change without prior notice for approval of buyer

# ROTAPLAS® STAR Independent Arm Machine

*Ideally suited for products with different cycle times, this machine allows to choose optimal processing parameters for multiple productions of different articles, different materials and different thicknesses. Suitable for multi layer products.*



Four Arm Five Station Fixed Oven Independent Arm Machine

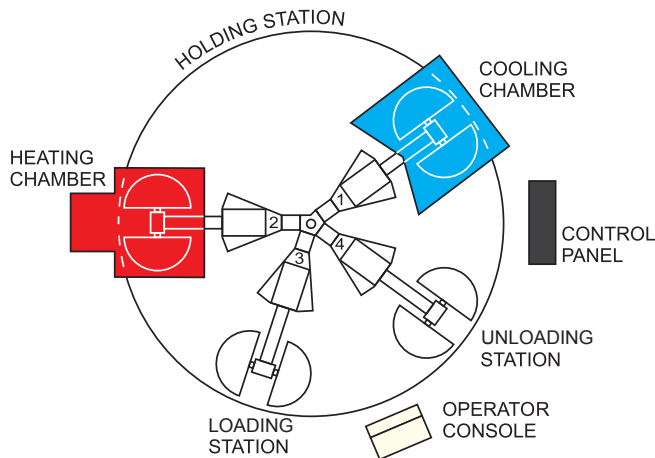
## THREE / FOUR ARM, FIVE / SIX STATIONS INDEPENDENT ARM MACHINE

ROTAPLAS STAR Independent Arm Machines have independent Mould Carriages and have separate drives for each Mould Carriage that can be indexed forward / reverse, programmed, controlled independently.

This has all the standard features as described in our turret machines with same, Heating Chamber, Cooling Chamber, Arms & Control System. In case of Turret Machine, all the Mould Carriages are joined together and have common drives, where as in Independent arm machines, all the Mould Carriages are independent to each other.

Holding station in Independent Arm machines can be used as an additional cooling station. The machine has capability of complete segregation of heating and cooling times from one arm to another. The built in programmability provides optimum Production Management. This Machines is most suitable for any product mix and multi layer products.

Automatic and independent control of time and temperature for each arm, and therefore for each mould or moulds configuration allows to gain better control.



# Typical Working Cycle

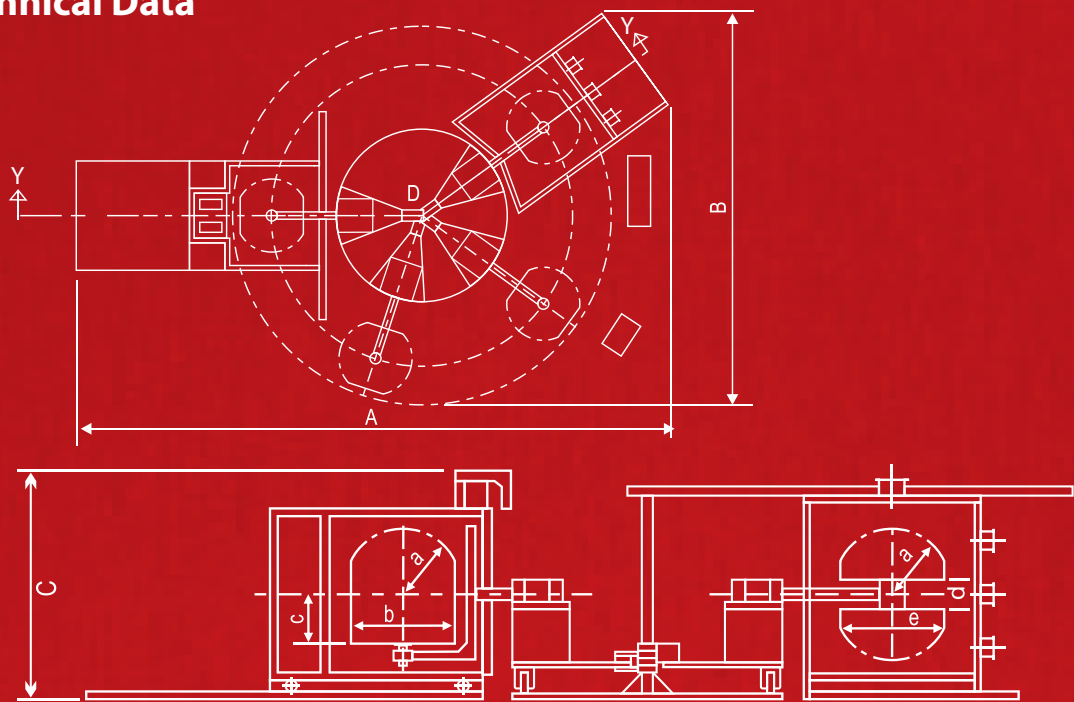
- Heating the polymer in the heating chamber.
- Intermediate holding station before cooling.
- Mould cooling station.
- Holding station before mould opening.
- Material loading and/or unloading station.
- Pre-moulding station for second layer or sandwich layer.

Available up to 6 stations for maximum flexibility.

Depending on the customer requirements, the work stations can be arranged in different configurations.



# Technical Data



INDEPENDENT ARMS MACHINE								
MODEL NO.	a	Øb	c	d	Øe	A	B	C
4I A- 1400	700	900	300	400	1100	10750	7500	2750
4I A - 1800	900	1400	450	450	1600	13000	8300	3500
4I A - 2200	1100	1800	560	450	1900	16500	11000	4000
4I A - 2700	1350	2250	800	450	2400	17750	11500	4500
4I A - 3200	1600	2750	975	625	2950	22250	14750	5200
4I A - 3600	1800	3100	1080	675	3250	23000	15000	5750
4I A - 4000	2000	3550	1300	775	3700	25500	16500	6350
4I A - 5000	2500	4550	1750	800	4700	33500	22000	7500

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# ROTAPLAS® Shuttle Machines

*Ideally suited for production of large parts of different cycle times, ROTAPLAS Shuttle Machine has an added advantage of lesser floor space requirement.*

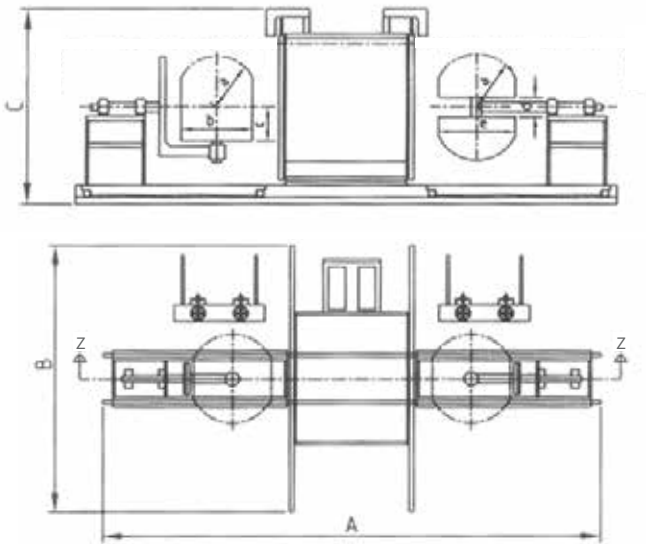
Possible configuration with 1 or 2 carriages, with central oven and two stations on either sides for cooling/loading/unloading.

The same arm can do two consecutive cycles, while the other is either waiting or is being serviced.

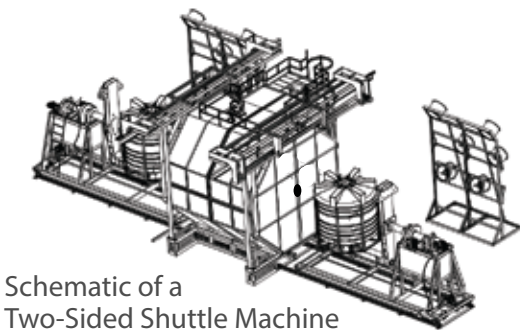


Two Sided Shuttle Machine ( Station #1 )

## Technical Data



Computerised and automatic operation, independent of time and temperature settings for each arm, and therefore for each mould or combination of moulds.



Schematic of a Two-Sided Shuttle Machine

SHUTTLE MACHINE								
MODEL NO.	a	Øb	c	d	Øe	A	B	C
2TA-1400	700	900	300	400	1100	10000	3600	3300
2TA-1800	900	1400	450	450	1600	12000	4600	4000
2TA-2200	1100	1800	560	450	1900	13500	5500	4600
2TA-2700	1350	2250	800	450	2400	15000	6500	5700
2TA-3200	1600	2750	975	625	2950	16500	7700	6200
2TA-3600	1800	3100	1080	675	3250	18000	8500	6700
2TA-4000	2000	3550	1300	775	3700	20500	9500	7300
2TA-5000	2500	4550	1750	800	4700	24000	11500	8500

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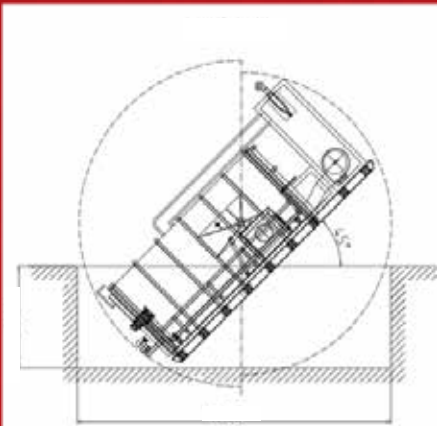




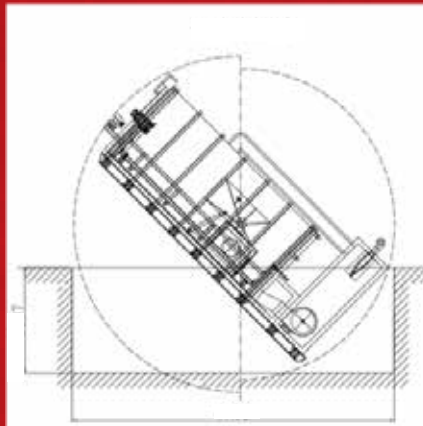
## Rocking Oven Rock 'n' Roll Machine

The machine is most suitable for manufacturing very large products (upto 15 meters) such as:

- Boats & Kayaks
- Large diameter Pipes
- Section Water Tanks
- Porta Cabins
- Vehicle Bodies
- Car Sheds
- Grain storage tanks
- Marina Systems



Position-1



Position-2



## Standard Features

- Sturdy and reliable design.
- Double skin stainless steel construction oven.
- Fail safe burner control.
- Direct drive geared motors.
- Variable speed A.C. drive having auto reversible facility.
- Hydraulic power pack for rocking & other movement having proportional control valve/gas/Air injection facility.
- Microprocessor based machine control having multiple time, temperature, speed setting possibility.



# Ancillary Equipments

## MPU Series Pulverisers

*The polymer pellets must be reduced to a much smaller particle size, for which we recommend our MPU Series of Pulverisers. This is necessary to obtain good heat transfer from the mould to the powder. It also improves the flow of the particles during melting*

**M PLAST** Pulverizers are designed to meet the most demanding requirements and conform to the highest engineering standard. These Pulverizers are meant for tough and reliable operation round the clock. All Rotating members are dynamically balanced for long trouble-free performance.

The MPU Series Pulverizers are high speed precision grinders for pulverizing, medium hard, impact resistant and friable materials. Typical applications are the Pulverization of PVC, PE, PC and other temperature sensitivie materials. The material to be pulverized is introduced through the centre of the grinding disc and pushed outwards by the centrifugal foce between stator and a rotary disc. A power suction unit system draws off the material below the mill and cools it intensively. After separation by a cyclone the materal falls into a screening machine which is adopted to the special requirement of plastic material to allow efficient and effective performance.



## STANDARD EQUIPMENTS

- Grinding mill with drive motor
- Magnetic vibro feeder
- Feed hopper
- Pneumatic conveying system with motorised blower
- Air lock valve with drive motor
- Dust collector
- Vibro screen with drive motor
- Complete support structure
- Electrical Control Panel

Model No.	Drive Motor	Total Connected Load	Output kg/hr : LLDPE 30 Mesh	Dimensions
MPU-300	20 H.P.	25 H.P.	60 to 70 kg/hr	1600 x 2000 x 3900mm
MPU-400	30 H.P.	37 H.P.	100 to 120 kg/hr	1900 x 2200 x 4400mm
MPU-500	50 H.P.	57 H.P.	175 to 200 kg/hr	2500 x 2500 x 4800mm
MPU-600	75 H.P.	85 H.P.	300 to 350 kg/hr	3700 x 2200 x 4900mm
MPU-800	125 H.P.	139 H.P.	425 to 500 kg/hr	5100 x 2300 x 5400mm

\*Approx Dimensions in mm  
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## Turbo Mixer

*Turbo Mixer is suitable for mixing polymers and other ingredients. It consists of Stainless Steel Vessel, Mixing Tool, a Pneumatic discharge control cabinet and other accessories.*

### SPECIFICATIONS:

**MIXING VESSEL:** 5mm thick Stainless Steel Vessel having outer jacket fabricated from 6 mm thick plate, top cover lid is fabricated having various openings for material feeding. Complete vessel is mounted on heavy cast iron bearing housing on sturdy frame of fabricated steel structure.

**BEARING HOUSING:** Bearing Housing is fitted directly on the frame below the vessel housing main device shaft with two nos. of ball bearings. Resin leakage to bearing is prevented by mechanical rotary shaft seal and gasket.

**MIXING TOOL:** Four/Six blades of stainless steel dynamically balanced to avoid vibration, mounted on the main shaft driven by a motor.

**DRIVE:** A.C. Motor (Single Speed) drives the main shaft.

**ELECTRIAL EQUIPMENTS:** All controls are mounted in a combined switching control. It includes Ammeter, Voltmeter, Temperature Indicator with Thermocouple, starter for drive motor and other electrical equipments.



MODELS	DRIVE MOTOR
TM - 35	10 H.P.
TM - 50	15 H.P.
TM - 100	30 H.P.

## Scrap Grinder

*Scrap Grinder is used for Recycling of rejected Moulded Products. The rejected Products are cut into pieces and ground in order to reuse.*

**HOUSING:** The main housing is fabricated of heavy mild steel plates & section in two parts. The top cover has hinged type openable arrangement for cleaning and is adjusted by bolts. A screen is fitted at the lower part of the housing which can be taken out easily for cleaning.

**ROTOR:** Dynamically balanced rotor made from alloy steel which ensures fast grinding and good output. The Rotor blades are of alloy steel, hardened & ground for long life.

**BLADES:** All the stationary and rotating blades are made of alloy steel, hardened and ground for long life. The blades cutting angle is such, which accepts even lumps for grinding.

**DRIVE:** 1440 RPM 50 Cycle A.C.Motor Drives the main rotor shaft. Transmission from motor to drive shaft is via 'V' Pulley and belts.

**HOPPER:** Hopper is fabricated from mild steel sheet. This is designed in such a way that ground particles do not come out from the hopper side.



Model No.	Length of Blades	Throat Size	Grinding Capacity	Power Required	Number of Blades	Floor Space
MPI - 200	200 mm	200 X 200 mm	30 kgs/hr.	2.2 KW	5	950 X 650
MPI - 300	300 mm	300 X 300 mm	70 kgs/hr.	3.75 KW	5	1100 X 950
MPI - 400	400 mm	400 X 400 mm	125 kgs/hr.	7.3 KW	5	1550 X 1150
MPI - 500	500 mm	500 X 500 mm	170 kgs/hr.	11.25 KW	5	1600 X 1300
MPI - 600	600 mm	600 X 600 mm	250 kgs/hr.	22.5 KW	5	1700 X 1400

\*Approx Dimensions in mm

\* Dimensions are subject to change without prior notice for approval of buyer



# Moulds

The quality and the tolerances on a rotationally moulded part are dependent upon the quality and precision incorporated into the mould. Selection of type of rotational mould is hence critical.

It may depend on the size, shape and surface finish of the piece to be moulded, as well as the number of moulds made for a particular piece.

Since very little pressure is exerted in the rotomoulding process the cost of a rotational mould is less in comparison to injection or blow moulds.

## Types of Rotational Moulds

- Sheet Metal Fabricated
- CNC Machined
- CNC Machined cum Fabricated
- Cast Aluminium

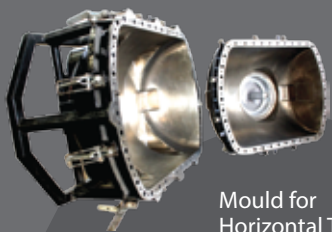
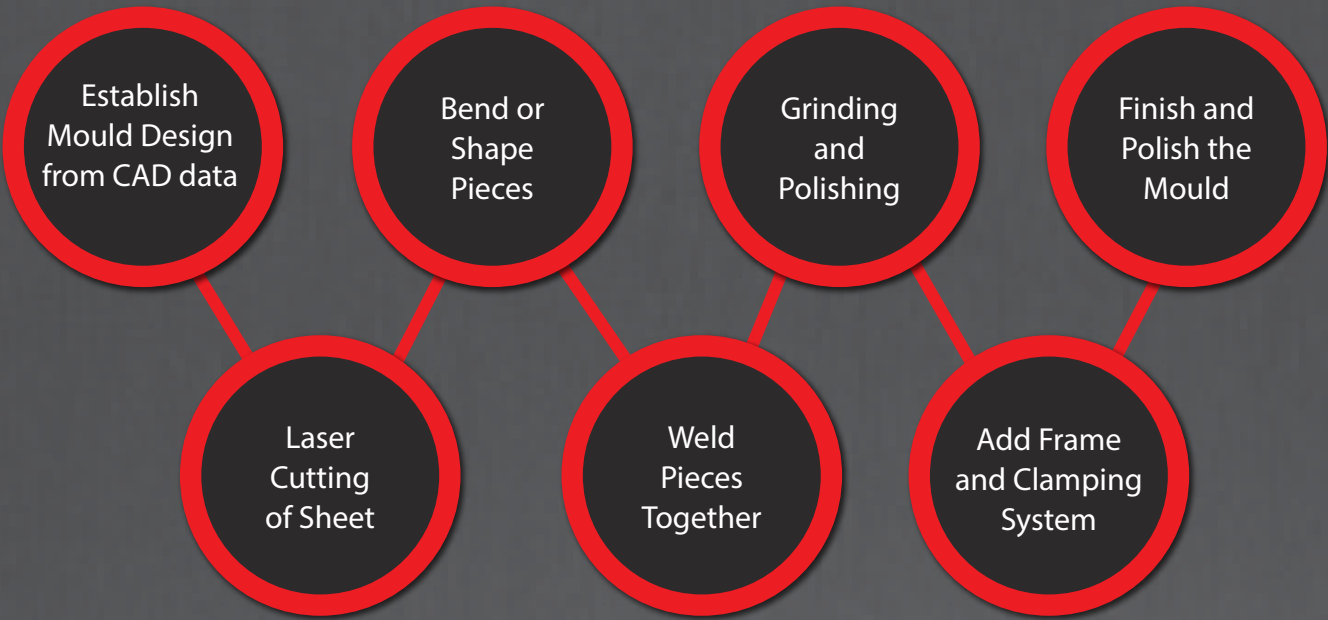


Typical Sheet Metal Mould for Horizontal Tank



Spider for mounting multiple Moulds on a Straight Arm

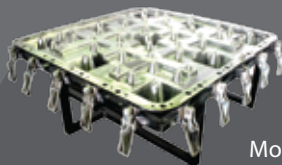
## Sheet Metal Moulds – Procedure



Mould for Horizontal Tank



Wheeled Dust Bin



Mould for Pallet



# CNC Machined Aluminium and Mild Steel Moulds - Procedure

- 3D CAD Model

Develop or obtain a 3D geometry model.
- Decide Machining

Decide machining operations and cutter-path directions.
- Generate NC Code

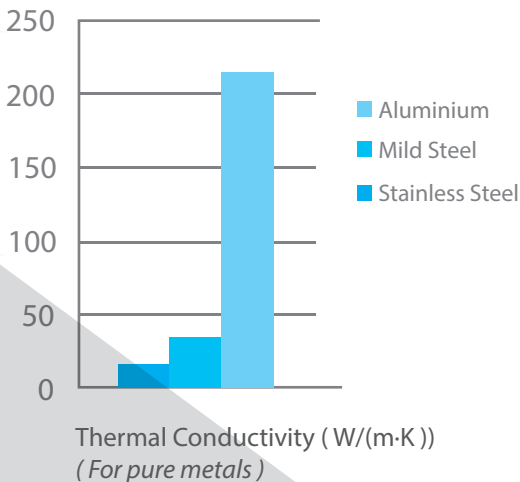
Run CAM software to generate the CNC part program.
- Transfer Program

Download the part program to appropriate machine
- Produce Mould

Run the program and produce the mould.



Three Axis CNC  
Veritcal Machining Centre



Rocker ( Toy )



Dessert Cooler



CNC Machined Aluminium mould  
for Fuel Tank



CNC Machined Aluminium mould  
for Dessert Cooler

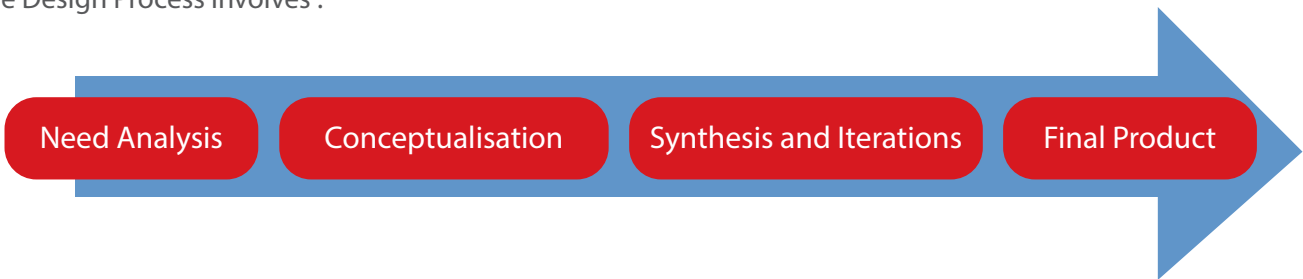
# Collaborative Product Development and CAE Capabilities

Rotational Moulding is a highly versatile process that allows for virtually unlimited design possibilities.

Our design team makes sure to check the product for its engineering design, ergonomics, functionality and utility.

**Got an idea ?  
We'll help you bring it to life !**

The Design Process involves :

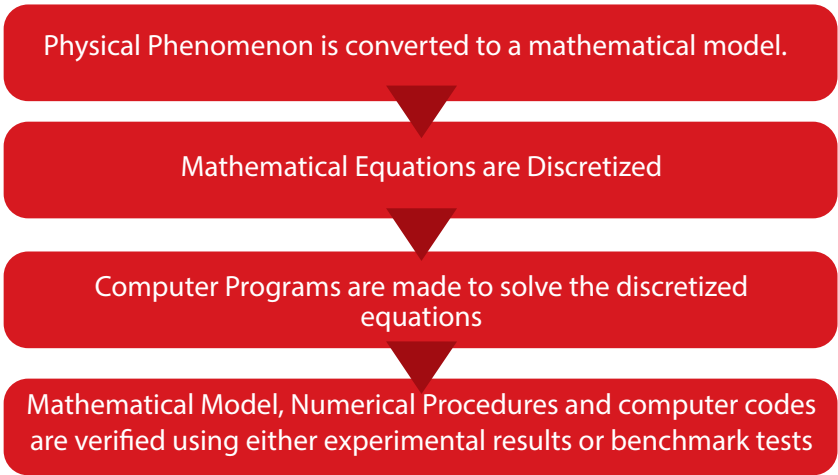
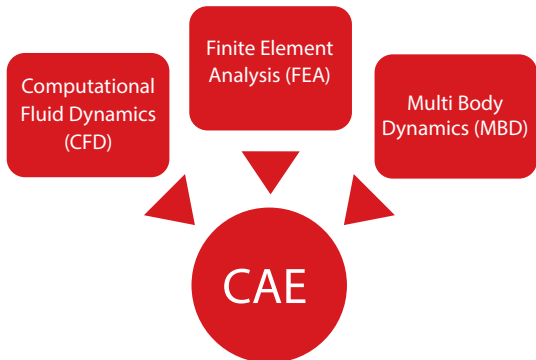


CAE ( Computer Aided Engineering ) tools are used to analyse the robustness and performance of components and assemblies. It includes simulation, validation, and/or optimization.

It could be broadly classified as:

- *Finite Element Analysis (FEA)* - allows detailed visualization of where structures bend or twist and indicates the distribution of stresses and displacements.
- *Computational Fluid Dynamics (CFD)* - allows analysis of fluid flows.
- *Multibody dynamics (MBD)* – allows analysis of dynamic behavior of interconnected rigid or flexible bodies .

These capabilities allow us to visualize qualitative results for component behaviour under different loading and environmental conditions.



Typical Steps involved in CAE

Our In-house Virtual Prototype Tests allow you to reduce the product development cycle and introduce new products early into the market.

Some of the questions to be asked, while analysing the product/ component /system are :



## What is the nature of load during Product Life Cycle ?

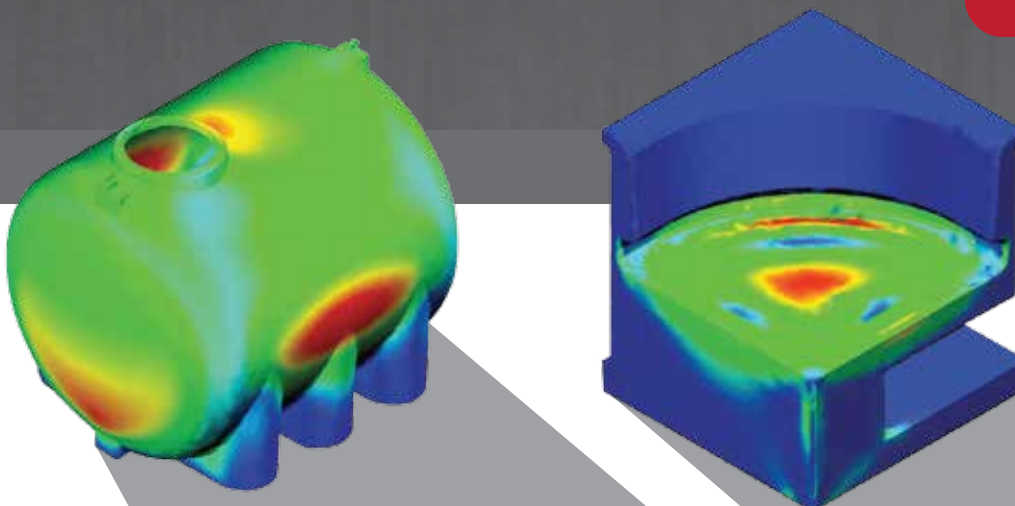
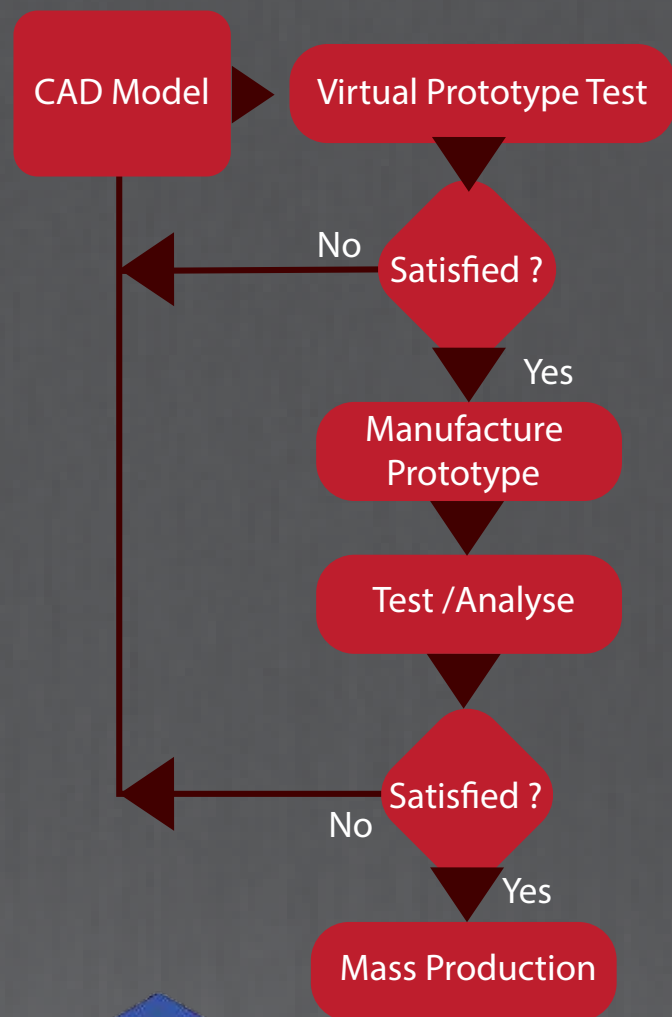
- Continuous and uniform OR non-uniform
- Static / Dynamic/ Impact / Fatigue etc.

## What do you term as 'failure' ?

- Is stiffness / rigidity important ?  
(i.e. minimum deformation under given load)
- Is strength essential ?  
(for maximum tolerance of loads before fracture)

## Factor of Safety considerations ?

- How critical the component is  
( consequences of engineering failure )
- Environmental conditions.
- Knowledge of material properties, residual stresses.
- Knowledge of the loads.
- Weight factor.
- Quality control.
- Unknown stresses in the manufacturing process and its characteristics.
- The cost of over engineering the component to achieve certain factor of safety.



Typical Stress and Displacement Plots

## World Full of Possibilities !

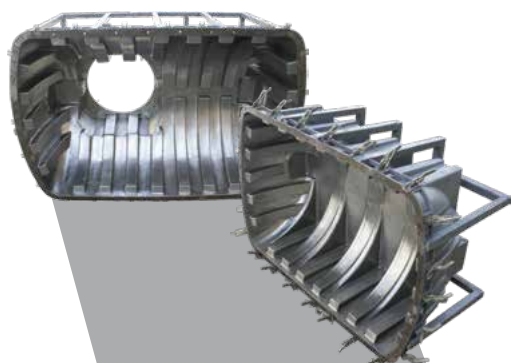
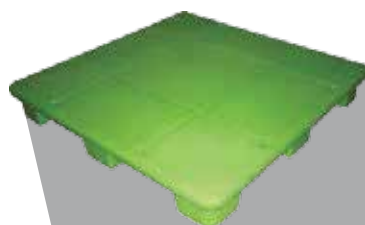
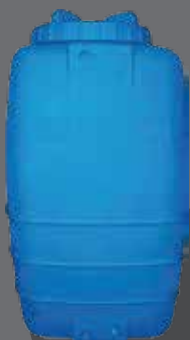
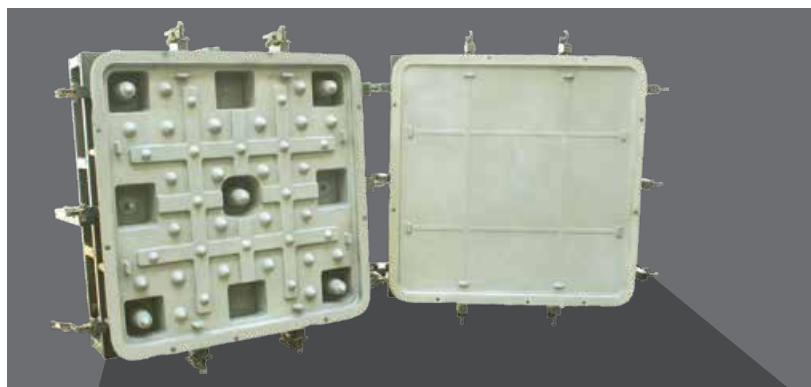
- Commercial, industrial and agricultural storage tanks
- Automotive accessories
- Material handling and construction equipments
- Garbage bins and containers





## World Full of Possibilities !

- Ice-boxes, coolers, food trolleys, medical storage boxes
- Portable outhouses and toilets
- Playground equipments, furniture items, toys
- Boats, canoes and kayaks etc.

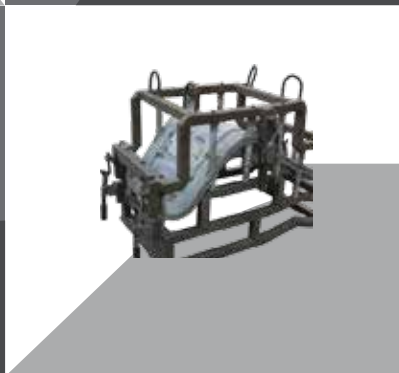
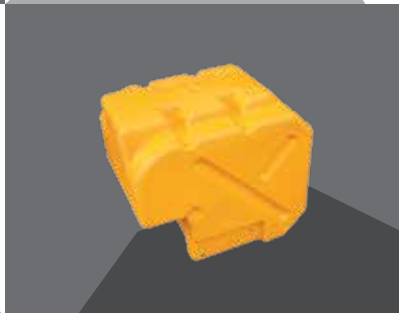
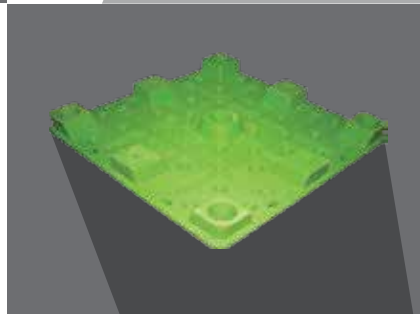
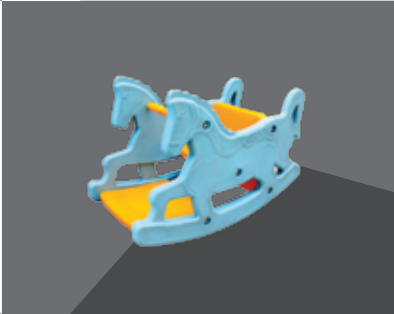
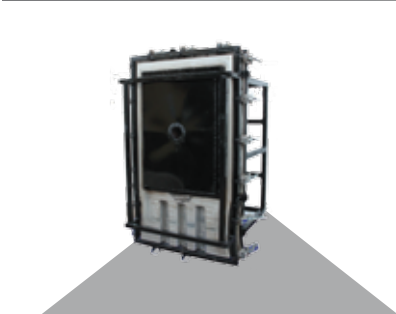
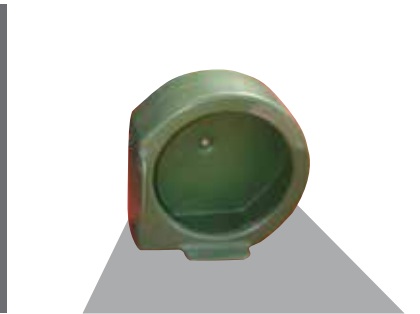
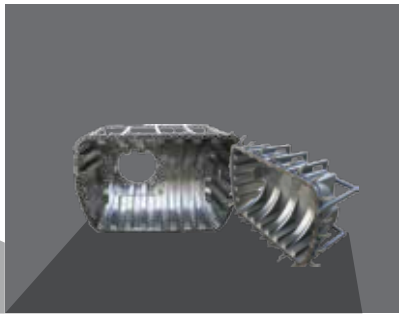
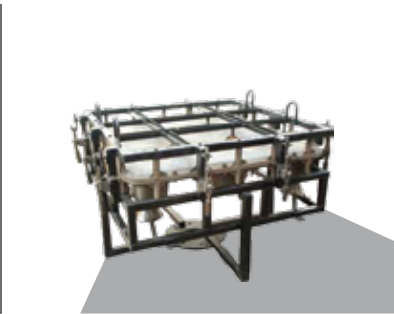
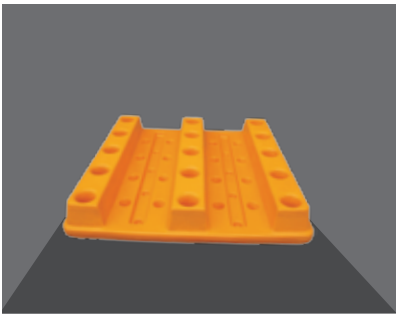


## Notes

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## World Full of Possibilities !

- Automotive components
- Construction and safety
- Water and food storage
- Furniture and Toys
- Material handling
- Playground equipments
- Portable toilets
- Marine applications





## TOOLING FOR ROTATIONAL MOULDING INDUSTRY

### ■ ROTATIONAL MOULDING MACHINES

- Multi Arm Turret Machines
- Multi Independent Arm Machines
- One Arm/ Two Arm Shuttle Machines
- Rocking Oven Rock 'n' Roll Machines
- Open Flame Rock 'n' Roll Machines

### ■ PULVERISERS FOR MICROFINE GRINDING

### ■ EXTRUDERS FOR BLENDING/ COLOURING COMPOUNDING

### ■ SCRAP GRINDERS

### ■ MIXERS FOR DRY BLENDING

### ■ CNC MACHINED ALUMINIUM MOULDS

### ■ CNC MACHINED MILD STEEL MOULDS

### ■ SHEET METAL FABRICATED MOULDS FOR ROTO MOULDED PRODUCTS

