Reliance Polymers – 360° Partnership Delivering Value

Enables Growth
- Sector-specific, process-focused developmental approach from “Molecule to Marketplace”
- Product, application and market development
- Structured Sector Management programmes
- Trend transplantation
- Market selection in conjunction with nodal agencies, machinery manufacturers and leading processors

Supports Development
- Technical support
- Quality Assurance
- Post-trial vendor development
- Advisory services
- An exclusive Entrepreneur Development Program
- Collaborative research with scientific institutions
- Partnerships with government bodies and institutions for developing new standards and specifications
- Capability and capacity development

Enriches Relationships
- Knowledge transfer
- Sharing of intellectual capital and technical resources
- Customer meets
- Manpower training

Ensures Sustainability
- Development of sustainable, cost-effective and environmental friendly solutions
- Easing the pressure on natural resources
- Focus on renewable resources
- Balancing economic growth with improved quality of life

For more information, contact:
Rotational Moulding

**Process**

Rotational Moulding or Rotomoulding is a highly versatile process that allows unlimited design possibilities with the added benefit of lower production costs. The range of products being moulded is matched only by the innovative manner in which moulders devise new product lines and markets. The product portfolio ranges from micro moulding of PVC extrusions in large polystyrene tanks.

**Four Principal Stages of Rotomoulding**

1. **Charging the Mould**
   - The rotomoulding process is simple in concept and consists of loading a known amount of plastic material in powder, micropellets, or liquid form into a hollow, shell-like mould. The mould is then heated and simultaneously rotated about its two principal axes so that the material enclosed in the mould fuses and uniformly adheres against the surface. The mould is then cooled to solidify the shell and simultaneously rotate while rotating to retain the desired shape. The part is then de-moulded.

2. **Heating the Mould**
   - The mould and its contents are then placed in the oven which is kept at a specific temperature to ensure reaction.

3. **Cooling**
   - Once the part has been moulded, the mould is then cooled down to solidify the plastic.

4. **Demoulding**
   - Once the part has been solidified, the mould is opened and the part is removed. Any excess material is trimmed off and the mould is then ready for the next cycle.

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**Polypropylene**

Being the largest manufacturer of Polyeonene (PP) in the world and with a capacity of over 1.8 MM per annum. Reliance Polymers offers a wide range of Homopolymer, Random and Impact Copolymer grades.

Homopolymer grades from Reliance Polymers are available in a wide range of melt flow and molecular weight distribution. They are used extensively by industries such as commodity and industrial packaging (TOPP), woven fabric, BOPE and cast film. Special grades are available for fibre and filament, extruded sheet and thermofor molding applications.

Reliance Polymers has customised Impact Copolymers that are available in a diversified range of Impact and MFI to suit the needs of injection moulding, thermoforming, blow moulding, extrusion coating and compound molding. Random Copolymers with improved strength and excellent contact clarity are available for packaging pipes, sheets and blow moulding applications.

**Polyethylene**

Reliance offers the entire basket of Polyethylenes (PEs) viz. LDPE, HDPE and LLDPE with a capacity of 1.1 MMTA. Reliance Polyethylene are available in wide ranging density and melt flow to match the demanding needs of the end applications. Low Density Polyethylene (LDPE) is used in extrusion coating, flexible packaging and moulding applications. High Density Polyethylene (HDPE) finds applications in high pressure pipes, heavy-duty packaging, blow moulding, telecom ducting, pipe coating, woven sacks and monofilaments.

Linear Low Density Polyethylene (LLDPE) is used extensively in extrusion coating, milk, edible oil packaging, laminated films, specialty films and rotomoulding. Our Octene and Butene LLDPE grades are used in specialty films, various flexible packaging and rotomoulding applications.

Reliance is one of the six producers of Octene (PP) in the world and with a capacity of over 1.8 MM per annum. Reliance Polymers offers a wide range of Homopolymer, Random and Impact Copolymer grades.

**Polyvinyl Chloride**

Reliance Polymers is India’s largest manufacturer of suspension grade Polyvinyl Chloride (PVC), with a capacity of 0.52 KT per annum and a wide range of viscosities. State-of-the-art manufacturing technology ensures consistency in the resin quality. Typical applications for Reliance PVC include rigid pipes, windows, partitions, floor/ wall coverings, caps, cables, electrical conduits and fittings, blow bags, tubing, heart catheters, IV fluid bags, toys, sports goods, shower curtains and footwear.

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**Rotational moulding**

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Reliance Industries Limited

Reliance Industries Limited is India’s largest private sector company and the only private sector company from India to feature in the 2005 Fortune Global 500 list. The Group’s activities span exploration and production of oil and gas, petroleum refining and marketing, petrochemicals (polymers, polyester, fibre intermediates and chemicals), retailing and textiles.

Reliance Polymers

Reliance Polymers is one of the world’s largest producers with a current capacity of 3.5 MMT per annum and massive expansion plans underway. It operates world-scale plants for Polyethylene (PE) and Polypropylene (PP) using state-of-the-art technology, setting global benchmarks in product quality and service.

A wide range of grades in each of the categories provide diverse applications across packaging, agriculture, automotive, housing, healthcare, water and gas transportation and consumer durables. Superior technological strengths, a strong focus on integration and consumer durabilities, provide diverse applications across packaging, agriculture, automotive, housing, healthcare, water and gas transportation and consumer durables.

Polypropylene

Being the largest manufacturer of Polypropylene (PP) in the world and with a capacity of over 1.8 MMT per annum, Reliance Polymers offers a wide range of Homopolymer, Random and Impact Copolymer grades.

Homopolymer grades from Reliance Polymers are available in a wide range of melt flows and molecular weight distribution. They are used extensively in consumer and appliance applications (TOPP, woven fabric, BOPP and cast film). Special grades are available for fibre and filament, extruded sheet and thermformed applications.

Reliance Polymers has customised Impact Copolymers that are available in a diversified range of Impact and MFI to suit the needs of injection moulding, thermoforming, blow moulding, extrusion coating and rotational moulding. Random Copolymers with improved strength and excellent contact clarity are available for packaging pipes, sheets and blow moulding applications.

Rotomoulding

The rotomoulding process is simple in concept and consists of loading a known amount of plastic material in powder, micropellets, or liquid form into a hollow, shell-like mould. The mould is then heated and simultaneously rotated about its two principal axes so that the material enclosed in the mould fuses and uniformly adheres against the surface. The mould is then cooled to solidify while rotating to retain the desired shape. The part is then de-moulded.

Process

1. Charging the Mould
2. Heating the Mould
3. Cooling
4. Demoulding

Four Principal Stages of Rotomoulding

Reliance Polymers is India’s largest manufacturer of suspension grade Polyvinyl Chloride (PVC), with a capacity of 1.25 Kt per annum and a wide range of viscosities. State-of-the-art manufacturing technology ensures consistency in the resin quality. Typical applications for Reliance PVC include rigid pipes, windows, partitions, floor/wall coverings, wire, cables, electrical conduits and fittings, blister bags, tubing, heart catheters, IV fluid bags, toys, sports goods, shower curtains and footwear.

Polyethylene

Reliance offers the entire basket of Polyethylenes (PEs) via LDPE, HDPE and LLDPE with a capacity of 1.1 MMTA. Reliance Polyethylenes are available in wide ranging density and melt flow to match the demanding needs of the end applications. Low Density Polyethylene (LDPE) is used in extrusion coating, flexible packaging and moulding applications. High Density Polyethylene (HDPE) finds applications in high-pressure pipes, heavy-duty packaging, blows moulding, telecommunication piping, pipe-coating, woven sacks and monofilaments.

Linear Low Density Polyethylene (LLDPE) is used extensively in extrusion coating, milk & edible oil packaging, lamination films, specially films and rotational moulding. Our Octene and Butene LLDPE grades are used in specialty films, various flexible packaging and rotomoulding applications. Reliance is one of the six producers of Octene copolymers in the world. Our LLDPE rotomoulding grades find extensive applications in automotive components, insulated containers, material handling products, tanks etc.

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The recent technological developments in terms of materials, machines, moulds and process control, have opened up new application avenues. However, the versatility of the process is still largely unknown to the potential end users and to the design community. With increased awareness in the design community, more areas will open up for rotational moulding, which have not yet been considered or explored. This catalogue showcases typical application areas and new products that can be rotomoulded, to the Indian Rotomoulding Industry and to potential end users.

Materials and Moulds

Globally, the rotomoulding industry uses fabricated sheet metal moulds for simple designs or for very large products like tanks. For complex designs and for specific surface finishes/textures, rotomoulders prefer cast aluminum moulds or CNC machined aluminum moulds, which offer a very high degree of design flexibility and consistency. Even though the cost of these moulds are comparatively higher than sheet metal moulds, they offer a very high value-addition to end products in terms of quality and finish.

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Materials and Moulds

Rotational Moulders currently use a variety of polymers. The most widely used are Polyethylenes that include Linear Low-Density Polyethylene (LLDPE), High-Density Polyethylene (HDPE), Low-Density Polyethylene (LDPE), Cross-likable Polyethylene (XLPE) and PVC Plastisols. Other materials which are rotomoulded in a limited way include Polypropylene (PP), Nylons (PA), Fluoropolymers, Polycarbonates (PC), Cellulose Acetate Butyrate (CAB), Elastomers, Inomers, EVA and specially formulated compounds.

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Industrial

4

Tote Box

Bin with moulded-in pallet base for 2-way entry

Pallet

Industiral

5

Insulated Bulk Container

Linen Exchange Truck

Tilt Truck
Furniture

Hand Chair

Stack Chair

Ultra Control Chair

Quarter Circle Sofa

Glove Chair

Shoe Fitter

Couch
Newspaper Rack

Coffee Dispenser

Housing of Vacuum Cleaner

Mannequin

Baby Diaper Changing Station
Special Category

Garbage Can Lid with Mould-in Graphics

Light Globes

Door Panel with Colour Mould-in Graphics

Custom-made Floating Pump Base

Custom-made Roll Box
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Door Panel with Colour Mould-in Graphics

Custom-made Floating Pump Base

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Decorative

Light Post

Bird Bath

Contemporary Bench

Garden Bench

Poly Rock
Planter

Pedestal Planter

Decorative

Round Planter

Half Round Planter

Decorative
Decorative

22

Fluted Grooved Planter

Fluted Grooved Planter

San Juan Planter

Large Urn with Base

Decorative

23

Fluted Grooved Planter

San Juan Planter
Roman Pillars

Ionic Pillar

Polysteel Bollard

Railing
Decorative

Roman Pillars

Ionic Pillar

Polysteel Bollard

Railing
Advantages of Rotational Moulding

Rotational Moulding is an economically viable process to manufacture a limitless range of products in all shapes and sizes, some of which would be difficult to produce by any other moulding process. It is also possible to give special effects like textured grain, leather finish, etc. in the moulds. The benefits of rotomoulding are varied.

Design and Process Benefits
- Flexibility – from small and intricate to large and complex products
- Seamless construction and virtually stress-free products
- Easy to vary thickness with uniform wall distribution – no thinning at corners
- Double-wall products
- Multi-layer or multi-material products
- Products with undercuts and metal inserts
- Foamed products
- Products with mould-on or mould-in graphics
- Product with different surface textures and colours

Mould Fabrication and Cost Economic Benefits
- Short lead-time as moulds are easy to fabricate
- Low tooling cost
- For short production runs and prototypes as well as for volume production

Indian Rotomoulding Industry - An Overview

Indian Rotomoulding Industry started in early 70’s with a focus on water tanks and containers. Rotomoulded water tanks became extremely popular due to their light weight, durability, hygienic & easy installation and maintenance, easy availability, and low cost. Since then, the industry has grown by leaps and bounds, both in number of rotomoulders and plastic consumption. Today, there are more than 200 rotomoulders spread across the country consuming around 70 KTA of different grades of polymers. The annual growth rate of the industry is around 20% and this robust growth is likely to continue in the years to come.
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Water tanks have traditionally been the main product segment for the Indian Rotomoulding Industry and more than 95% of rotomoulders depend on this segment. Today, water tanks constitute 80% of the market share and would continue to be the major segment due to scarcity of water and increasing building and construction activities in the country. This market segment will continue to have very good growth rate and higher volumes.

With increased awareness and access to the global market, many of the rotomoulders have started venturing into custom made/industrial products like fuel tanks, chemical tanks, material handling products, solid waste management products, etc. These products – though they are at a nascent stage – will register higher growth rates. Awareness within Indian design community about the process and products is fast growing, and this will fuel further growth in the industry as new and innovative design products are developed.

Presently, the Indian Rotomoulding Industry uses fabricated sheet metal/stainless steel moulds since the tanks have been the main product segment. Rotomoulders have extended their knowledge of sheet metal fabrication to newer products. The development of casting technology and usage of cast/CNC machined aluminum moulds is still at the infancy. The industry has to invest in technology for casting/CNC machining. Also mould-in or mould-on graphics in rotomoulded products have neither been used nor developed.

Indian rotomoulding industry is going through structural changes in terms of material development, technological advancement in machines, processes, moulds and new market segments.
Reliance Industries Ltd. is committed to the development of Indian Rotomoulding Industry. The primary emphasis has been on identifying thrust areas, providing assistance to potential rotomoulders, development of required grades/material, facilitating development of mould manufacturing technology and technology transfer from developed countries, orientation programme to design community – so that world-class rotomoulded products are developed and manufactured in the country.

In its effort to upgrade the product design and technology, Reliance Industries has imported rotomoulded products from different countries, and showcases the same at various forums and customer meets.

Rotomoulding Industry in India is on high growth mode of development and has tremendous growth opportunities. Rest assured, Reliance Industries will partner with the Indian Rotomoulding Industry every step of the way in making international-standard products a reality in India – now and in the future.

This booklet is an attempt to showcase some of the opportunities for rotomoulding, however the sky is the limit.
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