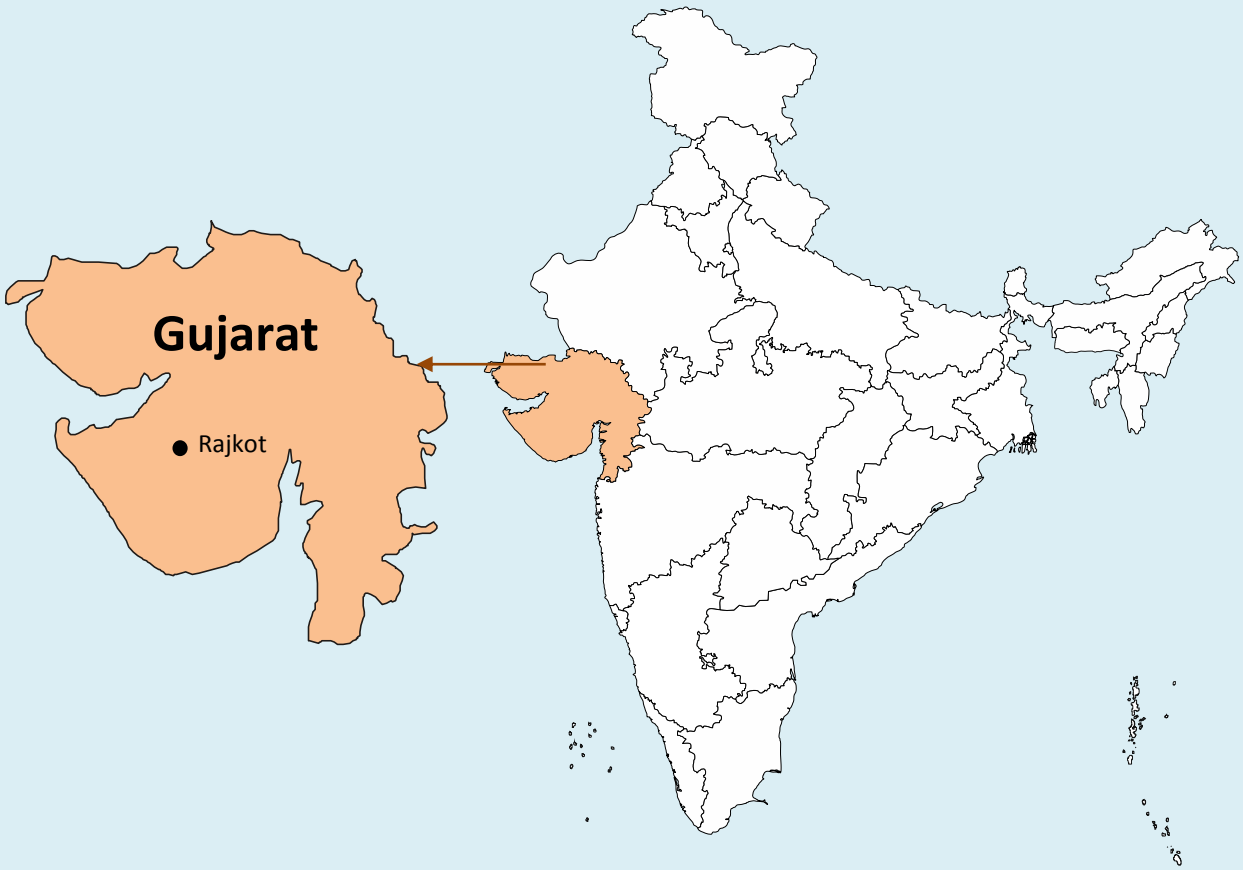
Cluster Profile
Rajkot plastic industries



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Promoting Energy Efficiency in SMEs
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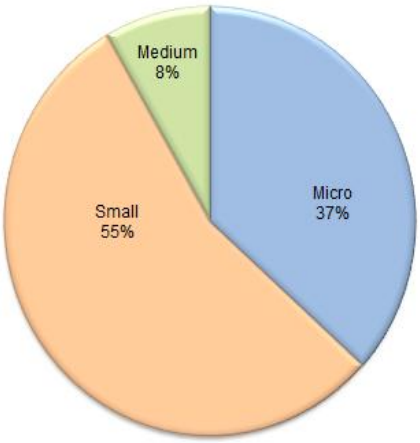
Rajkot plastic industries

Overview of cluster

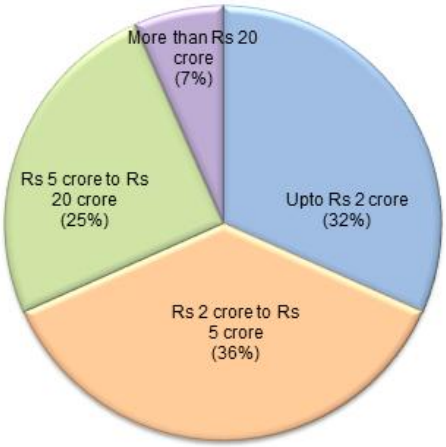
Rajkot is one of the prominent plastic clusters in the country. There are an estimated 15,000 MSME units in Rajkot, of which majority are foundry and engineering units. The cluster is spread within Rajkot and neighbouring GIDC industrial estates. The engineering industry is diverse in nature. Some of the major engineering segments include foundry, plastic, agro and diesel pump sets, machine tools, auto components, kitchenware and hardware, forging and diesel engine.

The plastic industry cluster comprises large, medium, small and micro industries, manufacturing products like PVC pipes and fittings, polybags, woven and non-woven sacks, household items like buckets, chairs and roll straps, etc. About 70% of plastic industries located in and around Rajkot. Plastic industries are mainly of micro and small size category with few medium sized units. Some of the medium sized industries include Suffer luggage, Paramount Group, Narmada Pipes, Essen and Waterflo. The plastic industries in Rajkot provide employment to about 10,000 people. A majority of plastic industries is associated with plastic pipe and roll straps manufacturing industries.

The total number of plastic industries existing in the cluster is close to 300. The annual turnover of plastic industries is generally in the range of Rs 2-5 crore. The total turnover of plastic industries in Rajkot is estimated to be Rs1500 crores.



Product types and production capacities



Annual turnover-wise distribution of plastic industries

Rajkot plastic industries are involved in the production of a variety of products which are used in different end-use sectors such as domestic, industrial, municipality, service, medical and academic sectors. Followings are some of the primary products that are manufactured in Rajkot cluster:

- Pipes and fittings
- Roll straps
- Woven sacks and fabrics

- Sheets / bags/ tarpaulin
- Moulded furniture and household goods
- Plastic disposable glass/ cups
- Water tank and conduit pipe
- Packaging materials
- Reprocess granules
- Chemical raw mater in powder form

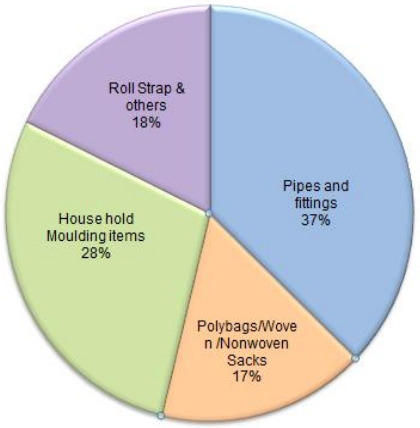
These products can be grouped into following primary products:

(1) Pipe and fittings
(2) Poly bags and sacks
(3) Household items
(4) Roll straps

Primary plastic products from Rajkot

Around 50% plastic units in the cluster are engaged in production of various types of carrying/ packaging materials and pipes. Product-wise distribution of plastic industries shows that almost half of the production is accounted by pipes and fittings as shown in the figure.

The installed capacity and production of similar type of industries vary with each unit. The production is not recorded in terms of tonne while some of the units record production in terms of number of pieces. Based on the interactions with entrepreneurs, industrial bodies and government body in the cluster, it is estimated that the cluster produces approximately 196,210 tonne of plastic products. The annual productions of different types of plastic products are shown in the table. Different sources of data include collective directory data of Saurashtra Plastic Manufacturers Association(SPMA), Rajkot Plastic Manufacturers Association(RPMA), Rajkot Engineering Association, GIDC Lodhika Industrial Association, AJI (GIDC) Industries Association and Shapar-Veraval Industrial Association



Product-wise distribution of plastic industries

Annual production by plastic industries

Product category	Number of units	Production (tonne /year)
Pipes and fittings	95	94,500
Polybags/ woven / non-woven sacks	65	30,310
House-hold plastic moulding items	55	38,900
Roll strap & others	85	32,500
Total	300	196,210

Raw material usage in cluster

The primary sources of raw material for plastic products are major petrochemical plants at various locations in India. Depending upon the type, quality and source, the cost of raw materials varies between Rs 110-160 per kg. Different raw materials used in manufacturing of plastic products include the following:

- High Density Polyethylene (HDPE)
- Low Density Polyethylene (LDPE)
- Linear Low Density Polyethylene (LLDPE)
- High Molecular High Density Polyethylene (HMHDPE)
- Medium Density Polyethylene (MDPE)
- Polypropylene (PP)
- Polyvinyl Chloride (PVC)
- Un-plasticized Polyvinyl Chloride (uPVC)
- Biaxially Oriented Polypropylene (BOPP)
- Polyethylene terephthalate (PET)
- Biaxially-oriented polyethylene terephthalate (BoPET)

The sources of major raw materials include GAIL, IOCL and Reliance as shown in the table.

Sources of raw materials

Raw material type	GAIL	IOCL	Reliance
HDPE	✓	✓	✓
LDPE	✓	✓	✓
LLDPE	✓	✓	✓
PP	✓	✓	✓
PVC	✓	✓	✓

Plastic granules

Energy scenario in the cluster

Electricity and diesel are the major sources of energy for the pump-set units. Electricity is supplied by Paschim Gujarat VIJ Company Ltd (PGVCL) and diesel is procured from local market. Electricity is used for running all machinery and diesel is used in DG-set in case of emergency during unscheduled power outage. The details of major energy sources and tariffs are shown in table.

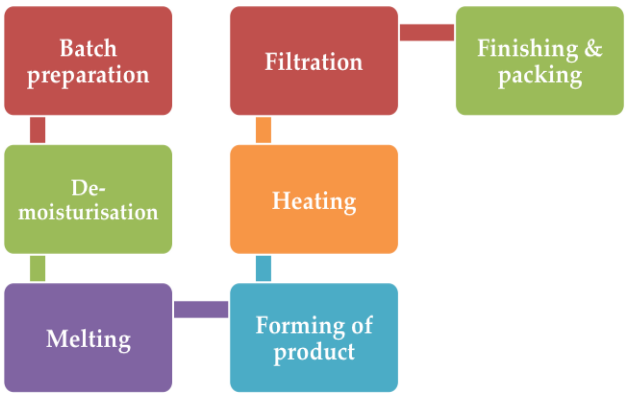
Prices of major energy sources

Source	Remarks	Price
Electricity	HT	Rs 8.00 per kWh (inclusive of energy, demand charges, other penalty/ rebate and electricity duty)
	LT	Rs 9.00 per kWh (inclusive of energy, demand charges and electricity duty)
Diesel	From local market	Rs 55 per litre (price subjected to market fluctuations)
NG	GSPC	Rs 30 per scm (price subjected to market fluctuations)
LPG	HPCL/ BPCL	Rs 60 per kg (price subjected to market fluctuations)

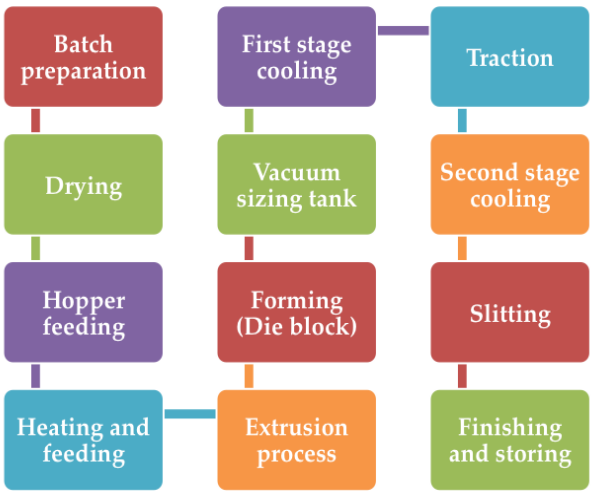
Production process

The plastic products are made either in continuous mode following extrusion method for intermittently by blow moulding process. In extrusion method, initial forming of the ready to shape batch material takes place in pre-designed die heads, which is further passes through different process steps depending upon the final product. In moulding, ready to shape batch material is injected (or injected with blow of air in case of blow moulding) into the pre-shaped mould to produce the target products in one step. Both methods follow broadly similar primary steps such as preparation of ready to shape batch, forming and finishing operations to produce desire products. The generic process steps of manufacturing plastic products are explained below.

- *Batch preparation:* Depending upon product line, fresh raw material granules, recycled shop floor reject material of similar product, colouring batch master and relevant additives are mixed and appropriately grinded.
- *De-moisturising:* Moisture from the prepared batch is removed in this phase. The final batch composition is transferred either manually or automatically to hopper for next process step.
- *Filtration:* Contamination if any from the batch composition is removed using both filtering element and demagnetiser. Filtration is also carried out again after melting of the raw material batch before it is fed to screw in the barrel.
- *Melting and heating:* -Temperature of dry composition is increased to change the solid phase to liquid phase while it is conveyed through barrel with the help of barrel screw. Temperature of the molten batch is further increased to pre-set temperature with the help of PID based automatic electrical heater, placed on the barrel surface.
- *Forming:* Depending upon the end product, forming is done using in place appropriate shaping mechanism such as moulding, extrusion, blowing, spinning and drawing.
- *Finishing:* This phase includes all operations carried out after forming to final product. It may include stretching, sizing, burr removal, printing and embossing, flattening, lamination, stitching etc.
- *Packaging:* The final marketable products are packed as per marketing and despatch requirement.



Generic process steps for plastic products



Process flow chart for plastic pipe manufacturing

The generic production steps for plastic products are shown in figure.

The production process for each primary plastic product in the cluster is mentioned below:

(i) Plastic pipe and fitting manufacturing units

These are made in various size and length using extruder. Plastic pipes are very suitable for various applications like corrosive environment in chemical industries and municipal application (sewage and water piping), electrical conduit, agricultural pipes etc.

Primary raw materials are HDPE and PVC. Pipe of different colour could be made using appropriate colouring chemical during batch preparation. Pipe diameter depends on die block as well as working pressure in vacuum calibration tank installed in the line.

Plastics pipe extrusion commonly uses plastic chips or pellets, which are usually dried to remove moisture and conveyed to a hopper before going to the feed screw for forming in die. After forming, pipes are cooled and strengthen in cooling and traction phases before slitting automatically to a pre-set length with the help of limit switch. A "caterpillar haul-off" (commonly called a "puller") is used to provide tension with consistent pull on the extrusion line which is essential for overall quality of the extrudate. The extrudate like fiber-reinforced tube is pulled through a very long die, in a process called "pultrusion". The process flow chart of plastic pipe manufacturing is shown in figure.

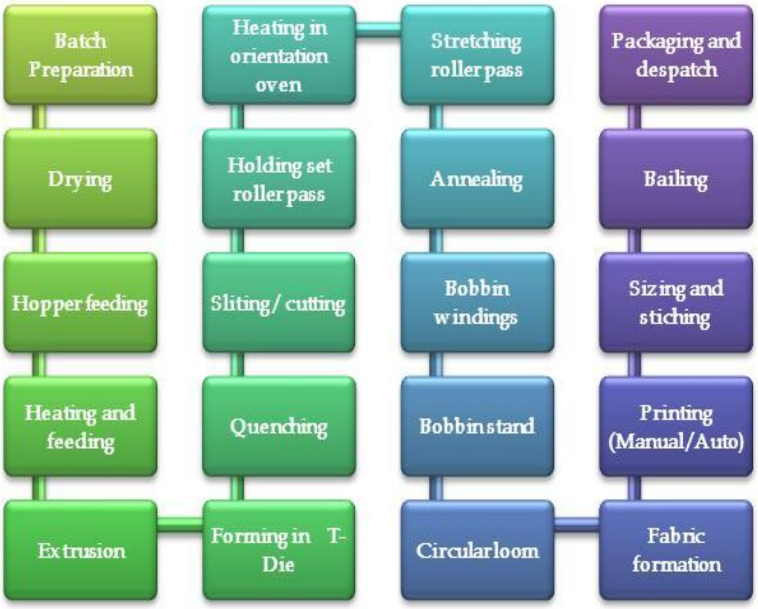
PVC pipes and fittings

(ii) Polybags, woven and non-woven sacks manufacturing units

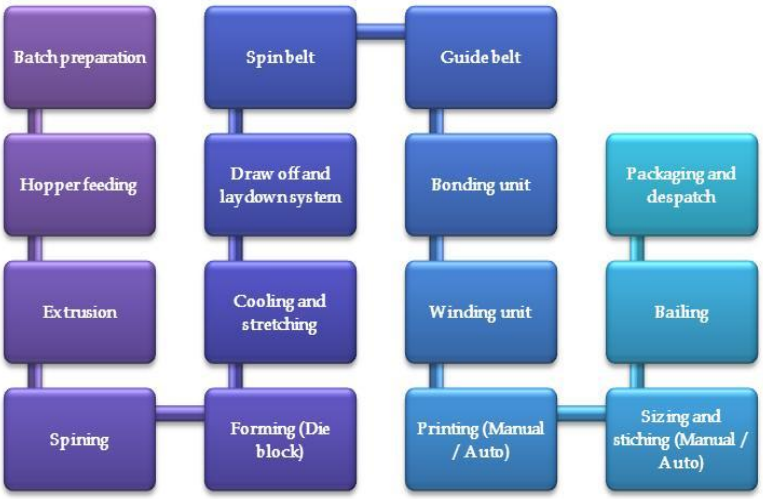
One of the chemicals - PP, HDPE, UPVC, etc. is used as base material in plastic sacks manufacturing using extrusion method. Sacks could be either woven or non-woven type depending upon process steps in place after die head. Multiple threads from bobbin stand is fed to circular loom to make circular sheet, which is later cut to target size to make woven sacks whereas in non-woven sacks, threads produced after spinning is passed over multiple belts / rollers arrangement in series to produce continuous sheet roll, which is later used to make non-woven sacks of different sizes. These products are mostly custom made as per order / market demand. Sometimes, internal surface is laminated and printed on external surface to meet particular application.

Polybags, non-woven and woven sacks

The process flow charts for woven and non-woven sacks are provided in below figures respectively.

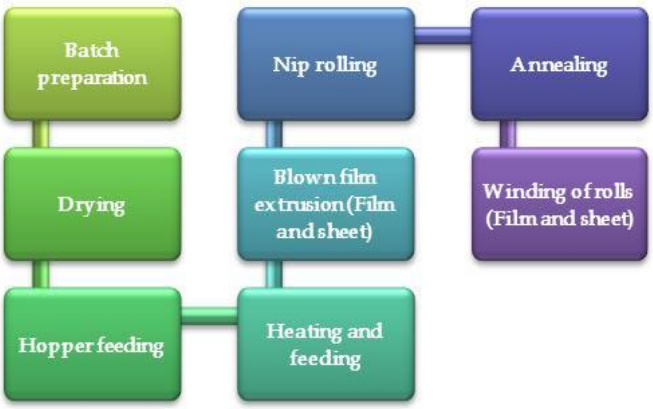


Process flow chart for woven sacks



Process flow chart for non-woven sacks

Packaging and carry bags are made using one of the chemicals from PP, HMHDPE, LLDPE, LDPE, HDPE, BOPP, etc. as base material to suit load carrying capacity and hygiene requirement for a given application. In the blown film process, melted raw material is formed through slit die to form thin walled circular film, which is blown up by air pressure. The pressurized air is supplied in the middle of the die for cooling from outside and



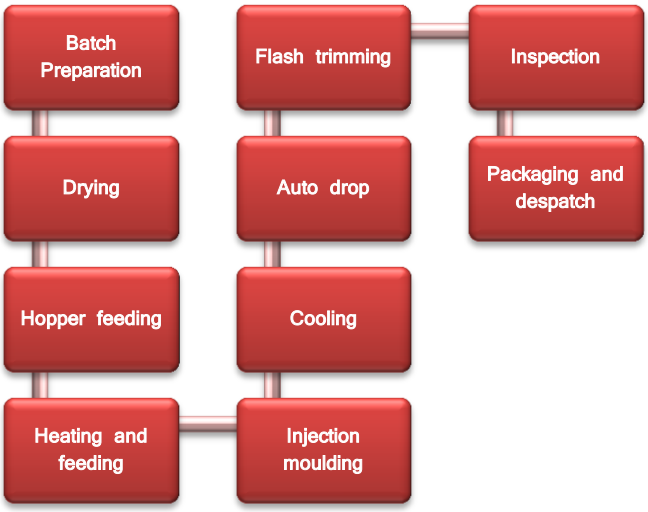
Process flow chart for blown film plastic

inside apart from blown up. Film is flattened while passing through nip rolls and rolled after it passes over idler rollers in the line. Film is packed in winding rolls and later cut to pieces as per requirement for target sizes.A schematic layout of system used in manufacturing blown film plastic product is provided in the figure.

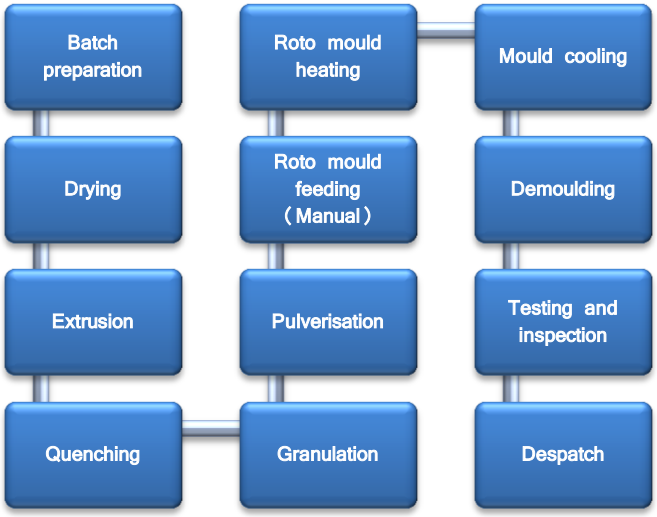
(iii) Household plastic moulding manufacturing units

This includes all kinds of products that are used in daily life such as chair, bucket, mug, table, water tanks etc. These are made using product specific mould with the help of injection moulding or roto moulding machines. Moulded products are made using one of the chemicals from PP, HDPE, PET, BoPET, LLDPE etc. as base material to make target moulded products.

PET and BoPET is safe plastic used for beverage and food graded containers. These products are made only in PET machine, which is later blown to particular size. LLDPE is used in making moulded plastic tank using Rotomoulding machine. Most of the plastic household and furniture products are made with the help of injection moulding machine. Process flow charts for injection moulding and Roto moulding are provided in the following figures respectively.

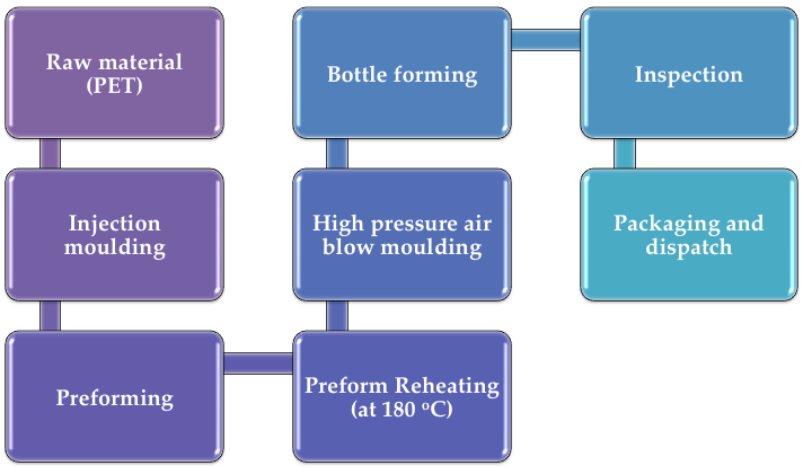


Process flow diagram for injection moulding



Process flow diagram for Roto moulding

Apart from injection moulding and roto moulding products, blow moulding is also done for manufacturing products like bottles etc. In this PET is the raw material on which injection moulding is done for preforming and this preform is reheated at 180 °C to make it soften which is then formed in bottle by blow moulding operation using high pressure air blowing into the softened preforms. Generic process is as shown in below figure.



Process flow for plastic bottle forming (PET)

Preform production-injection moulding process

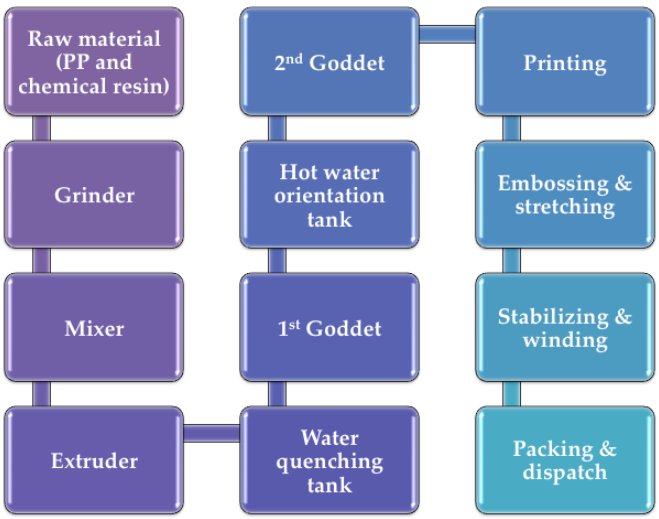
Preformed jobs

Preform reheating process

PET bottle production- blow moulding process (High pressure)

(iv) Roll straps and others

This includes roll straps used in packaging industries and general-purpose straps and other products such as master batch manufacturers which is used as a colouring agent in plastic industry. Raw material used for roll straps manufacturing is mixture of PP and chemical resin. PP is made into granules from plastic lumps and it is mixed with resin in rotating mixture. This mixture is then poured through hoper into extruder machine. Roll straps of bigger width is extruded through die and is passed through water quenching tank, it is then continuously run through 1st goddet which decreases its width and stretches it to provide required elasticity and strength. After passing through hot water tank and 2nd goddet printing of batch no, code, etc. is done online and straps are passed through number of rollers and stretched and embossed for strips. Finally winding is done and it is sent for packing and then for dispatch.



Process flow for roll straps

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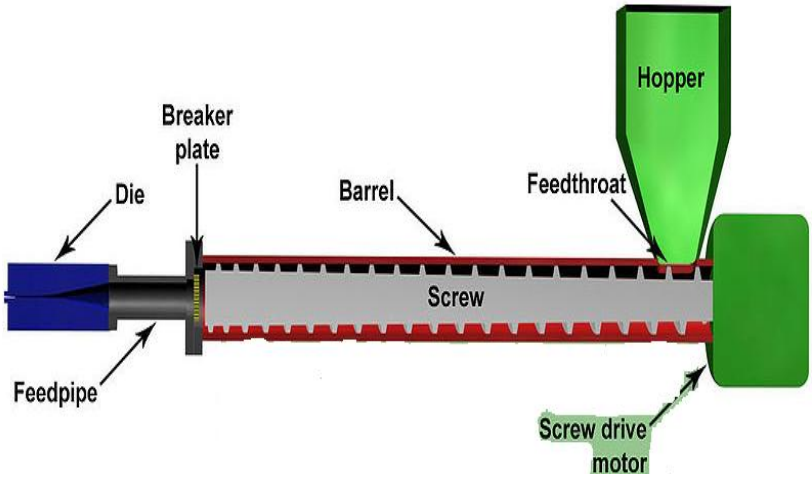
Roll strap manufacturing line

Technologies employed

Plastic industries in the Rajkot cluster use product-based forming technology like extruder, injection mould, blow moulding, roto mould along with connected auxiliary equipment as required for smooth operation of these machines. Apart from forming machines, thermic fluid heater, air compressor, chiller, cooling tower, electrical heating elements, printing and lamination machines, diesel operated generator as power back up is mostly used in plastic manufacturing plants. Some of the primary process technologies are explained below.

(i) Extruder

Extruder primarily consists of two sections such as extrusion and calibration as well as strengthening. Extrusion includes screw, hopper, barrel, heating assembly and forming die. Other section has vacuum calibration tank, quenching, traction or caterpillar haul-off, cutting arrangement with limit switch and belt conveyor. Screw movements effects transport of liquid plastic to dies for extrusion process. The formed plastic cools under blown air or in water bath and hardens on a moving belt. High end advance extrusion machines have built in programmable automatic controlling panel, which is highly efficient. These are used in forming pipes, woven and non-woven sacks as well as blown film. The schematic view of extruder is provided in figure.



Schematic view of extruder

PVC pipe extruder setup

(ii) Injection moulding

Like extruder, injection moulding machine is used to form different plastic products like chair, table, bucket, mug etc. with the help of appropriate mould in place. It operates on hydraulic pressure provided by hydraulic power pack. Injection moulding has primarily two sections such as injection section which includes hopper, barrel, screw, barrel heaters, hydro motor and other is clamping section which includes movable platen (core), fix platen (cavity), clamping shutter arrangement for clamping force. Hydraulic system of injection moulding system is normally equipped one of the pressure generation and control mechanism out of variable displacement pump (VDP), variable frequency drive (VFD) for hydraulic pump and servomotor for hydraulic pump. Out of these, servomotor arrangement is the most energy efficient system. A Schematic view of injection mould system a photo view of injection moulding under operation is shown in the figure.

Injection moulding machine

Oil and milk can production- Injection moulding process

(iii) Roto moulding

Production of water tank in roto moulding Process

Rotomouldig is specially designed equipment for manufacturing plastic water storage tanks of different capacities. Moulds are fitted at the end of its arm, which can be rotated on its circular axis. The final raw material batch in powder form is manually poured into the mould cavity and later mould is slowly heated to 230^{O}C in a closed oven. Conventionally these ovens were of oil fired type but presently most of them have been modified to use LPG to reduce environmental pollution. Machine can have multiple arms with maximum two moulds at the end of each arm. At time only one arm is placed inside the heating oven and moulds are rotated in circular axis inside the oven to ensure even heating of the mould body and proper distribution of raw material. On attaining set temperature and completion of heating, heated mould is taken out from the oven and allowed to cool naturally in the open area. The product is taken out after de-moulding when its temperature becomes equal to ambient. The roto moulding machine with three arms (one arm is shown inside the oven) is provided in the figures.

(iv) Film blowing extruder

It is a special purpose extruder where extruded raw material pass through the specially designed slit die and blown with adequate air pressure to form circular film tube. Later films are passed through nip rollers and followed with annealing before it is rolled after collapsing for downstream processes. Blown film is used to make plastic sheets and bags of different size for diverse applications. A schematic layout of blown film extruder with all connected equipment is shown in the figure.

(v) Pulveriser and mixer

Pulverisers are used for reuse of waste plastic left from the processes like extrusion and injection moulding. Many PVC pipe manufacturers use pulverisers in-house to reuse waste plastic. Pulveriser converts waste plastic into powder form, which is non-virgin form and it is used in mixture with the virgin plastic. Nowadays automatic pulverizes are employed by the industries which have suction blowers and it automatically runs in batch operation. Mixers are used to mix virgin raw material with additives or resins depending on the process. They operate in batches and also remove moisture from raw materials by heat generated due to rotational movement in the mixer barrel. Grinders are used to break big lumps of plastic wastes into small granules, which are then fed to pulveriser.

Pulverizer

Mixer

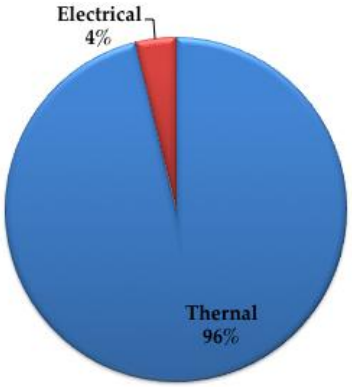
Grinder

(vi) Heating coils

Two types of electrical heating elements for melting and heating are placed over the heating barrel to achieve set temperature with built in control mechanism, either on/ off or PID (thyristor based) controller. Most of the conventional electrical heaters are inferiorly insulated resulting higher surface heat loss. One of the energy efficient heating coils is PID controlled barrel band type with better and compact insulation.

Energy consumption

Electricity is the main source of energy for most of the plastic units in the Rajkot cluster. Almost all the units are dependent on electricity from grid to meet their energy needs. A majority pf the plastic units have LT connection and the average connected load is about 100 kVA. Pipe and sack manufacturing units have HT connection of about 300 kVA or more depending on the plant installed production capacity. The other energy forms used in the cluster include natural gas (NG), liquefied petroleum gas (LPG) and high speed diesel (HSD). NG or LPG is used in heating ovens as a fuel in roto moulding plants. HSD is used in the DG sets, only during power failure, which is not very common in the cluster. The power situation has significantly improved in Rajkot over the past few years. Consequently, the dependence on DG set is reduced and its use is insignificant in term fuel consumption compared to electrical energy from connected grid supply. The energy consumption by plastic industries in Rajkot cluster is estimated to be 7417 toe with 96% of energy is accounted by electricity as shown in the table.



Share of energy sources in Rajkot plastic cluster

(i) Unit level energy consumption

Unit level energy consumption indicates that pipes and fittings type of plastic industry consumes more energy than other plastic industries. Most of the plastic industries are using electricity as a primary fuel.

Type of industry	Thermal energy (toe/year/unit)	Electrical energy (kWh/year/unit)	Total energy (toe/year/unit)
Pipes and fittings	0.17	336,351	29.1
Polybags/ Woven/ Non-woven sacks	0.04	218,600	18.8
Household moulding items	4.75	391,743	38.4
Roll Strap & others	0	179,692	15.5

(ii) Cluster level energy consumption

The total energy consumption of plastic industries in the cluster is estimated to be 7417 toe. Electricity accounts for about 96% of total energy consumption in the cluster.

Total Energy consumption by plastic industries in Rajkot

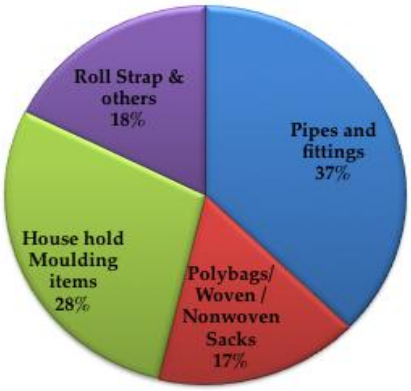
Type	Unit	Equivalent energy(toe/yr)	GHG emissions (tonne CO_2/yr)	Annual energy bill (million INR)
Electricity	83 Million kWh	7137	81,322	615
NG	198,000 SCM	168	347	6
LPG	79 tonne	93	236	5
HSD	20 kL	19	58	1
	Total	7417	81962	627

**Energy data collected from individual units in Rajkot*

Pipes and fittings manufacturing industries in Rajkot contribute around 37% of total energy consumption in the cluster. The contribution of all the industry segments to total energy consumption is also presented in the figure.

Energy consumption profile in the cluster

Type of industry	Energy consumption (toe/Year)
Pipes and fittings	2,764
Polybags/ Woven / Non-woven Sacks	1,225
House hold Moulding items	2,114
Roll Strap & others	1,314
Total	7,417



Distribution of energy share by different plastic industries

Energy saving opportunities and potential

Some of the major energy-saving opportunities in the plastic units in the cluster are discussed below.

(i) Radiant barrel heater band

Barrel heating is one of the largest energy users at most facilities. Conventionally, it is done with the help of on-off type electrical heating system with improper insulation on its surface. Accuracy of on-off type temperature controller is not very good. Further, improper insulation on the barrel surface results higher heat loss from this surface causing higher power consumption.

Thyristor base temperature controllers with appropriate insulations can reduce power consumption in barrel heating. The latest radiant heater band design is more promising solution. It is easy to install and maintain. The innovative design hastens warm-up times and can make cool-down systems more effective and efficient. Facilities that have incorporated this technology with extrusion machines have seen energy use reduced significantly. Depending on the base case potential energy saving could be in the range of 20 – 30 %.

(ii) All electrical injection moulding machines

Most of the injection moulding machines in the cluster is hydraulic-injection moulding machines. This could be replaced all electrical injection moulding machines, which can significantly decrease energy use to the tune of 50 - 80 % in this system. Further, system has additional control benefits, such as improved repeatability and precision, and improved cycle times in some applications results faster and more-efficient production with less rejects.

(iii) Application of variable speed drives

Motor-driven systems often are oversized and inefficiently controlled. VSDs can provide a more cost-effective method for reducing flow or pressure at the source by varying the speed of the connected load to match the process requirements. Energy savings in VSD applications usually range from 20 - 50 %. Some of the potential applications of VSDs in plastic industry are mentioned below.

Extrusion motor

The barrel screw normally driven through gearbox at constant RPM irrespective of the load on the screw barrel, which is variable at different stages of operation. Hence use of variable frequency drive in place of constant RPM will reduce of power consumption up to 20 %.

Injection moulding

Hydraulic oil pressure is used to generate force at time of loading but during unloading phase pressure is released to the tank via return line. Pumping system could be equipped with appropriate arrangement to meet the variable pressure demand in cycle which will result in decrease of overall power consumption for a given cycle .This could be achieved with one of the options out of VSD, servo drive motor for hydraulics or variable displacement hydraulic pump. Out of this, Servo drive motor for hydraulics is the best option, which could save more than 30 %.

Bobbin winding drive

Use of VSD in place of magnetic eddy current in bobbin windings can save energy to extent of 50 - 60% per 200 tapes winding.

(iv) Optimization of process cooling circuit

This includes the staging of chillers, reducing condenser water temperature, and improving pumping efficiency through the use of VFDs and controls. Depending on the required process temperature and application, some of the chilled water demand can be eliminated by using dry coolers or cooling towers in place of chillers.

Very often the pumps used in cooling tower system are inefficient and selection is not done on technical basis. This results in higher power consumption. The inefficient pumps may be replaced with energy efficient pumps. Optimizing process cooling can reduce cooling costs by 10 to 25 % annually.

(v) Compressed air

Savings of more than 40 percent can be realized through improving the supply and reducing demand in compressed air systems. Opportunities can be found in the supply side by installing new or optimizing existing equipment and reducing the system pressure. Demand can be reduced through improving end uses and repairing leaks. Blow-off nozzles can be upgraded to high-efficiency engineered nozzles or replaced with a low-pressure electric blower. Some of the potential areas of compressor system with specific option are mentioned below.

Replacement of reciprocating air compressors with energy efficient VFD screw air compressors with permanent magnet synchronous motor

Reciprocating air compressors have high specific power consumption along with high maintenance, noise levels and vibration. Screw air compressors have low specific energy consumption due higher CFM output per kW power consumption. Also, new age screw air compressors with permanent magnet synchronous motor coupled to speed drive can give as much as 50% energy savings with payback period below 8 months to 1.5 year depending on the operating hours and size.

Retrofitting air compressor with variable frequency drive

During normal operation, screw air compressor operated on unloading position for more than half the time. Installation of variable frequency drive (VFD) to such compressors will minimise the unload power consumption.

Arresting the compressed air leakage

Compressed air is an expensive utility in a plant. However, in most cases, air leakages in piping system are quite high (more than 20%) and go unnoticed. The compressed air leakage can be reduced to about 5% with better operating practices. Plant can reduce significant energy consumption by controlling compressed air leakages with no or minimum investment.

Reduction in pressure setting of air compressor

The pressure setting of air compressors are often much higher than the actual air pressure requirement at the point of use in the plant. The typical unload and load pressure settings are 8.5 and 7.5 bar respectively. Reducing the compressed air pressure as per end-use requirements will result in high energy savings. Reduction of generation pressure by one bar can lead to energy saving of 6%.

(vi) Replacement of rewound motors with energy efficient motors

“Rewinding” of motors result in a drop in efficiency by 3-5%. It is better to replace all old motors which have undergone rewinding three times or more. The old rewound motors may be replaced with EE motors (IE3 efficiency class). This would results into significant energy savings with simple payback period of 2 to 3 years.

(vii) Replacement of old centrifugal and submersible pumps with horizontal multistage mono-block pumps

Old single stage pumps consume more power due bigger motor size with reference to its flow and pressure output; these pumps can be replaced with energy efficient horizontal multi-stagemono-block pumps, which can give 30 to 50% energy savings with immediate payback period. Many plastic industries use submersible pumps, which do not have long life, hence submersible pumps can also be replaced by multistage mono-block pumps.

Major stakeholders

The primary stakeholders in the cluster are the manufacturing units based in Rajkot and the leading industry association of the region – Saurashtra Plastic Manufacturers Association (SPMA), Rajkot Plastic Manufacturers Association (RPMA) are major plastic industries aggregators. Other than these two, Rajkot Engineering Association (REA),GIDC (Lodhika) Industrial Association(GLIA), AJI (GIDC) Industries Association and Shapar-Veraval Industrial Association. The other key stakeholders include Central Manufacturing Technology Institute (CMTI), National Small Industries Corporation (NSIC), District Industries Centre, Rajkot (DIC), MSME-DI Rajkot, SIDBI, Indian Institute of Foundrymen, machinery suppliers, etc.

Out of these stakeholders, SPMA is the most proactive in the region. It has members from all over the Rajkot district as well as other parts of Saurashtra region. It has more than 1200 members. SPMA holds regular meetings for business development for its members which addresses other activities like raw material quality assurance, technology interventions etc. It also organizes exhibit displaying its members' products in different parts of Saurashtra region and also takes parts in National level exhibits like Plasto India. NSIC provides testing facility for plastic industries in the Rajkot region.

Cluster development activities

There are no specific cluster development activities in Rajkot cluster specific to plastic industries.

About TERI

A dynamic and flexible not-for-profit organization with a global vision and a local focus, TERI (The Energy and Resources Institute) is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to tackling issues of global climate change across many continents and advancing solutions to growing urban transport and air pollution problems, TERI's activities range from formulating local and national level strategies to suggesting global solutions to critical energy and environmental issues. The Industrial Energy Efficiency Division of TERI works closely with both large industries and energy intensive Micro Small and Medium Enterprises (MSMEs) to improve their energy and environmental performance.

About SDC

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

SDC (Swiss Agency for Development and Cooperation) has been working in India since 1961. In 1991, SDC established a Global Environment Programme to support developing countries in implementing measures aimed at protecting the global environment. In pursuance of this goal, SDC India, in collaboration with Indian institutions such as TERI, conducted a study of the small-scale industry sector in India to identify areas in which to introduce technologies that would yield greater energy savings and reduce greenhouse gas emissions. SDC strives to find ways by which the MSME sector can meet the challenges of the new era by means of improved technology, increased productivity and competitiveness, and measures aimed at improving the socio-economic conditions of the workforce.

About SAMEEEKSHA

SAMEEEKSHA (Small and Medium Enterprises: Energy Efficiency Knowledge Sharing) is a collaborative platform set up with the aim of pooling knowledge and synergizing the efforts of various organizations and institutions - Indian and international, public and private - that are working towards the development of the MSME sector in India through the promotion and adoption of clean, energy-efficient technologies and practices. The key partners are of SAMEEEKSHA platform are (1) SDC (2) Bureau of Energy Efficiency (BEE) (3) Ministry of MSME, Government of India and (4) TERI.

As part of its activities, SAMEEEKSHA collates energy consumption and related information from various energy intensive MSME sub-sectors in India. For further details about SAMEEEKSHA, visit http:/ / www.sameeeksha.org