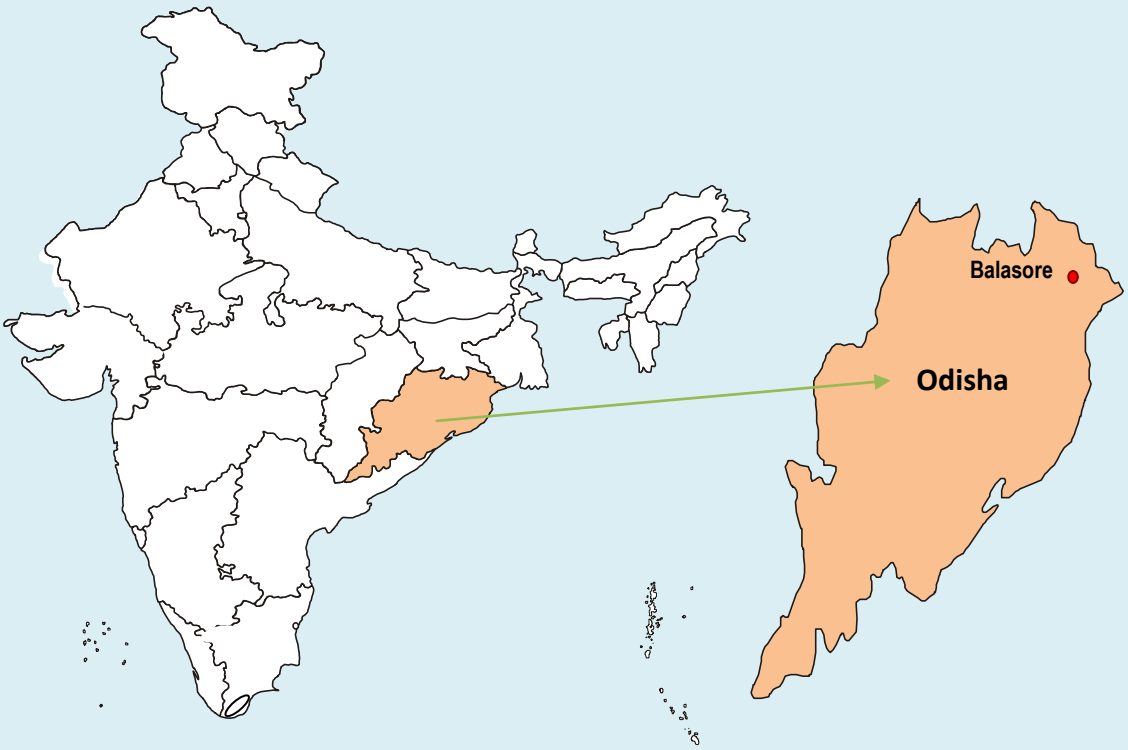
Cluster Profile
Balasore plastic industries



teri

Promoting Energy Efficiency in SMEs
SAMEEEKSHA

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development
and Cooperation SDC

Certificate of originality

Original work of TERI done under the project "INDIA: TERI-SDC Partnership: Scaling up Energy Efficient Technologies in Small Enterprises (EESE)"

Suggested format for citation

TERI. 2015
Cluster Profile Report – Balasore plastic industries
New Delhi: The Energy and Resources Institute 18 pp.
[Project Report No. 2014IE15]

Disclaimer

This document is an output of a research exercise undertaken by TERI supported by the Swiss Agency for Development and Cooperation (SDC) for the benefit of MSME sector. While every effort has been made to avoid any mistakes or omissions, TERI and SDC would not be in any way liable to any persons/organisations by reason of any mistake/ omission in the publication.

Published by

T E R I Press
The Energy and Resources Institute
Darbari Seth Block
IHC Complex, Lodhi Road
New Delhi-110 003
India

For more information

Project Monitoring Cell
T E R I
Darbari Seth Block
IHC Complex, Lodhi Road
New Delhi – 110 003
India

Tel. 2468 2100 or 2468 2111
E-mail pmc@teri.res.in
Fax 2468 2144 or 2468 2145
Web www.teriin.org
India +91 • Delhi (0)11

Contents

Acknowledgements

TERI places on record its sincere thanks to the Swiss Agency for Development and Cooperation (SDC) for supporting the long-term partnership project focusing on energy intensive MSME clusters in India.

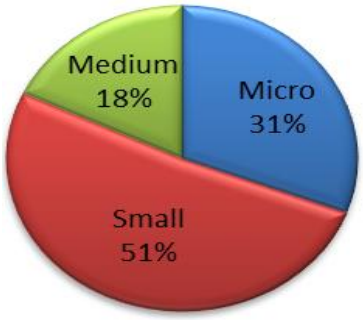
TERI team is indebted to North Orisha Chamber of Commerce & Industry (NOCCI) for providing support and information related to plastic units in Balasore. TERI also places on record the support provided by Mr Sri P.Pravakar Rao, general Manager, district industries centre, Balasore, Mr Devashish Mahanti, President, NOCCI and MD, Gampas Plastech Pvt Ltd, Balasore, and Mr C P Bhartia, Secretary, NOCCI and MD, Jagdamba Polymers Pvt Ltd for their support and cooperation in organizing field visits and interactions with entrepreneurs during the study for the preparation of this cluster profile report. TERI extends its sincere thanks to Mr P K Gupta, Director (I/c) and Mr C P Reddy, Assistant Director MSME-DI (Cuttack) for facilitating field visits.

Last but not least, our sincere thanks to MSME entrepreneurs and other key stakeholders in the cluster for providing valuable data and inputs that helped in cluster analysis

Balasore plastic industries

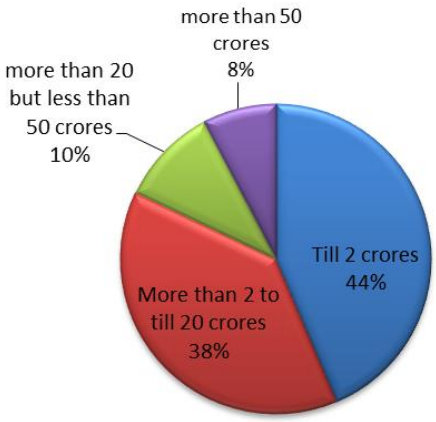
Overview of cluster

Balasore is one of the prominent plastic clusters in the country. Balasore district has more than 2000 industries. The industrial cluster located within Balasore town has around 500 different industries spreading over an area of around 15 square kilometres in different industrial estate such as Bampada, Somnathpur etc. around Balasore town. The cluster comprises large, medium, small and micro industries, manufacturing products like chemicals, papers, tyre, oil, medicine, furniture, electronic products, plastic and food items. About 70% of the plastic industries located in and around Balasore.



Distribution of plastic units as per category

The small and micro industries comprise mainly plastic industries, fly ash bricks, ice factory, rice mills and others. Some of the medium and large industries include Birla tyres, Ballasore alloy, Emami papers, Orissa alum extrusion, Everest industries and Indene bottling plant. The plastic industries in Balasore provide employment for about 3000 people. Majority of them is associated with plastic sacks and plastic pipe manufacturing industries. There are about 40 plastics industries located in the cluster of the plastic units are either small or micro and have been registered accordingly.



Distribution of plastic industries based on annual turnover

The estimated total turnover of plastic industries in Balasore cluster is more than Rs 500 crore. The annual turnover of about 44% of the units is within Rs 2 crore (figure).

Product types and production capacities

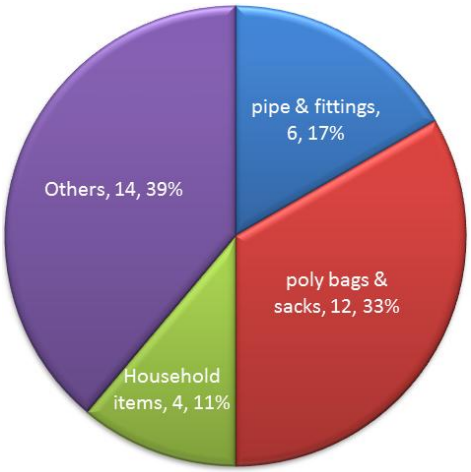
The products manufactured in plastic industries in the cluster covers a wide range of end-use sectors such as domestic, industrial, municipality, service, medical and academic institutions. Some of the primary products from Balasore cluster are given below.

- Pipes and fittings
- 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

Primary plastic products from Balasore

These products of Balasore plastic cluster may be grouped into (1) pipe and fittings, (2) poly bags and sacks, (3) household items and (4) others (figure). About 50% of the units are engaged in making various types of carrying/ packaging materials and pipes (figure).

The production and installed capacity of the similar industries in the cluster varies from unit to unit; the production is also not constant during the year. Each type of unit records its production in different ways and not in terms of tonnes of production. For example, some units record the number of pieces manufactured. Based on the interactions with different key stakeholders like entrepreneurs, industrial bodies and government body in the cluster, it is estimated that the cluster manufactures about 62,600 tonne of plastic products by consuming Table provides approximate details on number of units, aggregate production and energy consumption by a particular type of product in the cluster.



Product wise distribution of plastic plants

Annual production by Balasore plastic industries

Product category	Number of units	Production (tonne/year)
Pipe & fittings	6	39,000
Poly bags & Sacks	13	10,500
Household items	4	4,800
Others	16	8,300
Total	39	62,600

Raw material usage in cluster

The primary sources of raw material for plastic products are petrochemical industries from various locations in the country. Depending upon its type, quality and source, cost of different raw materials varies in the range of Rs 95-120 per kg. The plastic industries use one or more of the following raw materials in their production processes. Sources of major raw materials are provided in the table.

- 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)

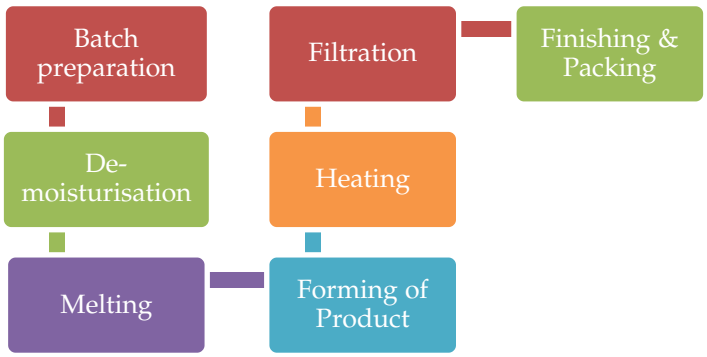
Sources of raw materials of plastic products

Raw material	GAIL	Haldia	IOCL	IPCL	Reliance
HDPE	✓	✓	✓	✓	✓
LDPE	-	✓	-	✓	✓
LLDPE	✓	✓	✓	✓	✓
PP	✓	✓	✓	✓	✓
PVC	-	-	-	✓	✓

Production process

The plastic products are made either in continuous mode following extrusion methods or intermittently by moulding process. In extrusion method, initial forming of the ready-to-shape batch material takes place in pre-designed die heads and is further passed through different process steps based on the nature of final product. In moulding process, the ready-to-shape batch material is injected 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. The generic process steps of manufacturing plastic products are explained below. The generic production steps for plastic products are shown in figure.

- *Batch preparation*: 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:* The moisture from 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 present, if any from the batch 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 appropriate shaping mechanism such as moulding, extrusion, blowing, spinning and drawing.
- *Finishing:* It includes all operations carried out after forming to final product. It may include stretching, sizing, burr removal, printing & embossing, flattening, lamination, stitching, etc.
- *Packaging:* The final marketable products are packed as per marketing and despatch requirement.



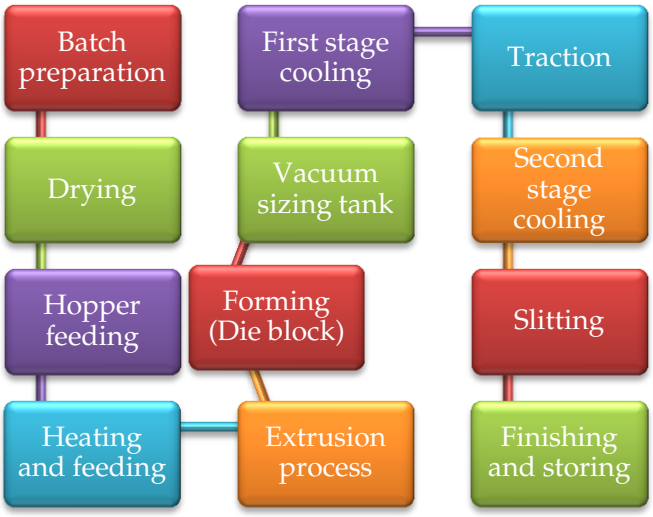
Generic process steps for plastic products

The production process for each primary plastic product manufactured in the cluster is explained below.

(i) Plastic pipe and fitting manufacturing units

Plastic pipes are made in various size and length using extruder. These 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.

The primary raw materials used in pipe & fittings include HDPE and PVC. Pipes of different colour can be manufactured 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.



Process flow chart for plastic pipe

Plastics pipe extrusion commonly uses plastic chips or pellets, which are usually dried to remove moisture and conveyed to a hopper before sent to the feed screw for forming in die. After forming, pipes are cooled and strengthened 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

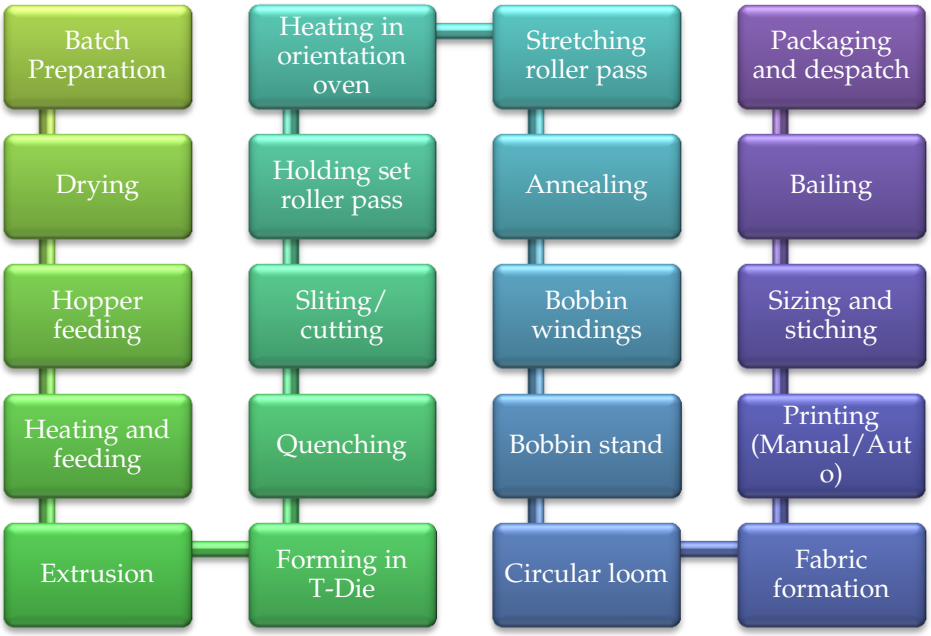
Plastic pipe and fittings

(ii) Plastic sack and bag manufacturing units

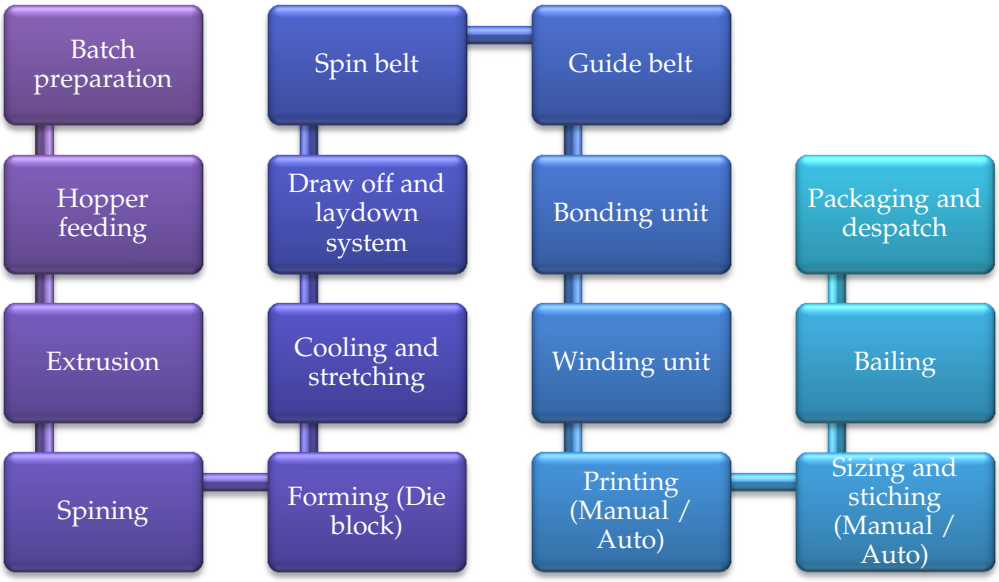
PP or HDPE or UPVC is used as base material in plastic sacks manufacturing using extrusion method. Sacks could be either woven or non-woven type depending upon process steps in place after die head. Multiple threads from bobbin stand is fed to circular loom to make circular sheet, which is later cut 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 or market demands. The internal surfaces of sacks are also laminated and printed on external

Plastic sack and bag manufacturing unit

surface to meet particular application. Process flow charts for woven and non-woven sacks are provided below.

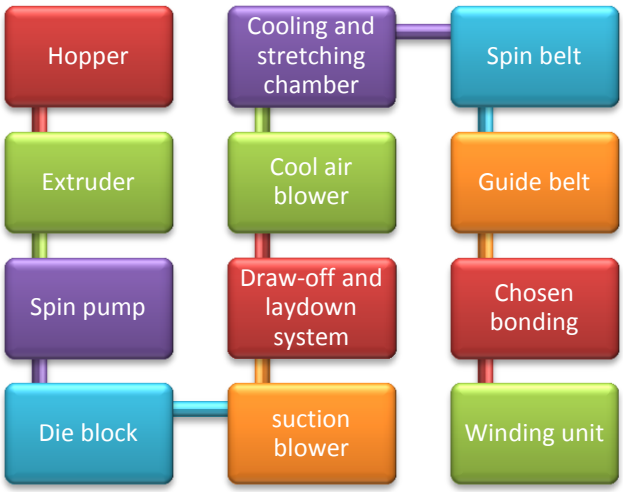


Process flow chart for woven sacks



Process flow chart for non-woven sacks

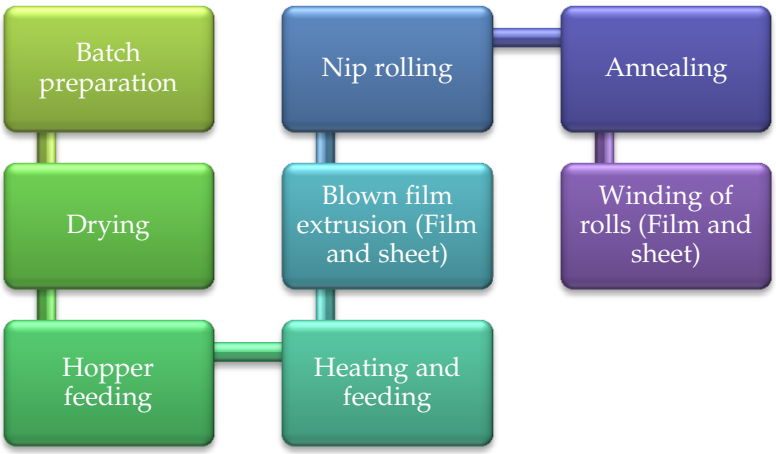
A schematic layout of system used in manufacturing non-woven spun bonding plastic product is provided in this figure.



Plastic pipe and fitting manufacturing units

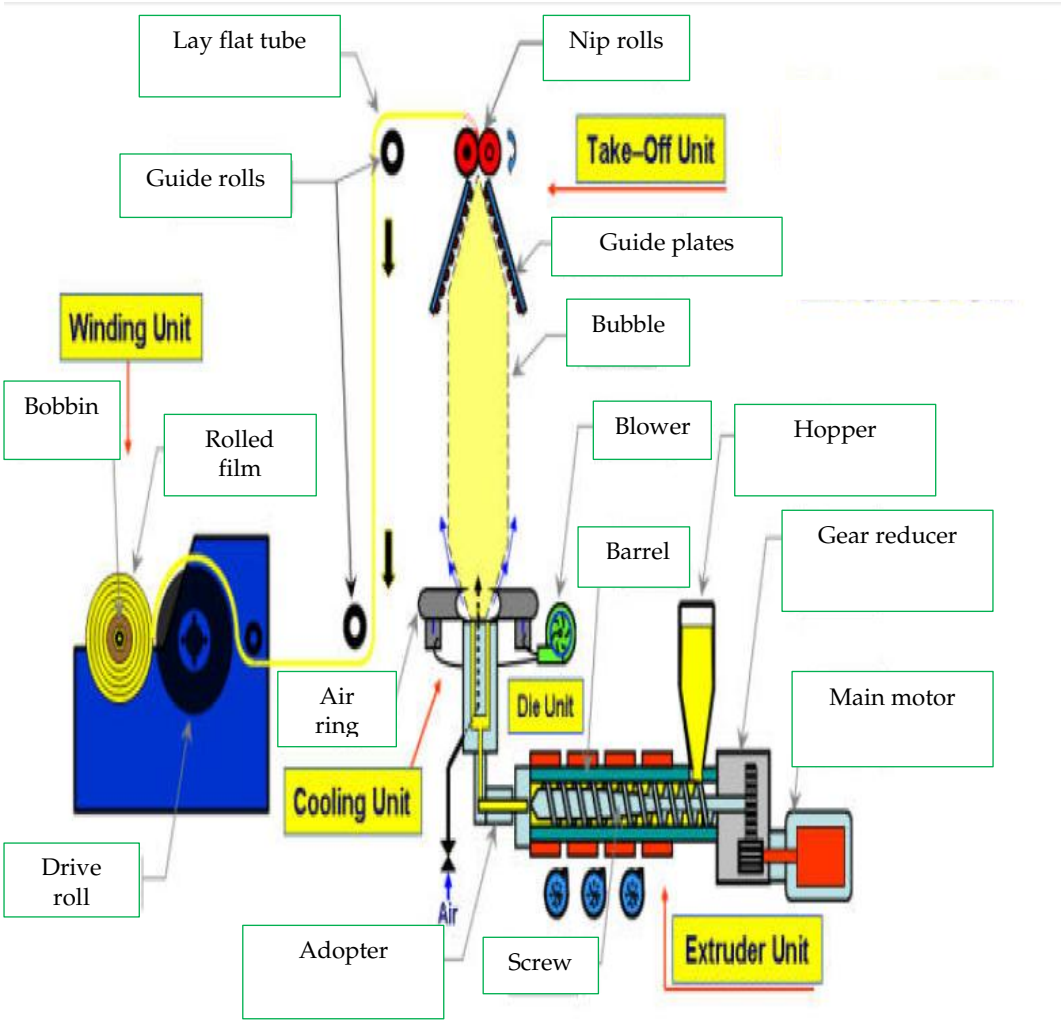
Packaging and carry bags are made using one of the chemicals from PP, HMHDPE, LLDPE, LDPE, HDPE, BOPP etc. as base material to suit load carrying capacity and hygiene requirement for a given application. In the blown film process, melted raw material is formed through slit die to form thin walled circular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

Blown film unit



Process flow diagram of blown film unit

A schematic layout of system used in manufacturing blown film plastic product is provided in figure below.



Schematic layout of blown film unit

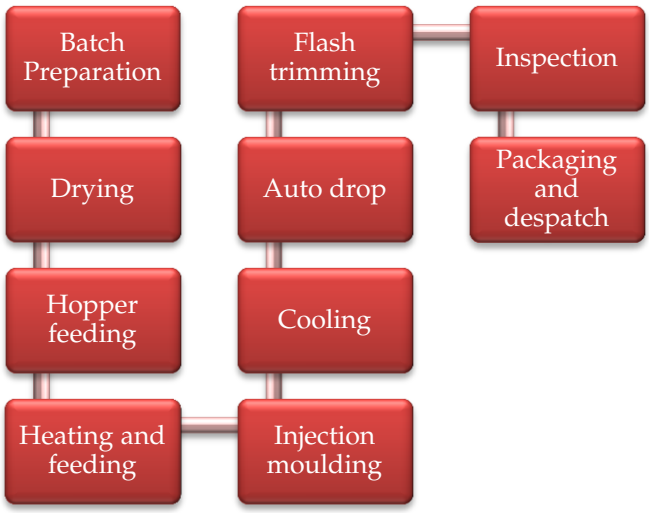
Source: http://www.polyregion.org/files/attachments/13135/449165_02_Extrusion_of_tubular.pdf) as accessed on 28/08/2015

(iii) Plastic household and furniture manufacturing units

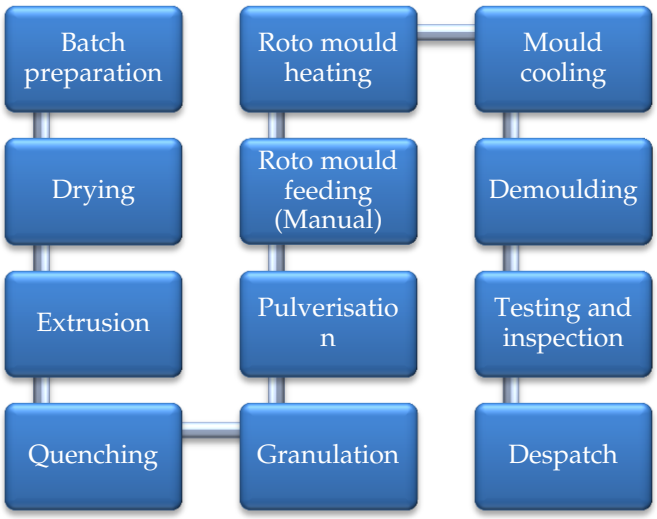
This includes all kinds of products that are used in daily life such as chair, bucket, mug, table, water tanks, etc. These are made using product specific mould with the help of injection moulding or roto-moulding machines. Moulded products are made using one of the chemicals from PP, HDPE, PET, BoPET,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

Plastic household and furniture manufacturing units

PET and BoPET are safe type of plastics 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 Roto moulding 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

Technologies employed

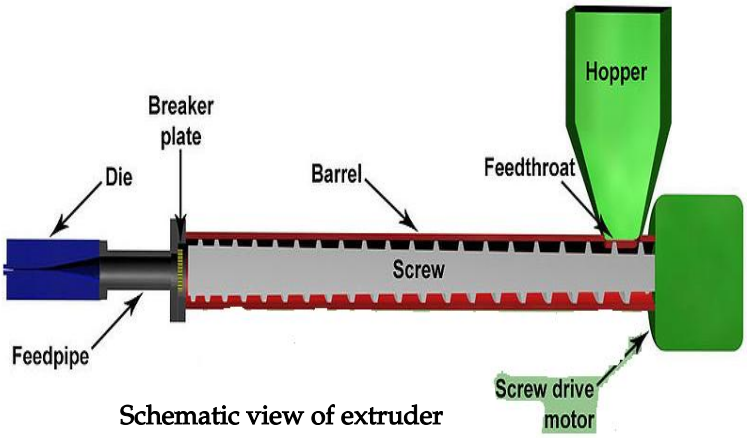
Plastic industries in Balasore plastic industries cluster use product based forming technology like extruder, injection mould, roto-mould along with connected auxiliary equipment as required for smooth operation of these machines. Apart from forming machines, thermic fluid heater, air compressor, chiller, 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) Heating coils for melting and heating

Two types of electrical heating elements 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 poorly insulated leading to higher surface heat loss. One of the energy efficient heating coils is PID controlled barrel band type with better and compact insulation.

(ii) Extruder

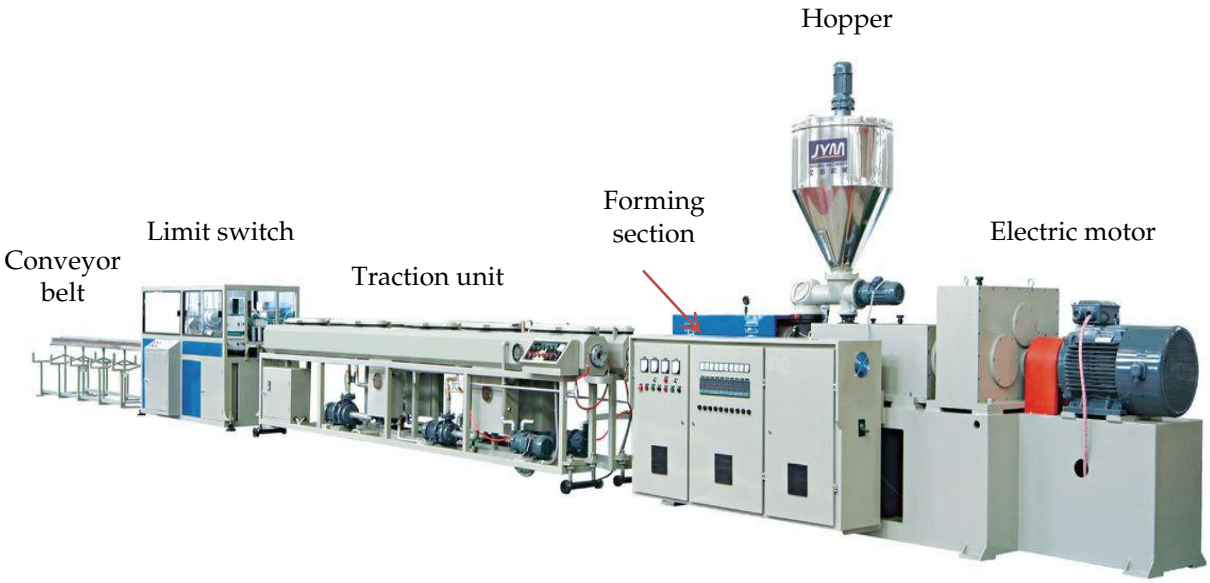
Extruder primarily consists of two sections namely extrusion and calibration as well as strengthening. Extrusion includes screw, hopper, barrel, heating assembly and forming die (figure). The other section has vacuum calibration tank, quenching, traction or caterpillar haul-off, cutting arrangement with limit switch and belt conveyor. Screw movements effect transport of liquid plastic to dies for extrusion process. The formed plastic product cools under blown air or in water bath and gets hardened 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.



Schematic view of extruder

Source: *https://en.wikipedia.org/wiki/File:Extruder_section.jpg* as assessed on 28/08/2015

A generic layout view of a plastic pipe extruder system is shown in the figure

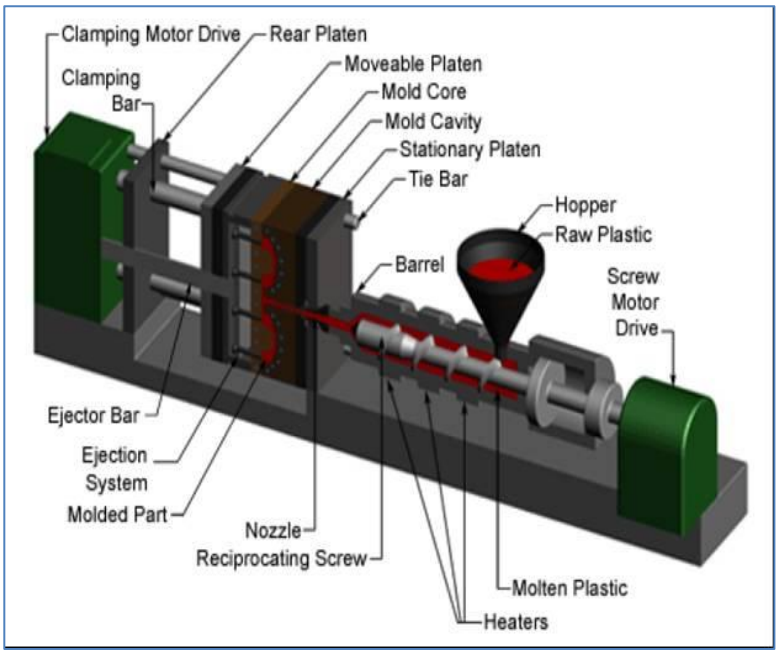


Layout of plastic pipe extruder

Source http://www.eagle-machinery.com/Pipe-Extrusion-Line-1.html as accessed on 28/08/2015

(iii) 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 basically operates with hydraulic pressure provided by hydraulic power pack. Injection moulding has primarily two sections viz. (1) injection section (includes hopper, barrel, screw, barrel heaters, hydro motor) and (2) clamping section (movable platen (core), fix platen (cavity), clamping shutter arrangement) for clamping force.



Schematic view of injection mould system

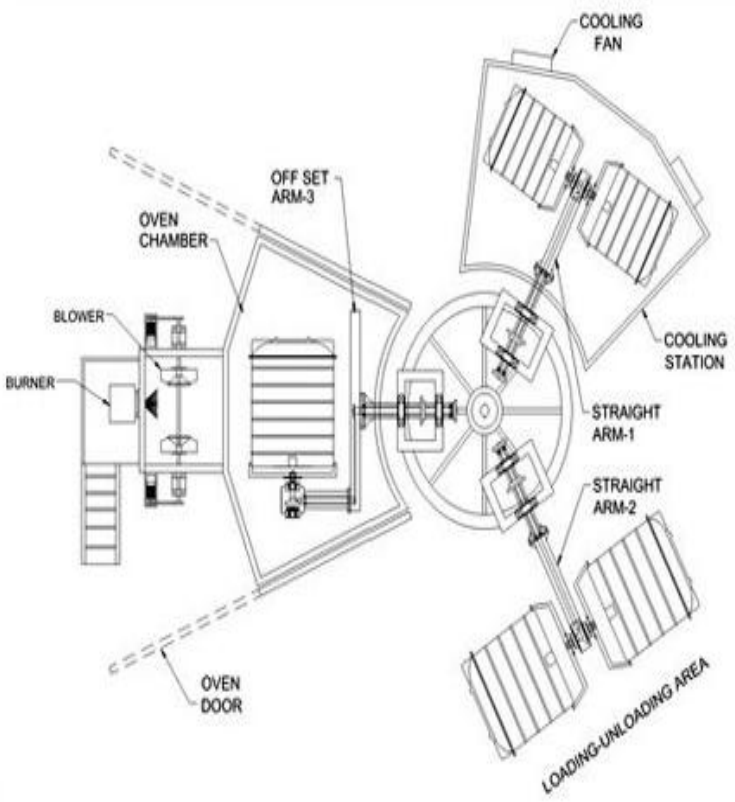
Source: http://www.custompartnet.com/wu/InjectionMolding

Hydraulic system of injection moulding system is equipped with 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 (figure). Of these, servomotor arrangement is the most energy efficient system.

Injection moulding system

(iv) Roto moulding

This 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 oil fired; presently most of them are designed to use LPG. 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 the set temperature and completion of heating, the mould is taken out from the oven and allowed for natural cooling. The product is taken out after cooling down.



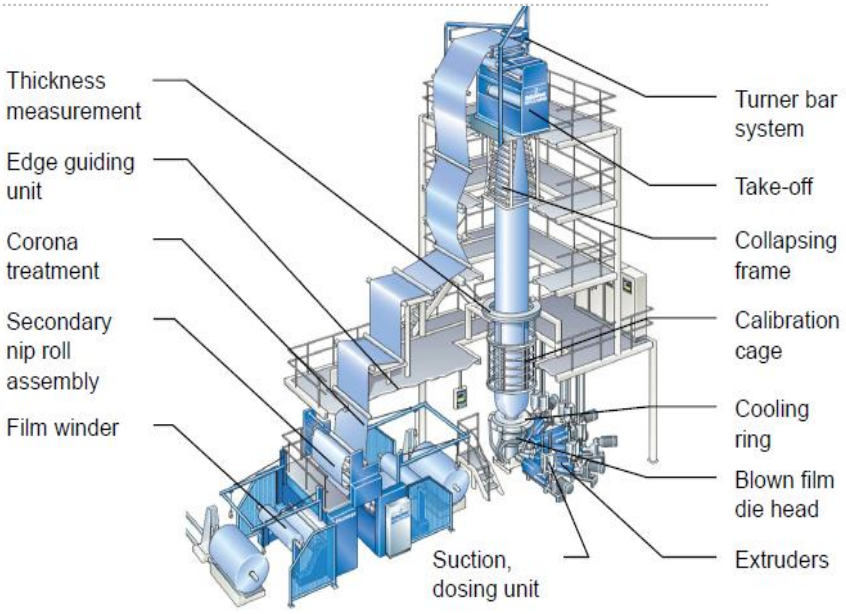
Roto mould with three arms

Source: http://www.naroto.com/Rotational-rotomoulding-machine-manufacturer.htm

Schematic view of roto mould with three arms

(v) Film blowing extruder

It is 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.

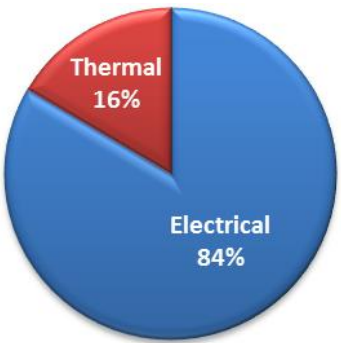


Schematic of blown film extruder
Source:
http://www.polyregion.org/files/attachments/13135/449165_02_Extrusion_of_tubular.pdf) **as accessed on 28/08/2015**

Blown film extruder

Energy consumption

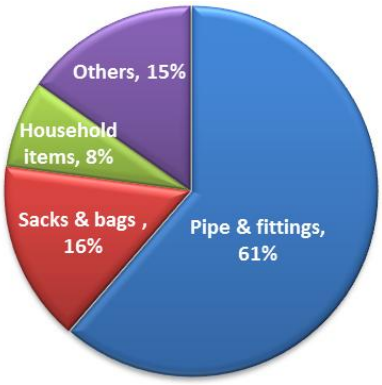
Electricity is the main source of energy for most of the plastic units in the Balasore cluster. It accounts for about 84% of total energy consumption in the cluster. Almost all the units are dependent on electricity from grid. The average connected loads of an unit depends on the type of products and installed capacity of the plant. Majority of the units have LT connection of about 100 kVA. Pipe and sack manufacturing units have HT connection about 400 kVA or more depending on the plant installed production capacity.



Share of energy source in Balasore plastic cluster

Apart from electricity, the cluster uses furnace oil (FO) and high speed diesel (HSD). FO is mainly used by a few non-

woven sacks manufacturing plant having oil-fired thermic fluid heater system. HSD is used mainly in DG sets to meet the requirements during power failure. However, power failure is not very common in the cluster and the power situation has significantly improved in Balasore over the past few years. The estimated annual energy consumption of the cluster is 2,860 toe.



Distribution of energy consumption share by different plastic industries

Annual energy consumption profile in the cluster

Type	Unit	Quantity	Equivalent energy (toe)	Share
Electricity	Million kWh	27.8	2,389	84%
HSD	kL	452	429	15%
LPG	tonne	36	42	1%
Total			2,860	100%

The breakup of estimated energy consumption of different types within the cluster is shown in the table. Pipe & fittings industries account for more than 60% of energy consumption in the cluster.

Energy consumption of plastic industries in Balasore cluster

Industry sector	Energy consumption (toe/year)
Pipe & fittings	1,755
Sacks & bags	450
Household items	220
Others	435
Total	2,860

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 insulation can reduce power consumption in barrel heating. The latest radiant heater band design is more promising solution which 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 radiant barrel heater band 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 molding machines. This could be replaced all electrical injection molding machines, which can significantly decrease energy use of about 50-80%. Electrical injection moulding system has additional control benefits such as improved repeatability and precision and improved cycle times in some applications resulting in faster and more-efficient production with less rejects.

(iii) Application of variable speed drives (VSD)

Motor driven systems often are oversized and inefficiently controlled. VSDs can provide a 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.

(a) Extrusion motor

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

(b) Injection moulding

Hydraulic oil pressure is used to generate forces 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 of about 30%.

(c) 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.

(d) 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 correct resulting in higher power consumption. The inefficient pumps may be replaced with energy efficient pumps. Optimizing process cooling can reduce cooling costs by 10-25%.

(iv) Compressed air

Compressed air system offers significant energy saving. In some cases it is as high as 40% by improving supply side and reducing end-use demands. 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

(a) 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.

(b) 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%.

(c) 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.

(v) Replacement of rewound motors with energy efficient motors

Rewinding of motors may result in efficiency drop of about 3-5%. It is better to replace old, inefficient 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.

Major stakeholders

The primary stakeholders in Balasore plastic industries cluster include the following: manufacturing units and the leading industry association of the region- North Orissa Chamber of Commerce & Industry (NOCCI). The other key stakeholders include Advanced Plastic Processing Technology Centre (APPTC), Balasore Chamber of Industries & Commerce (BCIC), District Industries Centre (DIC), machinery suppliers and various government agencies. These actors provide various services to the plastic units, such as training of workers, testing facilities, financial services, technical know-how, raw materials supply and supply of technologies.

Out of these stakeholders, NOCCI is the most proactive in the region. It has members from all categories of industries in five districts such as Balasore, Bhadrak, Jajpur, Mayurbhanj and Keunjhar. It has around 200 members, out of which around 70 industries from Balasore.

The association address the issues related to the welfare and grievance redressal of their member industries. The services offered by NOCCI include (1) policy advocacy and advisory services, (2) wider networking and business development, (3) education and training for greater competitiveness and (4) business services.

Similarly, BCIC is another prominent industry association enrolling the local plastic industries including other industries as its members and very proactive to the cluster development. It is very common that the members and plastic entrepreneurs in particular meet together to discuss about the common problems faced by the plastic industries.

Cluster development activities

Advanced Plastics Processing Technology Centre (APPTC) is an educational institute under CIPET, Bhubaneswar. It was established with financial support from both central and state governments at a total project cost of Rs 15 crore in Bampada industrial area in Balasore. The institute has been approved under AICTE and provides great support to plastic and allied industries in around Balasore in terms of generating pool of trained skilled man power as well as conduct capacity building training programs. Industries are greatly benefitted from APPTC regarding technology support services relevant to their process.

NOCCI has established a Special Purpose Vehicle (SPV) with a sanction of Rs 60 crores grant from the Department of Industrial Policy and Promotion (DIPP) under Industrial Infrastructure Upgradation Scheme (IIUS) for setting up of several infrastructures for use of industries. This SPV is being operated as NOCCI Balasore Infrastructure Company with facilities as Business Park at Bampada and Integrated Logistics Hub (ILH) at Somnathpur Industrial estate. The business Park has multiple facilities like exposition centre, training centre, auditorium, craft village and trade tower.

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