



Product : PET Bottles

Quality Standards : IS 14537: 1998

Installed Capacity : 3000000 Numbers/Annum

Year of preparation: June 2020



Micro Small and Medium Enterprises-Development

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# **A PROJECT PROFILE ON**

## **PET- Bottle**

### **Introduction: -**

Polyethylene Terephthalate (PET) is linear thermoplastic, long-chain molecule consists of repeating units, white but bluish resin made from terephthalic acid and ethylene glycol through poly-condensation. Plastic PET is very important raw material used in man-made fibers. PET is a kind of polyester material for fiber, injection molded parts, as well as blow-molded bottles and jars. Special grades are offered with the required properties for the different applications. Polyethylene terephthalate (PET) is used to make beverage, food and other liquid containers, synthetic fibers, as well as for some other thermoforming applications. Depending on its processing and thermal history, it may exist both as an amorphous (transparent) and as a semi-crystalline (opaque and white) material. It can be synthesized by a transesterification reaction between ethylene glycol and dimethyl terephthalate. Plastic PET is supplied by the resin manufacturers in the form of small pellets, each about 0.05 grams. Its strength, temperature tolerance and wear-resistance made it an ideal replacement for or addition to natural fibers such as silk, cotton and wool. PET containers are plastic containers made from polyethylene terephthalate and are used in a wide range of applications. This plastic material is manufactured from various by-products of the oil and gas industries, especially ethylene glycol and terephthalic acid

PET can be moulded into containers and Bottle of different sizes and shapes.

Primarily used in the packaging of water and beverages, PET bottles are also gaining shares in other industries like- juices, salad dressings, household cleaners, medicines, dish detergents, mouthwashes, etc. Being light in weight and easy to handle, they are preferred in the packaging of carbonated soft drinks (CSD's) and are continuously replacing glass bottles due to their tendency to break and the inconvenience created while returning them after consumption. As a result of an increasing demand for bottled beverages and replacements of glass and metal containers with PET bottles, the global consumption of PET bottles is expected to show a continuous growth in the short and medium terms.

### **Market Potential:-**

The COVID-19 pandemic has presented a humanitarian crisis, creating an extraordinary strain on society and affecting millions of people around the world. The speed and depth of disruption is creating unprecedented challenges for industries and is having a growing impact on the global economy.

Beyond the negative impact of a traditional economic downturn due to factory closures, supply chain disruptions, movement restrictions and social distancing requirements, the pandemic has put the medical industry at the centre stage.

The major drivers bolstering the growth of the market are the introduction of a plasma-based coating that has made PET bottles more impervious in nature. Furthermore, recent changes in packaging regulations of various countries and the rapid development of the FMCG (fast-moving consumer goods) sector are also driving the growth of the market.

### **Atma-Nirbhar Bharat Abhiyan**

Each benefit under the Atma-Nirbhar Bharat Abhiyan is going to help Indian manufacturers continue business and sustain their logistics supply chain. Besides, this will likewise assist organizations with raising their self-reliance by requiring less from other countries.

### **BASIS AND ASSUMPTIONS:**

1. The production of the unit is worked on the basis of three shifts of 24 hours working a day for 300 working days a year.
2. The salary and wages are taken on the local rates prevailing in Maharashtra at the time of preparation of the profile.
3. Interest rate for capital investment is taken as 18%.
4. Cost of plant machinery and equipment has been considered as per prevailing rates in the market.
5. Cost of installation and electrification of machinery and equipment has been taken at the rate of 5% of the cost of plant and machinery
6. Working efficiency is taken as 75%

**Implementation Schedule:-**

The implementation of the project includes various jobs/exercises such as market surveys and tie-ups, preparation of project report, selection of site, registration, financing of project, procurement of machinery and raw materials etc., recruitment of staff, erection/ commissioning of machines, trial production and commercial production etc.

**PLANT CAPACITY PER ANNUM:**

Annual production capacity 3000000 PET bottles. Annual working days is assumed as 300.

**Process Details:-**

PET bottles manufacturing process involves two basic stages of Pre-form manufacturing and Bottle Stretch Blow Molding.

1. Pre-form manufacturing process consists of following steps:
  - a. Resin drying and dehumidification
  - b. Melting of resin and injection into mold
  - c. Injection blow molding
  - d. Primary cooling
  - e. Secondary cooling
  - f. Ejection and storage
2. Bottle Stretch Blow Molding, process involves:
  - a. Pre-form feeding
  - b. Pre-form heating
  - c. Transfer of heated pre-forms to blow wheel
  - d. Bottle stretch blow molding
  - e. Bottle ejection

**Manufacturing Stages :**

Bottles can be made through two types of processes.

1. One-step process
2. Two-step process

### ***One-Step Process***

In a one-step process, the PET bottles are made directly from the resin. Both the pre-form manufacturing and stretch blow molding is performed on a single line.

Main features of the one step process are as follows:

1. Lesser Power consumption.
2. Lower initial investment.
3. Same number of injection cavities and blow molds as on conventional machine.
4. Better thermal efficiency because the residual heat in the pre-forms from the injection molding process is used for blowing.
5. Bottles free from scruff marks, as pre-forms are not re-gripped before blowing.
6. Highly oval or rectangular cross-sectioned containers.
7. Different pre-form designs, as pre-form wall is thicker to retain heat where stretching is required.

### ***Two-Step Process***

In a two-step process, PET bottles are made in two discrete steps. The first step involves making the pre-form, and the next, the production of bottle. The pre-forms are produced earlier and stored, and stretch blow molding is done as and when required.

Main features of two-step production process are as follows:

Higher operating efficiency because of separate injection and blow molding function.

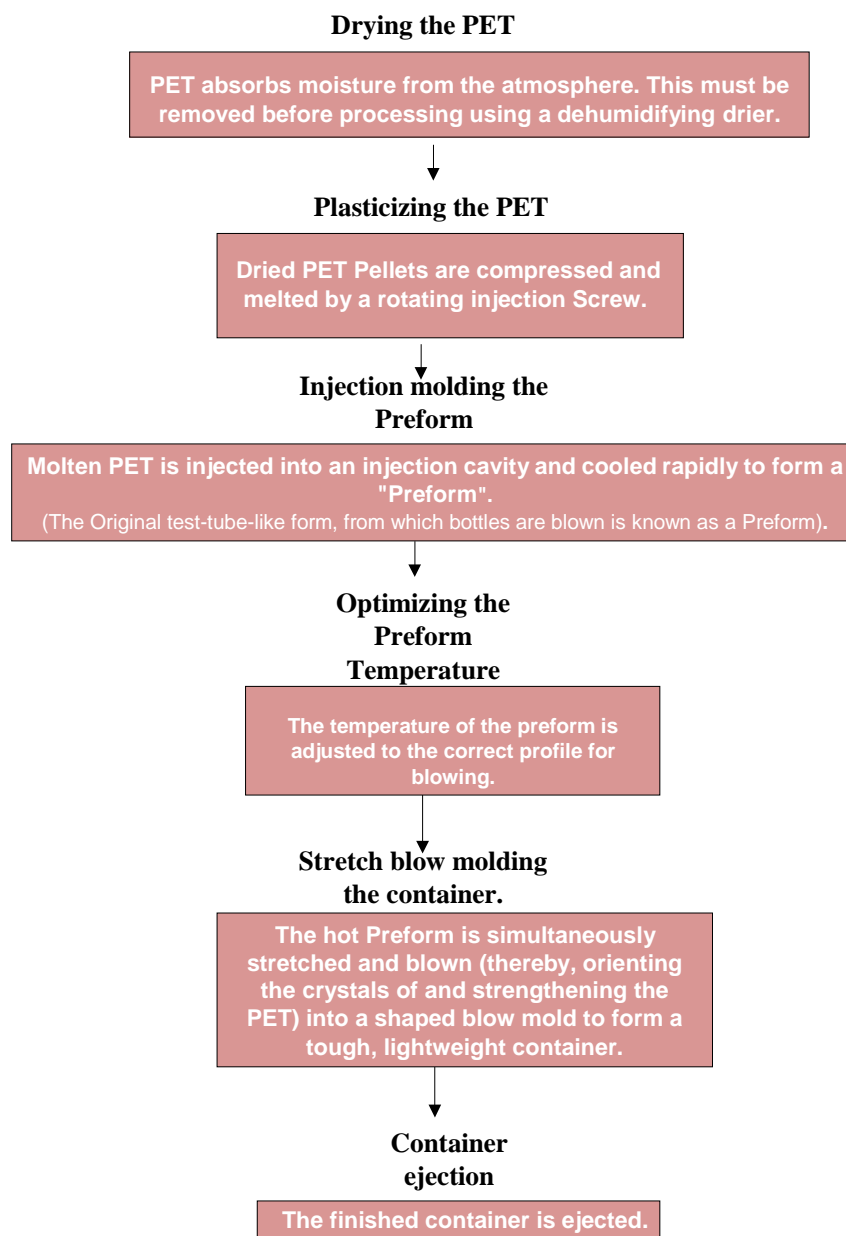
Higher initial investment. Buying pre-forms instead of making them can save money.

1. Different cycle times of the two separate machines, so the outputs are matched by increasing the number of injection cavities.
2. More suitable for high volume production of less technically demanding containers such as carbonated soft drink bottles.
3. Thermal efficiency lower since the pre-forms are first cooled to the room temperature for storage purposes and then re-heated to suitable blowing temperature.
4. Better adaptability to fluctuation in demand, as pre-forms can be stockpiled. Care must be taken in controlling storage conditions to ensure consistent aging and moisture absorption of different pre-form batches.
5. Centralized pre-form production facility can be created to supply several

blow molders.

6. Higher flexibility, as bottle makers can make or buy pre-forms.
7. Higher inventory of pre-forms, as they are frequently scuffed before blowing.
8. Degree of ovality restricted owing to the difficult of temperature profiling of the pre-forms.
9. Thinner pre-form walls, so that it heats up faster where stretching is required.

### **Process Flow Diagram of PET Bottles Manufacturing**



## FINANCIAL ASPECTS

### PLANT & MACHINERY

Sr. No	Description	Quantity	Value in lakhs
1	Injection Molding machine (including excise duty, CST, transport, insurance) Capacity : 200 to 250 ton /day Phase : Three Phase Frequency : 50 - 60 Hz Machine Structure : Horizontal Power Source : Electric Power : 15-20 kW Voltage : 220 - 340 V Plastic Type : PP, PET, ABS etc	1	8
2	4 Cavity Fully Automatic Servo Stretch Blow Moulding Machine with Air Recovery System, Pre-form Storage Hopper, Auto Feeder and Bottle Carrying Conveyor with 300ml Mould. <b>M/C Specifications:</b> Model No: DFAS4C28 Neck Dia: 28mm Suitable for Alaska & PCO Pre-forms Bottles Blowing: Oil, Water, Juice & Soda Blowing Capacity: 200ml to 1500ml (Water 2000ml) Production capacity: 300ml 6000BPH (Approx) (Depending on Moulds and pre-form Quality) Connecting Load: 15KW, 3 Phase	1	33.75
3	Moulds for injection moulding-16 cavity mold of (200 ml, 500 ml, 1000 ml, 1500 ml, 2000 ml each 1 number for preform)	5	24
4	Blow Moulds of (200 ml, 500 ml, 1000 ml, 1500 ml, 2000 ml each 1 number for preform)	5	4.6
5.	Cooling tower- 40 TR with Pump	1	1.00
6.	Dehumidifying Capacity ( Litre/Day) 17 - 500 Ltrs Body Material Stainless Steel Air Flow 20 - 280 cub m/hr	1	7.8
7.	Chiller for mould cooling-12 liter	1	6.98
8.	Blending unit	1	4.5
9.	Grinder	1	1.85
10.	High Pressure Air Compressor 20HP, FAD: 54 CFM (IR Model) Three cylinder, Two stage, Water cooler inner cooler and Water Cooler after cooler with Moisture Separator and Auto Drain Valves	1	2.45
11.	Compressor 20HP (Low Pressure)	1	1.75
12.	High Pressure Refrigerator Air Dryer 60CFM / 40 Bar	1	0.70

13.	Refrigerator Air Dryer (Low Pressure)	1	0.60
14.	Water chiller air cooled-2TR	1	1.00
15.	2TR cooling tower	1	1.00
16.	Testing Equipment's	-	6.00
17.	Erection & Electrification 10% of cost of machinery		5.28
18.	Office equipment & furniture	LS	3.00
	Total		114.26

### Total Fixed Capital :

(LAND, BUILDINGS, PROCESS PLANT & MACHINERY ETC.)		
1	Process Plant & Equipment	114.26
2	Preliminary & Pre-operative Expenses (Company Formation, Interest during construction, Pre-production expenses, etc.)	13.71
	Total	127.97

## B. WORKING CAPITAL

### a) RAW MATERIALS:

Size	Weight	Cost of Raw material	Products manufactured	RM Required / Month	Total RM Cost / Month ( Lac)
200 ml	7 gm	Rs.50/kg	8600 pcs / day	10750 kg / Month	5.37
500 ml	17.5 gm				
1000 ml	35 gm				
1500 ml	52.5 gm				
2000 ml	70 gm				



## **b) SALARIES & WAGES**

Sl. No	Designation	No	Monthly	Total
1	Production Manager	1	35000	35000
2	Supervisor Manager	1	20000	20000
3	Machine Operator / Helper	4	10000	40000
4	R&D, Testing / QA	1	12000	12000
5	Clerical Staff	1	10000	10000
6	Other Staff	2	5000	10000
7	Maintenance (Elec. & Mech.)	1	10000	10000
	Total			137000
8	Fringe Benefits (20 % of the above)			27400
	Total			164400

## **B. UTILITIES :**

<b>Electricity:</b> Load of Injection Molding Machine per hour is 20 KW Load of Stretch Blow Molding Machine and ancillaries per hour is 15 KW Hence total load is 35 KW/H and other machineries 5 KW Total load for month is 24000 KW	<b>Unit costing is Rs. 7.50 Hence total amount is around Rs.180000/-</b>
<b>Water: 3000 liter for chiller and other Works</b>	<b>1500/-</b>
<b>Total</b>	<b>181500/-</b>

## **C. OTHER EXPENSES**

1.	Postage and Stationery	2000
2.	Telephone	5000
3.	Transport and Traveling	10000
4.	Insurance for Machinery & Raw Materials	10000
5.	Miscellaneous	5000
6.	Advertisement & Publicity	5000
7.	Rent	35000
	<b>Total</b>	<b>72000</b>

### TOTAL RECURRING EXPENDITURE PER MONTH:

Description	Value (Rs.)
Personnel	164400
Raw materials	537000
Utilities	181500
Other contingent expenses	72000
Total	954900
Working capital (Approximately working capital is estimated as 3 months recurring expenditure)	2864700/-

### D. TOTAL CAPITAL INVESTMENT

1.	Plant and Machinery	11426000
2.	Working Capital ( for 3 months)	2864700
	<b>TOTAL</b>	<b>14290700/-</b>

### E. COST OF PRODUCTION PER ANNUM

1.	Working capital	12797000
2.	Depreciation of dies, jigs, fixtures, furniture, Office equipment @ 20%	60000
3.	Interest on investment @ 18%	2572326
	Total	15429326
	Rounded to	16000000/-

### TURN-OVER PER YEAR:

Items	Average Selling Price Unit (Rs.)
PET bottle 200 ml	Rs.3
PET bottle 500 ml	Rs.5
PET bottle 1000 ml	Rs.10
PET bottle 1500 ml	Rs.15
PET bottle 2000 ml	Rs.20
Total	Rs.25800000/- @ rate of average price of Rs.10/ for a production capacity of 2580000 bottles /Annum

## PROFIT PER YEAR

$$\begin{aligned}\text{Sales per year} - \text{Cost of production per year} &= 25800000 - 16000000 \\ &= \text{Rs. } 9800000/-\end{aligned}$$

## NET PROFIT RATIO ON SALES

$$\begin{aligned}\text{Profit (per year) / Sales (per year)} * 100 \\ &= 9800000 / 25800000 * 100 \\ &= \mathbf{37.98\%}\end{aligned}$$

## Rate of return

$$\begin{aligned}\text{Profit (per year) / Total Capital Investment} * 100 \\ &= 9800000 / 14290700 * 100 \\ &= \mathbf{68.57\%}\end{aligned}$$

## BREAK EVEN ANALYSIS

Fixed Cost per annum		
A	Interest on investment @ 18%	2572326
B	Depreciation of dies, jigs, fixtures, furniture, Office equipment @ 20%	60000
C	40% of wages & salaries	65760
D	40% of other expenses (except rent)	14800
	Total	<b>2712886/-</b>

$$\begin{aligned}\text{BEP} &= \frac{\text{Fixed Cost}}{(\text{Fixed Cost} + \text{Profit})} * 100 \\ &= \frac{2712886}{(2712886 + 9800000)} * 100 \\ &= \mathbf{21.68\%}\end{aligned}$$

## **LIST OF MACHINERY & RAW MATERIAL SUPPLIERS**

1. Dunamis Machines

No. 4/516C, Upparapalayam Road, Alamathi  
Red Hills, Chennai - 600052, Tamil Nadu, India

2. M/S Boolani Engineering Corporation Prabhadevi Indl Estate , 402,  
Veer Savarkar Marg,Mumbai-400025

3. M/S Pet Plat India

18,Astal Road, Bhakri Pali Road,,Bhakri, Faridabad ,Haryana-121001

### **RAW MATERIAL**

1. M/S Chemco, Chemco House,6th Floor, D.Sukhadwala Road Fort, Mumbai

2. M/S Premier flexi Plast ,C-608,DSIDC Indl. Area, Narela, Delhi

3. M/S Nirmal Pet,467,Indl Area, Mohali, Punjab

4. M/S Mittal Plastic Products,G-8,Bawana Indl. Area,Sector-3,Bawana New  
Delhi-110039