सत्यमेव जयते

MSME

MICRO, SMALL & MEDIUM ENTERPRISES

सूक्ष्म, लघु एवं मध्यम उद्यम

Development & Facilitation Office

Product	**:**	**PET Bubble Top Cans (20 liter)**
Quality Standards	**:**	**IS: 15410:2003**
NIC Code	**:**	**22203**
Installed Capacity	**:**	**650000 Bottles**
Net Profit Ratio	**:**	**53.71%**
Break Even Point	**:**	**31.51%**
Year of preparation	**:**	**January 2023**
Prepared by	**:**	**Chemical Division**

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PET Bubble Top Cans (20 liter)

1. INTRODUCTION

Rapid urbanization, coupled with increased income levels of people, steady economic growth and large number of educated inhabitants and their mega events and modernity are some of the key factors for the consistent growth of Food and Beverage Industry. Every segment in the F&B Industry, such as soft drinks, juices, water, beer, alcoholic drinks, snack & nutritional foods, packaged food, etc are growing at double-digit CAGR for many years now. Due to this rapid growth and competition, each segment is redefining its technology needs for producing high quality products and to meet the demand in sizeable volume. Hence, the demand for innovative technology/ and various products in this sector is on the rise. PET packaging bottles have made it big in the area of soft drink, edible oil, water, ketchup, hair oil and other liquid consumer products packaging.

This project explains the details of a PET bubble top cans manufacturing unit.

2. MARKET

The rising trend of westernization, inflating disposable incomes and altering food patterns of consumers have increased the demand for bottled beverages, particularly in developing countries like India and China. Additionally, hectic lifestyles have enabled consumers to opt for on-the-go beverages.

Due to their flexibility, PET bottles can be molded into numerous shapes to improve their appearance and utility. For brand differentiation, manufacturers are focusing on unique packaging and different-sized packs which are spurring the demand for PET bottles with customized shapes, colors and designs.

Advancements in technology have created a positive outlook for the PET bottle market. For instance, manufacturers have introduced a plasma-based coating which makes PET bottles more impervious in nature. Apart from this, they have also started utilizing silver to increase the product shelf life. The outbreak of Covid-19 has fuelled an astonishing demand for PET in the packaging of food and beverages. Hygiene has become a serious concern that has prompted the superior

procurement of disposable items. The demand for PET stretch bottles in India is growing at the rate of 25 per cent per annum in volume.

The demand of Bubble top PET can is increasing on account of new customers being created for packaged drinking water. The per capita consumption of PET is very low in India at 0.3 kg compared to the global average of 2 kg. This shows that there is a significant growth opportunity for PET cans in India due to the rapid urbanization and innovative approach of the people. The demand is also due the fact that PET Bubble Top Cans is a substitute for glass, high-density polyethylene (HDPE) and polypropylene (PP) bottles.

3. BASIS AND ASSUMPTIONS:

- ✓ The basis for calculation of production capacity has been taken on a single shift basis on 75% efficiency,
- ✓ The maximum capacity utilization on single shift basis is for 300 days in a year. During the first year and second year of operations, the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity utilization from the third year onwards.
- ✓ The salaries and wages, cost of raw materials, utilities, rent, etc. are based on the prevailing rates in and around, Kerala. These cost factors are likely to vary with time and location,
- ✓ Interest on term loan and working capital has been taken @ 13% on an average. This rate may vary depending upon the policy of financial institutions/ agencies from time to time.
- ✓ The cost of machinery and equipment's refer to a particular make/model and the prices are approximate.
- ✓ The break-even point percentage indicated is of full capacity utilization.
- ✓ The project preparation cost, etc. Whenever required could be considered under the pre-operative expense.
- ✓ The essential machinery and equipment's required for the project have been indicated. The unit may also utilize common facilities available at MSME Technology Centres under the Ministry of MSME, Govt. of India, CFCs set up under the MSE-CDP scheme of Govt. of India in different clusters, common facilities set up by Govt. of India & State Governments to manufacture products conforming to International standards.

4. Implementation Schedule

The major activities in the implementation of the project have been listed and the average time for implementation of the project is estimated at 12 months:

Sl.No	Name of activity	Period in months (Estimated)
1.	Preparation of project report	1
2.	Registration & other formalities	1
3.	Sanction of loan by financial institution	2
4.	Placement of orders	1
5.	Procurement	1
6.	Electrification & installation	1
7.	Procurement of raw materials	1
8.	Recruitment of technical personnel	1
9.	Trial operation	5th Month
10.	Commercial operation	6th

Note: Many of the above activities shall be initiated concurrently. When imported equipments are required, the implementation period of the project may vary Procurement of raw materials commences from the 3rd month onwards.

5. Technical aspects

5.1 Process of Manufacturing

A remarkable transformation takes place when injection molded PET is stretched at the right temperatures and to the right extent. The long chains undergo strain-hardening and strain-induced crystallization, which gives the properly-made PET bottle exceptional clarity, resistance to internal pressure, uniform wall thickness, toughness, and a host of other features.

Manufacturing containers with PET can be divided into two categories:

- One-Stage "hot preform" method
- and Two-Stage "cold preform" method.

The One-Stage Method

This method goes from PET granule to finished bottle on one integrated machine. This means the injection-moulded preform is withdrawn from the injection cavity while still hot enough to be stretch blown to form the bottle. No extra heating is required, and since preforms are not stockpiled to be blown at a later date, but are freshly moulded every time, there is no risk of surface damage from preforms

knocking together during storage or transportation. One-Stage method is suitable to small and medium scale production lines.

The Two-Stage Method

This method uses two separate machines. The Two-Stage system uses two separate machines: an injection molding machine for making the preforms, and a reheat blow moulding machine to reheat the preforms from a cold state and blow the bottles. The requirement for a preform heating system means the Two-Stage process has a lower thermal efficiency. This method is most suited to medium to large-scale production units. This project profile is prepared based on the of two stage method.

i) **Drying of PET**: PET absorbs moisture from the atmosphere. This must be removed by a dehumidifying drying process before processing.

ii) Plasticizing the PET : Dried PET pellets are compressed and melted by a rotating screw.

iii) Injection Molding the PET Preform : Molten PET is injected into the injection cavity and cooled rapidly to form a "preform" (The test-tube-like form from which bottles are blown is known as a preform).

iv) Heating the PET Preform

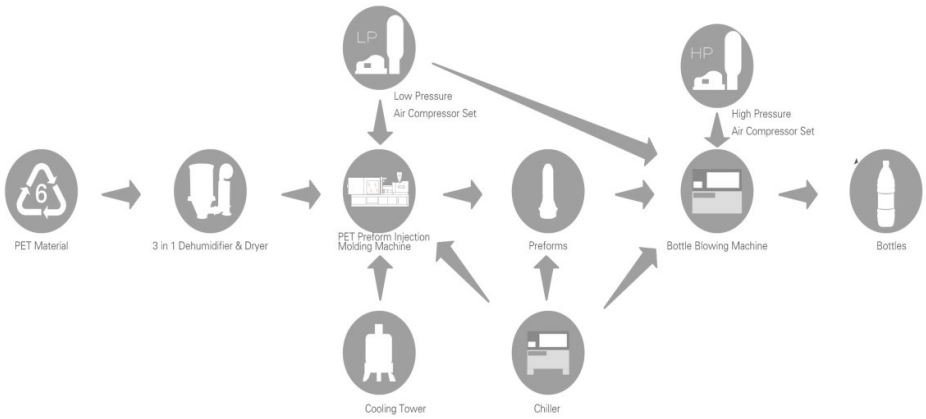
The temperature of the preform is adjusted to the correct profile for blowing.

v) Stretch Blow Molding of PET Container

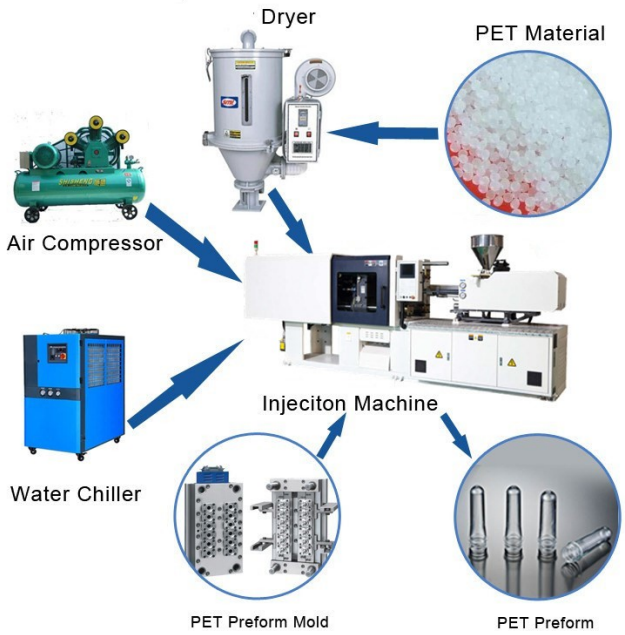
The hot preform is simultaneously stretched and blown (thereby orienting the crystals of and strengthening the PET) into a shaped blow mould to form a tough, lightweight container. PET that is heated to a temperature where its chain-like molecules are sufficiently mobile to uncoil instead of breaking when extended, can be oriented by stretching. Stretching applied from two directions at right angles, as in stretch blow molding, gives biaxial orientation. Oriented PET contains closely packed chains aligned in the directions of stretch. The material is stronger because the molecules act together instead of individually. The tensile strength of oriented PET is several times that of the un stretched material and the impact strength, barrier and chemical resistance are also significantly improved, so bottles can be lighter without sacrificing performance.

PET Container/Bottle Ejector

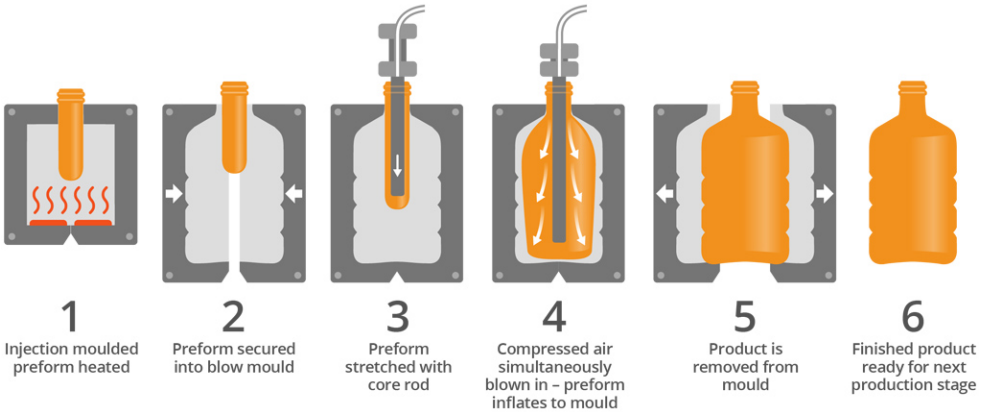
The finished container is ejected.



PET Preform injection molding process



Blow Molding Process:



5.2 QUALITY STANDARDS

Plastic bottles container for packaged natural mineral water and packaged drinking water is being tested according to 15410:2003.

5.3 Production Capacity

Annual production capacity installed is 650000 bubble top PET bottles/cans. Annual working days is assumed as 300.

5.4 Pollution Control- Government accords utmost importance to control environmental pollution. The MSEs should have an environmental friendly attitude and adopt pollution control measures by process modification and technology. The unit has to adhere the pollution control norms of central and state pollution control boards.

5.5 Energy Conservation- With the growing energy needs and shortage coupled with rising energy cost, a greater thrust in energy efficiency in industrial sector has been given by the Govt. of India. The Energy Conservation Act, 2001 has been enacted which provides for efficient use of energy, its conservation and capacity building of Bureau of Energy Efficiency created under the Act.

The following steps may help for conservation of electrical energy:

✓ Adoption of energy conserving technologies, production aids and testing facility,

✓ Efficient management of process/manufacturing machineries and systems, QC and testing equipments for yielding maximum Energy Conservation,

✓ Optimum use of electrical energy for heating during soldering process can be obtained by using efficient temperature controlled soldering and disordering stations,

✓ Periodical maintenance of equipments etc.

✓ Use of power factor correction capacitors. Proper selection and layout of lighting system; timely switching on-off of the lights; use of LED lamps etc.

5.6 Motive Power Requirement

1.	Electricity: Load of Injection Molding Machine per hour is 48.6 KW Load of Stretch Blow Molding Machine and ancillaries per hour is 35.5 KW Hence total load is 84.1 KW/H Total load for month is 50460 KW

5.7 Machinery Utilization

It's assumed that the production capacity is 60% of Installed capacity. Annual production capacity installed is 650000 bubble top PET bottles/cans.

6. FINANCIAL ASPECT

A. LAND & BUILDING REQUIREMENT

The unit may preferably be located in such a place where all infrastructural facilities viz. transportation, power, communication etc. are available. An area of 50 cents of land @ Rs. 23000/ cent on lease basis at any Industrial area are to be procured. Total cost of land is around Rs.11, 50,000/-. An area of 5000 sq.ft is required for production; storage of raw material, storing finished product, laboratory and office is required. It has been assumed that the average cost of construction would be Rs 1400 per sq. mtr. Therefore the total cost for land and building is approx. Rs.81, 50,000/-

B. PLANT & MACHINERY

Sl.No	Description	Quantity	Value in lakhs
1.	Injection Molding machine (including excise duty, CST, transport, insurance) Injection unit-90mm, Injection capacity max. (PET)-4372 gms, Injection Pressure-1276 bar, Injection rate-677 cc/sec, Screw dia-110mm, screw L/D ration-20, screw speed-61rpm, plasticizing rate-130 gm/sec, total heat capacity-55.5 kW, clamp force-350 ton, clamp stroke-1060mm, mould height (min/max)-600/300mm, Platen size (HxV)-1010 x 1010mm, Ejector stroke-200mm, Ejector force-8.9 ton, Total oil tank capacity-1130 ltr, Machine dimension (Lx WxH)-9.02 x 2.10 x 2.78, Machine weight-17900 kg	1	75.00
2.	Semi Auto PET stretch blow molding machine Infrared conveyorised preheating system, conveyorised speed variable drive, PLC based on 16 bid Micro Controller display interface via 320 x240 graphic display process on line control, Preform	1	14.00

	Indexing, Preform Holder-01 sets, set of tools and operation manual for hydro pneumatic and micro processor Air recovery system (including excise duty, CST, transport, insurance)		
	Ancillary equipments		
3.	Mould-4 cavity-20 liter preform	1	20.00
4.	Cooling tower- 40 TR with Pump	1	2.00
5.	Dehumidifier for PET with loader	1	11.00
6.	Chiller for mould cooling-12 liter	1	6.20
7.	Blending unit	1	2.00
8.	Grinder	1	0.75
9.	Compressor 20HP (High Pressure)	1	1.25
10.	Compressor 20HP (Low Pressure)	1	1.00
11.	Water chiller air cooled-2TR	1	1.15
12	20TR cooling tower	1	0.75
13	Refrigerator Air Dryer (High Pressure)	1	1.00
14.	Refrigerator Air Dryer (Low Pressure)	1	0.75
16.	Testing Equipments		10.00
17.	Erection & Electrification 10% of cost of machinery		14.69
18.	Office equipment & furniture		5.00
	Total		161.54

	TOTAL FIXED CAPITAL	
(LAND, BUILDINGS, PROCESS PLANT & MACHINERY ETC.)		
		Project Cost (Rs.)
1	Land & Building	8150000
2	Process Plant & Equipment	13685000
3	Preliminary & Pre-operative Expenses (12%) (Company Formation, Interest during construction, Pre-production expenses, etc.)	2620200
	Total	24455200 rounded to 25000000

C. WORKING CAPITAL

a) RAW MATERIALS:

Main raw material is Polyethylene Terephthalate (PET) confirming to IS: 12252. PET is supplied by the resin manufacturers in the form of small pellets, each about 0.05 grams. The advantages of PET are Crystal Clear; Pure; Safe; Good Barrier; Lightweight; No Leakage; Design Flexibility; Recyclable; Good Resistance; Long Shelf-life.

Raw material consumption per bottle:

Size	Weight	Cost
20 liter	700 gm	Rs. 80/kg

For manufacturing 20 liter bottle 700gm of PET is required. Thus for manufacturing 70 Jars (80% of installed capacity), approximately 50 kg of PET is required for an hour. Thus total 1200kg PET is required per day. For a month (25 working days) 30000 kg PET is required. Therefore total cost of raw material is approx. Rs. 2400000/-

b) SALARIES & WAGES

Sl. No	Designation	No	Monthly	Total
1	General Manager	1	35000	35000
2	Production Manager	1	25000	25000
3	Machine Operator / Helper	8	10000	80000
4	R&D, Testing	2	12000	24000
5	Marketing	2	25000	50000

	Manager & Sales Manager			
6	Clerical Staff	1	10000	10000
7	Other Staff	2	5000	10000
8	Maintenance (Elec. & Mech.)	1	10000	10000
	Total	18		244000
9	Fringe Benefits (20 % of the above)			48800
	Total		292800 rounded to 293000	

b) UTILITIES

Electricity: Load of Injection Molding Machine per hour is 48.6 KW Load of Stretch Blow Molding Machine and ancillaries per hour is 35.5 KW Hence total load is 84.1 KW/H Total load for month is 50460 KW	Unit costing is Rs.5.50 Hence total amount is around Rs.2,77,530/-
Water: 2000 liter for chiller and other works	1250/-
Total	**278780**

c) OTHER EXPENSES

1.	Postage and Stationery	2000
2.	Telephone & Internet	10000
3.	Transport and Traveling	20000
4.	Insurance for Machinery & Raw Materials	15000
5.	Miscellaneous	10000
6.	Advertisement & Publicity	5000
	Total	**62000**

TOTAL RECURRING EXPENDITURE PER MONTH:

Description	**Value (Rs.)**
Personnel	293000
Raw materials	2400000
Utilities	278780
Other contingent expenses	62000
Total	3033780
Working capital (Approximately working capital is estimated as 3 months recurring expenditure)	**9101340 say 9200000**

D. TOTAL CAPITAL INVESTMENT

1.	Fixed capital	25000000
2.	Working Capital	9200000
	Total	**34200000**

E. COST OF PRODUCTION PER ANNUM

1.	Working capital	9200000
2.	Depreciation of machinery and equipment @ 10%	1368500
3.	Depreciation of dies, jigs, fixtures, furniture, Office equipment @ 20%	100000
4.	Interest on investment @ 16%	5472000
	Total	16140500
	Rounded to	**16200000**

Turn-over per year:

It's assumed that the production capacity is 60% of Installed capacity

Items	Average Selling Price	Quantity	Amount
20 liter BT Jar	100	350000	35000000
			35000000

10. PROFIT PER YEAR

Sales per year – Cost of production per year = 35000000-16200000

= **Rs. 18800000/-**

11. NET PROFIT RATIO ON SALES

Profit (per year)/ Sales (per year) *100

=18800000/35000000 *100

= **53.71 %**

12. Rate of return

Profit (per year)/ Total Capital Investment *100

=18800000/ 34200000*100

= **54.97%**

13. BREAK EVEN ANALYSIS

	Fixed Cost per annum	
a	Interest on investment @ 16%	5472000
b	Depreciation of machinery and equipment @ 10%	1368500
c	Depreciation of dies, jigs, fixtures, furniture, Office equipment @ 20%	100000
d	40% of wages & salaries	1406400
e	40% of other expenses (except rent)	297600
	Total	8644500 rounded to 8650000

BEP = Fixed Cost/ Fixed Cost + Profit * 100

= 8650000/ 8650000 + 18800000 *100

= 8650000/27450000 * 100

= **31.51%**

14. Additional Information:

1 The project may be modified/ tailored to suit the individual entrepreneurship qualities/capacity, production programme and also to suit the locational characteristics, wherever applicable

2 The technology in this sector is undergoing rapid strides of charge and there is a need for regular monitoring of the national and international technology scenario. The unit, may therefore, keep abreast with new technologies in order to keep them in pace with the developments for global competition

3 Quality today is not only confined to the product or service alone. It also extends to the process and environment in which they are generated. The Zero Defect &

Zero Effect (ZED) certification system should be adopted which is a quality management system and environmental management system for acceptability at international level. The unit may therefore adopt ZED certification to meet the challenges of global competition. For more details visit https://zed.msme.gov.in

4 The margin money recommended is 25% of the working capital at an average. However the percentage of margin money varies as per bank's discretion.

5 Govt. of India has introduced an online free registration portal for MSMEs https://udyamregistration.gov.in. Udyam registration enables MSMEs to avail various benefits from Government, financial institutions and supporting agencies.

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