Pre-feasibility Study

BLOWMOLDING PLASTIC PRODUCTS

June 2021

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Small and Medium Enterprises Development Authority
Ministry of Industries and Production
Government of Pakistan

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1 PROJECT PROFILE

1.1 Purpose of the Documents

This document is developed to provide the entrepreneur with potential investment opportunity in setting up and operating a Blow Molding Plastic Goods Plant, manufacturing a variety of plastic items. This pre-feasibility gives insight into various aspects of a blow molding setup including both technical and general information. The document is designed to provide relevant details to facilitate the entrepreneur in making the decision by providing various technological as well as business alternatives. The document also allows flexibility to change various project parameters to suit the needs of the entrepreneur.

1.2 Project Brief

Plastic is a common name for Polymers: materials made of long strings of carbon and other elements. Each unit in a string is called a monomer, and is a chemical usually derived from oil. There are many different types of plastic, depending on the starting monomer selected, the length of polymer chains, and the type of modifying compounds added. Each plastic is developed for a special purpose. However the varied use of plastic in our everyday life has made it an integral component in almost everything. Plastic is used in everyday items like ballpoint pen, buckets, cups, glasses, water pipes, plastic bags to items of engineering excellence like cars and airplanes. According to some experts, around 350 kilograms plastic is used in every car manufactured in Germany. With such a high ratio of usage in developed countries, plastic has become a cheap but an important commodity.

Most of the plastic products are manufactured using two types of technologies. Blow molding and injection molding. The proposed project envisages the setup of a blow molding products manufacturing business. The setup will produce plastic products i.e. tumblers, bottles, canes, drums, water coolers etc. The manufactured products will then be sold in the local market to generate revenue.

1.3 Opportunity Rationale

The manufacturing of plastic products through blow molding business is a viable business provided that it is operated with a good business acumen that involves having a thorough knowledge and experience of the product range, technical requirements, operational procedures and also managing the jobs with the right type of technical manpower. When these factors combine with good and effective business development skills, the business is expected to give considerable profits which are expected to grow over the years.

1.3.1 Properties of Plastics

The numerous properties of plastics have made it possible to virtually make every product conceivable. Some properties of plastic that distinguishes them from other materials are:

- Attractive
- Hard
- Soft and rubbery
- Easy to clean
- Flexible
- Good insulators of heat or electricity
- Light weight
- Hygienic
- Easy to shape and color
- Economical and Recyclable

Apart from some of the properties of plastics mentioned above, one important feature of plastic is that it is a non-rusting material which makes it a very usable commodity especially in coastal areas where there is a lot of humidity.

As stated earlier, the use of plastics is increasing all the time as they replace materials such as metal, wood, paper, ceramics and glass in a wide variety of uses. More over the overall demand and local supply gap that prevails in the market remains largely unmet which also provides opportunities for entering in to this business.

The following table gives an overview of some of the applications of plastics

POLYMER	PROPERTIES	TYPICAL APPLICATIONS
ABS	Toughness, Electroplatable	Home appliances, TV and computer parts, etc
POM	Low friction, low wear. Little change in impact strength with temp. Resistance to fatigue, free from biological attack but susceptible to UV radiation.	Bearing applications, gears, digit wheels, sprocket, chain, cams, carburetor body, aerosol parts etc.
PMMA	Excellent clarity & transparency Dimensionally rigid, Resistant to outdoor weathering.	Lamp covers, lenses, reflectors knobs, transparent panel knobs, covers.

POLYMER	PROPERTIES	TYPICAL APPLICATIONS
PPO	Excellent electrical properties flame resistant, good toughness, dimensionally rigid, resistant to detergent.	Electrical parts, TV back covers, car dashboards, and washing machine parts.
PA	Wear resistant, tough, low friction, low fatigue, withstand temp. Electrical insulation property.	Bearings, gears, electrical socket plug, cooling fan, power tool housing, safety belt parts, bathroom fittings, etc.
PC	High impact strength, excellent clarity, good dimensional stability good weathering resistant, low moisture absorption, high heat deflection temperature.	Replacement for glass, Transparent covers for instrument panel, lighting application, safety helmet, car lamp housing, goggles, lenses, food mixer parts, computer parts, connectors.
PES	Lower flammability, excellent electrical properties, excellent long term load bearing properties at elevated temperature, good toughness.	Aircraft parts, electrical parts, automobile parts, microwave, dishes, grills, dishwasher parts, hair drier parts, projector fan.
PET	Polyester resins combine excellent mechanical, electrical and thermal properties with very good chemical resistance and dimensional stability.	Bottles, Cans, largely used for mineral water and liquid bottling purposes
PBT	High rigidity, ultra-low water absorption, excellent electrical properties, withstands high temperature under load.	Electrical components, lamp housing, fuse cases, pump housing, toaster parts, and hairdryer parts.
PPS	Excellent electrical properties, arc resistant, withstand high temperature. good dimensional stability,	Connectors, terminal blocks, socket, coil former, relay parts, lamp holder, switches, carburetor parts, ignition plate.
PETP	High stiffness, excellent dimensional stability at elevated temperature, good electrical properties.	Rotary switches, contactors, circuit boards.
PP- Co polymer	High impact strength, Improved heat stability,	Luggage, housewares, toys, interior parts of car, washing m/c parts, bottle caps, disposable syringe, crates, battery boxes, bobbins, dyeing cones.
PEEK	Excellent long term bearing properties at high temperature of 200 degree C., strong, rigid, tough, excellent abrasion resistant.	Wire coating, parts for aerospace application.

POLYMER	PROPERTIES	TYPICAL APPLICATIONS
SAN	Excellent optical properties, tough, no weather resistant,	Cup, picnic items, tray, cutlery, cassette storage racks, dials, cosmetics containers,
TPU	Flexible, durable, oil resistant.	Seal, washers, rollers, watch straps, shoes soles.

Some most common applications of commodity plastics in our everyday life are:

APPLICATION OF COMMODITY PLASTICS		
HDPE	High Density Polyethylene	Bottle crates, containers, house ware
LDPE	Low Density Polyethylene	Toys, bottle caps, lids, bowls, shopping bags
PS	Polystyrene	Toys, containers, tape cassettes, disposable cups, transistor cabinet, appliance housing
CA	Cellulose Acetate	Toys, pen, handles for tools
RPVC	Rigid Polyvinyl Chloride	Pipe fittings, guttering, plumbing items
SPVC	Soft Polyvinyl Chloride	Washers, soft tubes, soles, heels, footwear

1.4 Plastic Industry & Market Overview

The plastics processing industry is prominent in every aspect of modern life. As new polymers and composite materials are introduced by the chemical industry, the industry is constantly refining and adding products to those that have been made over many decades. In its early years, the plastics industry greatly benefited from the substitution of plastic for other materials including various metals, wood, paper, glass, cardboard and natural fibers, etc. However, as a mature industry, the possibilities for substitution are limited, leading to greater dependence on economic growth and the expansion of demand in plastic's existing markets. The industry is also vulnerable to volatility in the global price of oil and gas feed stocks, used by the chemical industry to produce its raw and semi-finished materials.

The leading markets for plastics are in packaging, building and construction and the automotive/transport industries, all of which have generally been buoyant. However, a number of other industries which use some form of plastic, e.g. the textile, clothing, electrical, electronic, mechanical engineering and agricultural industries, have experienced a profound downturn in demand, as they struggle to adjust to changes in the market for their products and against a rising tide of imports.

1.4.1 The Plastic Industry in Pakistan

Pakistan, being the third fastest growing economy in Asia with a staggering real GDP growth rate of 4% is poised for vibrant growth that will bring the nation in to an era of prosperity. The manufacturing sector alone registered 13% contribution to the total GDP and has grown with 6.0% during 2019-2020[1].

The food and beverages industry is considered to be one of the nation's largest industrial sectors, accounting for 27% of country's total production and 16% of total employment in manufacturing sector. The co-related industry of Plastic, Printing & Packaging drives benefit from the food products manufacturing. The industry attracted average FDI amounting to more than US$ 233 Million during last decade, all contributing to an exceptional export growth by 6% in 2020.[2]

Adding further strength to the industrial progress, Pakistan has established successful export markets for its processed foods, plastic and packaging goods. In foreign markets including countries like United States, Afghanistan, Canada, Turkey and United Arab Emirates; Pakistan is strategically well placed to target the all-important local and international buyers in one of the world's largest trading regions.

1.4.2 Plastic Consumption

According to “Need Survey for Plastic Injection Mould Industry in Pakistan” recently conducted by the Japan International Cooperation Agency (JICA), the increase in demand for plastic materials has resulted in the enhancement of domestic production and import of moulds. The per capita plastic consumption in Pakistan has lately risen to 6.5 kilograms, but is still very low when compared with international average consumption of 38 kilograms per person.[3]

[1] Economic Survey of Pakistan – 2019-2020

[2] TDAP.

[3] Pakistan Plastic Manufacturers Association

1.4.3 Market Players

There are some 6,000 plastic manufacturers in the country and 600,000 people are directly and indirectly engaged with this business. The plastic industry falls in cottage industry and there are some manufacturers, who are medium-sized industries.[4]

1.4.4 Plastic Trade in Pakistan

Pakistan imports 80-90 percent raw material from different countries, and at present there are four companies that producing raw material for the industry. The Engro Polymer & Chemicals Pvt. Ltd has leading production of plastic raw material of 300,000 Metric tons in 2018-19 and it plans to expand its capacity to 400,000 Metric Tons, Secondly Pak Petro chemicals produces 100,000 metric tons, Gatron Industries has 235,000 metric tons and lastly Novatex has production of 50,000 metric tons of plastic raw material to meet the need of local plastic industry. There are some small scale raw material manufacturers as well, who are producing 25,000 to 30,000 tons annually.

The total consumption of raw material used in the plastic industry in the country is around 1.7 Metric tons. The country imports 70 percent raw material from UAE and Far Eastern countries. The special grade raw material is imported from Germany and USA, china which is 20 percent of total raw material consumption.

1.5 Key Success Factors/Practical Tips for Success

The three main critical success factors that affect the decision to invest in the proposed business setup are:

i) <u>Related Experience</u>

The entrepreneur must have considerable experience of the plastic industry wherein he / should be able to identify the changing environment both at the demand and the supply side and react accordingly. Molds are very expensive; therefore the entrepreneur needs to choose molds only for those products for which demand is expected to rise in the future.

Related industry experience is also required where purchase of raw material is being considered. Prices of HDPE / PP plastic resins are directly related to petroleum prices which are very dynamic.

[4] Pakistan Plastic Manufacturers Association

ii) Marketing Skill

Another critical factor is that the entrepreneur must have effective PR & marketing skills. These marketing skills will enable the entrepreneur to carryout business development activities to target his potential customers and also to maintain his existing client base. Contacts with relevant distributors and major wholesale / retail outlets and markets play a crucial role in business development.

iii) Toll Manufacturing / Contract Manufacturing

Considering the price competition and the possibility of decreasing margins at retail level, many plastic good manufacturers have adhered to toll manufacturing where they are subcontracted by large companies to manufacture product parts like refrigerator parts, AC vents, grills etc. Although the margins received initially might not be significant but the volume of business is considerably large which makes up for the low margins. The margins tend to be very significant if the manufacturer possesses an expensive mold which is not available quite easily in the market. A strong referral base needs to be established in order to get such contracts.

1.6 Proposed Business Legal Status

Although the legal status of business tends to play an important role in any setup, the proposed blow molding goods manufacturing business is assumed to operate on a sole proprietorship basis which may extend to partnership or Pvt. Ltd Company, in case of addition of new products that might add significant business to the existing setup.

1.7 Project Investment

This section will provide the total cost of the project.

ITEM	COST (RS.)
Plant & Machinery	4,140,000
Office Furniture	280,000
Working Capital	3,498,000
Raw Material Inventory	796,660
Preliminary Expenses	350,000
Security Deposit Rent	1,000,000

ITEM	COST (RS.)
Vehicles	1,200,000
Total	**11,264,660**

1.8 Proposed Product Mix

The proposed project is assumed to manufacture the following items using HDPE for Blow molding:

- Water Cans
- School Bottles
- Toll Manufacturing
    - Lubricant Oil Cans
    - Pesticide Bottles

It is desirable to have a vast array of products where most of the plastic manufacturers have at least 20 to 25 different product categories running in their production line, but initially the entrepreneur, needs to be careful in choosing the product mix of the right type and size that has the greatest acceptability such that the sales volume generated is able to cover the mold costs required for each separate item.

Considering this factor, it is proposed that the entrepreneur produces plastic goods for the above mentioned product categories will follow the product mix given under:

ITEM	SIZE	COLOR VARIANT
Water Cans (Refrigerator)	• 1.5 liters • 2.5 liters	• Blue & Red • Blue & Red
School Bottles	• Normal Size	• Blue & Red
Lubricant Oil Cans	• 1.5 liters • 3 liters • 4 liters • 10 liters	• Blue & Red • Blue & Red • Blue & Red • Blue & Red
Pesticide Bottles	• 250 Grams • 1 liters • 4 liters • 10 liters	• Blue & Red • Blue & Red • Blue & Red • Blue & Red

One important factor to consider here is that the entrepreneur must have the requisite skills to decide on whether to introduce a new product or add a new size to the existing product both of which require the purchase of an additional mold. Hence the experience of the entrepreneur will play an important role in determining the course of action.

1.9 Recommended Project Parameters

Yearly Capacity	Human Resource	Equipment	Location
45% Capacity Utlization	Management Staff (6) Techincial Staff (30)	Local	Industrial Area

Financial Summary			
Project Cost	**IRR**	**NPV**	**Payback Period**
11,264,660	45%	Rs8,469,995	3.8 Years

1.10 Proposed Location

The recommended area for the proposed business setup will be in an Industrial Area. The main reason for such a location is dependent on the availability of all provisions necessary for the production process.

2 MACHINERY & EQUIPMENT

An extrusion blow-molding machine consists of an extruder that melts the plastic and forms it into a molten tube (called a parison or preform) through a conventional-type die and a split-body mold. The die closes around the parison, sealing both ends, and a blow pin is inserted into the parison to inflate it, causing it to expand and confirm the shape of the mold cavity. Again, the mold is cooled and once the part has solidified, the mold opens and the part is removed. Extrusion blow-molding is a continuous process that is used to mostly to manufacture small, thin-walled parts but can produce parts as large as 44-gal drums.

An injection blow-molding machine consists of a number of stations with various devices at each station. In one such machine in the first station, the mold is closed and, with the aid of a mandrel, a hollow injection-molded preform is created. (A mandrel is a piece of steel that allows a hollow to be formed in extrusion or injection molding by filling the part of the cavity that would otherwise be filled by the melt. It is sometimes called a tongue.)

The mold then opens and the hot and soft preform is indexed to the blow station on the machine, where the final shape mold closes. Air is introduced through the mandrel to inflate the part to conform to the internal cavity of the mold. Once cooled, the mold opens, and the part is indexed to the ejection part of the machine where the finished part is removed from the mandrel.

Blow Molding Machine

Crusher

In plunger type machines all the heat for melting the plastic is supplied by external heaters. In screw type machines the shear heating of the resin between the screw flights provides a large contribution to heating and barrel heaters are used to produce complete melting and for controlling the final temperature of the melt, as in most injection molding machines. The spreader or torpedo is used to produce uniform flow around machine component peripheries and to produce desired flow-induced molecular structure.

2.1 Blow Molding Molds

In addition to the mold cavity which determines part geometric characteristics, blow molding molds have many features that influence process operation, efficiency and effectiveness in terms of part quality. Coolant flow channels are provided to accelerate part cooling and so reduce cycle time. In blow molding the general intent is to cool the part to a suitable ejection temperature as quickly as possible. In the production of performs in injection blow molding the coolant may be heated to a temperature lower than the melt temperature but high enough so that the preform can be directly transferred to the blowing station with no, or little, temperature conditioning.

There are raised regions on the die face to pinch off and seal the parison before blowing. Recessed regions are provided for flash to flow into, and so minimize the potential for mold separation due to flashing. Mold inserts are separate components fitted to the mold to produce specific features, e.g., a thread insert used to produce threads on the neck of a

container. Vents are small channels, perhaps with a porous plug at the mold wall end, to allow air to escape from between the part wall and mold surface.

Since blow molding pressures are relatively low compared to other molding operations, mold material strength is not as important and a large proportion of molds are made from high strength aluminum alloys. However, mold wear may become a problem. Plated steel and beryllium-copper are alternative materials for molds or these more wear-resistant materials can be used for various components of aluminum molds, e.g., inserts and pinch offs.

2.2 Extruder

The extruder is a machine for producing more or less continuous lengths of plastic sections. Its essential elements are a tubular barrel, usually electrically heated; a revolving screw, ram or plunger within the barrel; a hopper at one end from which the material to be extruded is fed to the screw, ram or plunger; and a die at the opposite end for shaping the extruded mass. Extruders may be divided into three general types—single screw, twin-or multiple screw, and ram—each type has several variations. The major components of an extruder as follows:

2.2.1 Feed screw

As the only moving part in many extruders, feed-screws must do the job of moving the resins through the barrel chamber in a steady and predictable manner. As a result, and the feed-screw is critical to the design. There are at least three defined sections in a basic feeds screw, and if specifically engineered to accomplish a definite purpose, they can have additional sections.

1. The feed zone takes resin from the hopper and conveys it along. During the journey, resin pellets encounter friction from feed screw surfaces, barrel surfaces, and each other. This mechanical friction is about 85% of the required heat, so it is critical that the drive equipment to turn the screw have the HP capabilities to overcome friction and turn the feed screw at a steady and controlled rate. Some extruders can continue to plastic materials long after their external heat sources are shut down.
2. The compression zone is next. Here, the channel depth between screw flights diminishes and the result is to pressurize the now melting resin. Friction, barrel heating, and compression in this stage should complete the melting process. Two important design parameters are associated with this zone.

    - The compression ratio is measured as the channel depth at the end of this zone divided by the channel depth in the feed zone. Different compounds or operating pressures require different compression ratios.

- The length of the compression zone affects the rate of compression. These two parameters will be different for different compounds.

3. The metering zone has a constant channel depth and primarily exists to further mix molten resin. The end result is a smooth consistent melt with uniform temperature.

4. In some processes, a de-gassing or de-volatizing section is required. This is a shorter zone that immediately follows the compression zone. Channel depth is suddenly increased, and the resulting pressure drop causes a release of any gas, which can be vented or drawn off via vacuum pump. The remaining melt is re-compressed and metered.

Mechanical screw design also requires the selection of high-grade materials and precision machining. The screw must fit tightly in the barrel to prevent excessive back-flow or drag flow of resin due to excessive gaps between the screw flights and the barrel surface. It must not be so tight that it contacts the barrel surface itself, causing grooves and other damaging effects.

As if the tight tolerances were not enough of a challenge, some materials require extra processing and are best handled in twin-screw extruder. Here, two screws are tightly mounted in a "figure 8 " type barrel, and the screw flights are designed such that they avoid grinding each other during rotation. The screws can be designed to operate co- or counter-currently.

Co-current operation adds a degree of mixing to the process and would be advantageous where, for example, green and blue pellets need to be mixed as extrusion occurs to get a melt that has an aqua hue. The resin is carried from the first screw to the second between each flight.

Counter-current operation serves to convey the melt in a smooth predictable manner and helps eliminate pressure pulsing. Due to machining and operation demands, this equipment is more expensive to build and maintain than single screw extruders, so it is reserved for special extruding needs.

2.2.2 Barrel Chamber

This thick-walled steel chamber that is expected to withstand high pressures (20,000 psig), is precisely machined for a tight fit with the feed screw, and has a hardened steel alloy on its inside wall to prevent wear and corrosion. Some barrels will also have a grooved feed zone to increase the frictional forces on the resin.

The barrel also is heated to facilitate melting of the resin. Although the major contributor to melting is friction, the heat as conducted through the barrel can serve as a "fine adjust" or

Vernier in temperature control and energy input. Electrical resistance heating is a common method employed. Advantages are that several temperature zones can be set up with multiple elements, and temperature profiles can be created as material requirements vary. When thermal needs are not so complex, steam is heated via a jacketed barrel chamber. A jacketed chamber uses cooling water to prevent overheating of the melt in the vicinity of the die as well.

2.2.3 Dies

The opening that allows plasticized material to form particular shapes is also a highly engineered part. Dies are designed to compensate for effects of shrinkage when a melt re-solidifies, two dimensioned size adjustments, and varying rates of solidification. Dies must be free from defects and scratches; otherwise the melt could show the defect's pattern. The flow of melt to the die typically follows a tapered path, with the die having a thickness associated with it. (See figure 3) This results in the melt undergoing a pressure drop as it exits the die, and this prevents unwanted build-up at irregular places along the die, which would spoil the product.

Dies can take on a variety of shapes and have adjustable openings. In the case of filament extrusion and others, multiple duplicate die patterns to extrude many strands in parallel can be found on a single die.

2.2.4 Other Equipment

There are other parts of the extruder that deserve a brief mention.

Different hoppers are used for different purposes. Feed hoppers hold and supply resins to the feed screws. Motor driven helical screws or vibrators help eliminate any bridging or arching of the resins that prevent the smooth flow from the hopper to the feed zone.

Mixing hoppers upstream of the feed hoppers compound any needed plasticizers and fillers to the required specifications.

Melt pumps can smooth the effects of pressure fluctuations that otherwise would result in uneven extrusions and resulting off-spec products. These help out in cases where multiple dies are on a machine, and can be individually closed off on the fly. The downside of melt pumps is their expense, plus they are extra moving parts that must be maintained in good condition.

As an alternative to a melt pump, there is a feed screw design variation that adds an additional zone with screw flights with a reverse pitch from the other sections. This serves to act as a surge suppressor

2.2.5 Power Transmission Equipment

As mentioned before, the feed screw is the moving part and it must be driven. Operation in a steady and predictable manner is vital to making quality extrusions. As friction represents about 85% of the energy used in heating resins, this also means that the power transmission equipment must be capable of supplying the energy to overcome this friction, particularly if starting from rest or recovery from a maintenance outage.

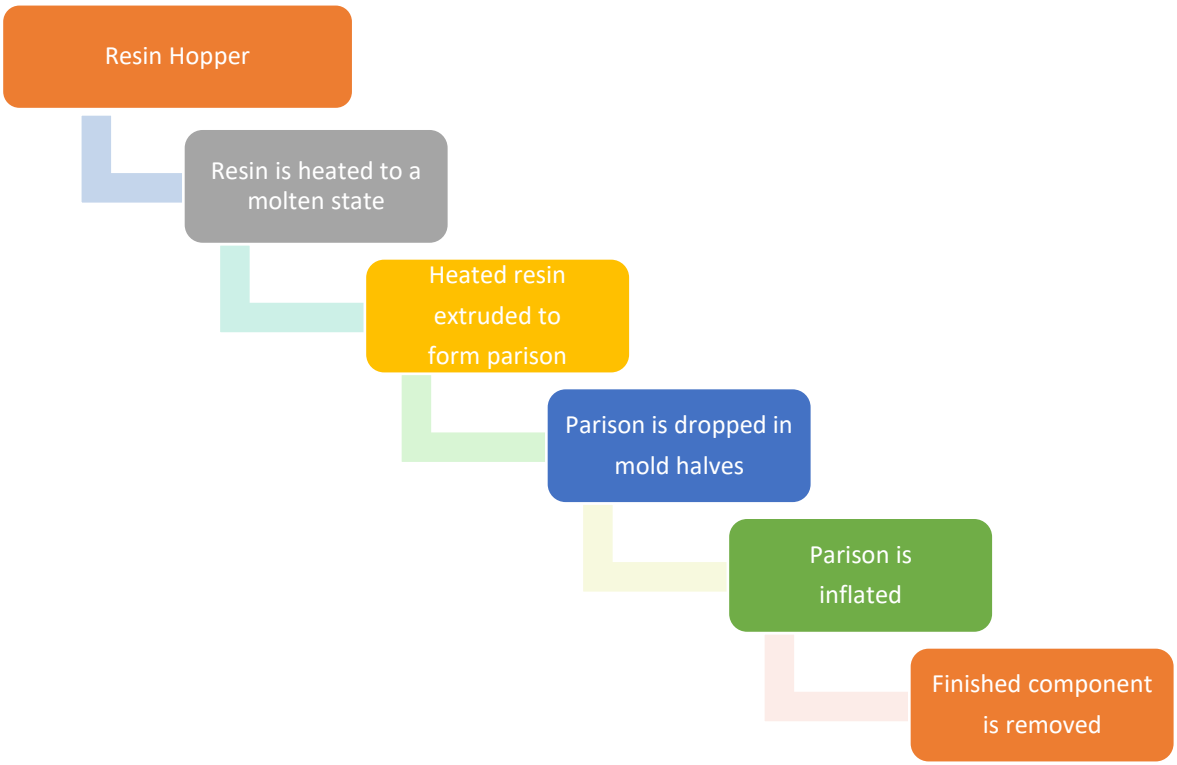
Good speed control is extremely important to assure that adequate resin is being fed to the process. However the ability to maintain even pressures to get consistent flow is equally important. Good response to torque changes as well as steady speed control of high friction loads is the challenge

2.3 Tips for Purchasing a Mold

The mold is the most expensive component requiring considerable investment which is sometimes higher than the cost of the machinery itself. Therefore as discussed earlier, the molds need to be carefully chosen based on product acceptance production ease. Some of the following points should be considered when selecting the mold:

- **Cavity Size** of the injection molding machine is the major factor when deciding on the mold. The larger the cavity capacity the greater the adjustability of large sized molds for large products. For example an injection mold machine with 75 ounce cavity capacity cannot accommodate a 100 ounce mold. It is preferred that the mold should be at least 10 ounce less than the cavity size.
- **Mold Area & Structure** is another important factor to consider since it is not necessary that the mold size fits in the cavity as the dimensions of the mold also need to be in congruence with the cavity dimensions. The length width and depth of the mold needs to be in line with the cavity dimensions.
- **Tie Bars** are the strongholds that firmly grip the mold such that it remains unmoved during the impact. The distance between the tie bars which holds the mold and their relative properties need to be considered in order to avoid mismatch and errors during the injection molding process.
- **Mold Opening Space** is the space required by the ejector mechanism to eject the product, in case the mold opening space is smaller than the mold, the ejector will not be able to eject the cooled product within the available space.

3 PROCESS FLOW



3.1 Production Process

The theory of blow molding can be reduced to six simple individual steps:

1. A thermoplastic resin is heated to a molten state
2. It is then extruded through a die head to form a hollow tube called a parison.
3. The parison is dropped between two mold halves, which close around it.
4. The parison is inflated.
5. The plastic solidifies as it is cooled inside the mold.
6. The mold opens and the finished component is removed.

3.2 Process Variations

There are basically four types of blow molding used in the production of plastic bottles, jugs and jars. These four types are:

1. Extrusion blow molding

2. Injection blow molding
3. Stretch blow molding
4. Reheat and blow molding.

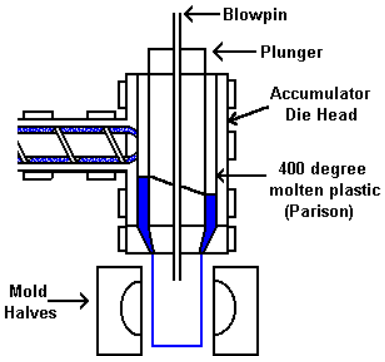
Extrusion blow molding is perhaps the simplest type of blow molding. A hot tube of plastic material is dropped from an extruder and captured in a water cooled mold. Once the molds are closed, air is injected through the top or the neck of the container; just as if one were blowing up a balloon. When the hot plastic material is blown up and touches the walls of the mold the material "freezes" and the container now maintains its rigid shape. Extrusion blow molding process has been used in the proposed project.

Injection blow molding is part injection molding and part blow molding. With injection blow molding, the hot plastic material is first injected into a cavity where it encircles the blow stem, which is used to create the neck and establish the gram weight. The injected material is then carried to the next station on the machine, where it is blown up into the finished component.

Stretch blow molding is perhaps best known for producing P.E.T. bottles commonly used for water, juice and a variety of other products. There are two processes for stretch blow molded P.E.T. containers.

The reheat and blow molding process (RHB) is a type of stretch blow process. In this process, a preform is injection molded by an outside vendor. There are a number of companies who produce these "stock" preforms on a commercial basis. Factories buy the preforms and put them into a relatively simple machine which reheats it so that it can be blown.

Whether using the injection stretch blow molding process or the reheat and blow process, an important part of the process is the mechanical stretching of the preform during the molding process. The preform is stretched with a "stretch rod." This stretching helps to increase the impact resistance of the container and also helps to produce a very thin walled container. Following diagram gives a simple pictorial illustration of the blow molding process.



3.3 Color Pigmentation

Attractive plastic products are key elements that appeal to the customer, since similar products vary nominally amongst various manufacturers. Usually the production manager decides on the color in consultation with the owner and then develops the pigment mix in terms of quantity and quality to meet the desired color schemes. The color pigments are then bought from the market and added to the plastic resins which are then churned in the coloring machine. Once the resins are colored according to the desired intensity, they are dried and cooled before being subsequently poured into the injection molding machine.

3.4 Raw Material Requirement

Most commodity grade and engineering grade resins may be blow molded, but the most common is polyethylene, which is used for food or chemical or detergent bottles. PET or polyester is used for clear beverage bottles such as water bottles or the familiar 2-liter beverage bottles. EVA is a rubber-like material used for blow molded parts. Generally the list includes: HDPE, PET, Polypropylene, LDPE, PVC, Polycarbonate, ABS, EVOH, LLDPE, TPO, PBT, Nylon, TPE, ABS/PC Blend, Polystyrene, K-Resin®, MDPE, PUR, PETG and PPO.

It is expected that a total of 700kg resin will be required on monthly basis by the production facility. Whereas, for raw material purchase, a number of resin suppliers are located in Bolton Market, Karachi and can be contacted for the procurement of raw material.

3.6 Production Capacity

The production capacity depends on two main things

- Cooling Cycle Time
- Raw Material Weight

Based on the above two factors and keeping in view the products to be produced, the yearly production output (at 45% capacity utilization)for the proposed project will be as follows:

Item	Size	Units
Water Cans	1.5 liters 2.5 liters	70,200 46,800
School Bottles	Normal Size	42,120

Item	Size	Units
Lubricant Oil Cans	1.5 liters 3 liters 4 liters 10 liters	70,200 46,800 42,120 35,100
Pesticide Bottles	250 Grams 1 liters 4 liters 10 liters	140,400 70,200 46,800 28,080

It is suggested that at least two machines be deployed for toll manufacturing purposes on which the margins tend to be relatively higher. Such contract manufacturing orders can be secured for various commodities like Oil cans and drums, plastic containers for various FMCG products etc.

4 LAND & BUILDING REQUIREMENT

The space requirement for proposed business is around 200 yards in any area where all utilities and facilities are properly available. The rented building will easily allow the accommodation of the recommended machines and also allow space for material and finished goods storage.

The detail of space allocated as per requirement is given in the following table:

DETAILS	SIZE (SQ. FEET)	RENT (COST IN RS / SQUARE FEET)	TOTAL CONSTRUCTION COST (RS)
Production Hall	1,000	60	60,000
Warehouse and tool Finished Goods	1000	60	60,000
Factory Office	100	60	6000
Total	**2,100**		**126,000**

The production facility will be a tin sheets covered shade with elongated boundary walls. This type of setup will cost minimum for the entrepreneur and will also help reducing temperature of the premises.

4.1 Office Furniture & Equipment

A total of Rs. 280,000 will be required for purchase of office furniture and related equipment. The following table gives the assumed breakup:

OFFICE FURNITURE		
ITEM	**NUMBER**	**ESTIMATED COST (RS.)**
Table & Chair Set (Owner)	1	30,000
Table & Chair Set (Customer Service)	1	25,000
Table & Chair Set (Office Staff)	3	45,000
Air Conditioner (Split Unit)	1	70,000
Waiting Chairs	10	50,000
Sofa Set for Customers	1	40,000
Curtains / Interior Décor	-	20,000
Total		**280,000**

The Office Furniture & Equipment will be depreciated at the rate of 10% per annum according to the diminishing balance method for the projected period.

5 MACHINERY & EQUIPMENT

Based on the number and type of products to be produced by the proposed Blow molding setup, the following machinery will be required:

S. No.	Machine	Qty.	Unit Cost	Total Cost	Local/Imported
1	Blow Molding Machine	6	350,000	2,100,000	Local
2	Crusher 14"	1	350,000	350,000	Local
3	Molds	8	80,000	640,000	Local
4	Lathe Machine 8 Ft	1	650,000	650,000	Local
5	Support structure (cutter, batteries, etc.)			250,000	Local
Total Machinery Cost				***3,990,000***	***Rs.***

The above table gives the details of the machinery and molds required along with their cost for each commodity to be produced. In case of 10 liter size output bottle, the one large size machine is enough with customized mold. These molds are locally available and can be

customized according to the customer requirements. The proposed machinery will be based on extrusion process technique and will be semi-automatic. For Installation and other charges Rs. 150,000 are allocated. For machinery purchase, following supplier can be contacted.

For Machinery
Kashif Yousuf Engineering works
Khurshid enter, Typhoon Street, Ghas Mandi, Karachi
Ph.: 021-32734319, 021-32778419
Cell No. 0321-2105616(Yousuf), (0321-2281819(Kashif)

For Molds:
Mr. Saleem / Mr. Tahir/ Mr. Tariq
All types of Molds Manufacturer
Phone: 021-32727737
Cell: 0300-2342702, (Mr. Saleem), 0312-8561448(Tahir), 0333-0356311(Tariq)

5.1 Office Vehicles

One small (second hand) trucks acting as light carrier vehicle would also be needed for transporting raw materials and finished goods. For this purpose, Rs. 1,200,000/- has been assumed. The vehicle will depreciate at a rate of 10% annually.

6 HUMAN RESOURCE REQUIREMENT

The human resource requirement for the general and management staff would be as follows:

GENERAL MANAGEMENT		
DESIGNATION / TYPE	**NUMBER**	**MONTHLY SALARY (RS.)**
Owner	1	-
Accountant	1	25,000
Purchaser	1	25,000
Office Assistant	1	20,000
Store / Warehouse Keeper	1	20,000
Driver	1	20,000
Guard (24 Hour)	1	20,000
Total	**7**	**130,000**

Considering the size of the proposed establishment it is assumed that the owner would be managing the overall affairs of the plastic molding setup. An accountant is required to

process and check bills, invoices, receivables management, maintain accounts, etc. for external and internal reporting. The accountant is required to update records and ensure safe custody of store keys.

The purchaser would be primarily responsible for making daily purchases; raw material purchases and other purchases as and when required. The purchaser would also assist the accountant in the safe custody of all inventories in the storeroom. The office assistant would be responsible for handling customers & complaints, following-up on bills and managing all day to day activities. Two round the clock security guards would be required for ensuring security for the overall premises.

The following table gives the details for the proposed technical labor that forms the integral part of the total employee payroll:

TECHNICAL MANPOWER		
DESIGNATION / TYPE	**NUMBER**	**MONTHLY SALARY (RS.)**
Production Manager	1	40,000
Production Assistant	1	30,000
Shift Supervisor	3	90,000
Color Operator	1	25,000
Electrician	2	50,000
Hydraulic Technician	1	25,000
Machine Operators	6	150,000
Helpers	15	300,000
Total	**30**	**710,000**

The Production Manager and Production Assistant should have considerable knowledge about polymer technology and properties preferably with diploma in plastic technology with 5 to 7 years' experience for the former and 2 to 3 years for the latter. The machine operators should also have relevant experience of handling and operating injection molding machines and plastic processing.

7 FINANCIAL ANALYSIS & KEY ASSUMPTIONS

The project cost estimates for the proposed Blow Molding Setup have been formulated on the basis of discussions with relevant stakeholders and experts. The cost projections cover the cost of land, building, inventory, equipment including office furniture etc. The specific assumptions relating to individual cost components are given as under:

7.1 Revenue & Cost Projections

The Sales are expected to increase by 7% every year while the cost of raw materials is assumed to increase by 7%. The annual increase in revenue is expected to result from a part increase in capacity utilization and part increase in product price. However the price of the plastic resins (Co-PP) is usually linked with the petrochemical prices, therefore the entrepreneur is required to carefully negotiate the purchase price and manage the inventory level in coordination with the production personnel.

The prices used to calculate the gross revenue earned are based on the selling rate at which the entrepreneur will charge the distributor. These basic prices do not include the selling and distribution margins and the since these would depend on the negotiation with the distributor. The prices are also exclusive of the General Sales Tax.

7.2 Utilities Requirement

The following table presents the assumed breakup of utilities on a monthly basis:

UTILITY	MONTHLY CHARGES (RS.)
Electricity	250,000
Water	15,000
Gas	40,000
Fuel for Vehicle	10,000
Telephone	5,000
Total	**320,000**

As depicted above the machines require considerable power during the blow molding process, whereas gas and water also important in process, Electricity for Running of batteries of machine and crusher whereas, gas will be require to melt resins, while water will be used by the cooling system. It is assumed that utilities expenses will increase by 7% every year.

7.3 Depreciation on Machinery & Equipment

Depreciation on Machinery and Office Furniture & Fixtures is assumed to be at the rate of 10% per annum based on the diminishing balance method for the projected period.

7.4 Machine Maintenance

The Blow Molding Machines and molds have a long life however the maintenance cost of the machines are usually very high since they need to be oiled and cleaned regularly specially before installing a new mold or starting a fresh production process. The yearly maintenance cost has been taken to be 3% of the written down value of the machine.

7.5 Working Capital & Pre Operating Costs

It is estimated that an additional amount of approximately Rs. 7.2 million will be required as cash in hand to meet the working capital requirements / contingency cash for the initial stages. The requirement is based on the utilities, salaries and other expenses for three months and raw material inventory on beginning. The following table gives the break up.

ITEM	3 MONTHS COST (RS.)
Utilities	960,000
Salaries	2,130,000
Raw Material Inventory	796,660
Misc.	30,000
Rent	378,000
Total	**7,180,338**

7.5.1 Provision for pre-operating cost

The provision for pre operating costs is assumed to be Rs. 350,000 which will be amortized equally over a 5 year period.

7.6 Account Receivables

A collection period of one month is assumed for sales. Further provision for bad debts has been assumed equivalent to 1.25% of Gross Sales.

7.7 Raw Material Inventory

Based on our assumptions for the production facility, orders and availability of desired material, it would be necessary to maintain 15 days of resins and color pigment stock in order to cover any urgent order requirement per month. Based on discussion with existing stakeholders HDPE is by product of petrochemical and all import for foreign countries so must contain minimum level of material for continuity of production.

7.8 Finished Goods Inventory

The proposed project will maintain 15 days finished goods inventory in order to meet market supplies and booked orders.

7.9 Taxation

The tax rate applicable to sole proprietorship is the same as that of the salaried individual. Therefore, we are assuming that the tax rate would be the same for the proposed Blow molding setup.

7.10 Owner's Withdrawal

It is assumed that the owner will withdraw from the business once the desired profitability is reached from the start of operations. The amount would depend on business sustainability and availability of funds for future growth.

7.11 ANNEXURES

7.11.1 Summary of Key Assumptions
7.11.2 Cost and Revenue Sheet
7.11.3 Projected Income Statement
7.11.4 Projected Balance Sheet
7.11.5 Projected Cash Flow Statement

Summary of Key Assumptions

(in Pak. Rs.)

Sr. No.	PARTICULARS	TOTAL COST/DETAILS
	Fixed Capital	
	Plant & machinery	**4,140,000**
	Blow molding Plant (Local)	3,990,000
	Plant & machinery Installation & trial run expenses	150,000
	Vehicles	1,200,000
	Factory / Office Furniture	280,000
	Securty Deposit for Rent	1,000,000
	Preliminary Expenses	350,000
	Total Fixed Capital	**6,970,000**
	Working Capital	
	Utilities - Three Months (Office & Factory)	**960,000**
	1. Electricity/Month	250,000
	2. Gas, Furnace Oil and Lubricants	40,000
	3. Water/Month	15,000
	4. Telephone/Month	5,000
	5. Monthly Rent	**378,000**
	6. Diesel for Vehicle	10,000
	7. Salaries - Three Months (Production Staff)	2,130,000
	Raw Material Inventory	**796,660**
	Misc. Expenses - Three months (@ 10,000 /month)	**30,000**
	Total Working Capital	**4,294,660**
	TOTAL PROJECT COST	**11,264,660**
	Equity Financing	**11,264,660**
	Debt:Equity Ratio (0:100)	**100%**
	PROJECT RETURNS AND OTHER FINANCIAL INDICATORS	
	IRR	33%
	NPV	8,469,995
	Payback Period (Years)	3 Year 8 months
	Debt Equity Ratio	0:100'
	Required return on equity	20%
	OTHER ASSUMPTIONS	
1	Depreciation	10%
2	Plant and Machinery Annual Repair & Maintenance (as %age of total cost of plant)	7.00%
3	Selling & Distribution Expenses	10.00%
	INCREASE IN PRICE AND GROWTH	
4	Increase in the Price (Annual)	7%
5	Increase in other consumables price	7%
6	Factory & Office Renovation (in Year 5 & 10)	7%
	Factory Operations and Capacity Utilisation Assumptions	
	Capacity Utilisation at the beginning of the period	45%
	Increase in capacity utilisation (Annual)	3%
	Maximum Capacity Utilisation	Not limited
	Annual sales price increase	7%
	Operational Hrs./day	20
	Operational Days / Month	26
	Operational Months	12
	Annual Operational Days	312
	Economy related assumptions	
	Electricity charges grow th rate	7%
	Annual Rent Grow th	5%
	Increase in Salaries	7%
	Oil/Diesel and other consumables price grow th rates	7%
	Increase in Misc. Expenses	7%
	Cash Flow Assumptions	
	Sales on Credit - as %age of total	100%
	Provision for bad debts (only on 30% credit sales)	2.00%
	Raw Material Inventory	15
	Finished Goods Inventory (Days)	15

BLOW MOLDING PLASTIC PRODUCTS
COST AND REVENUE SHEET

1. REVENUE CALCULATION

Production

Estimated Optimal Production - monthly	17,500	KG
Expected Capacity Utilization (At the beginning of the project)	45%	
Annual Capacity Utilization Growth Rate	3%	

Expected Production at the beginning of the project	**7,875**	Kg per month

Sales prices of differe categories of Plastics

Water Cans	1.5 Litre	53	Rs./ unit
	2.5 Litre	67	Rs./ unit
Lubricant Oil Cans	1.5 Litre	53	Rs./ unit
	3 Litre	72	Rs./ unit
	4 Litre	96	Rs./ unit
	10 Litre	144	Rs./ unit
Pesticide Bottles	250 Grams	19	Rs./ unit
	1 Litre	41	Rs./ unit
	4 Litre	72	Rs./ unit
	10 Litre	144	Rs./ unit
School Bottles	Normal Size	50	Rs./ unit

Plastic Category	Weightage	No. of units produced	Production in Rupees	
Water Cans	1.5 Litre	70,200	3,715,518	Rs. / annum
	2.5 Litre	46,800	3,152,560	Rs. / annum
Lubricant Oil Cans	1.5 Litre	70,200	3,715,518	Rs. / annum
	3 Litre	46,800	3,377,743	Rs. / annum
	4 Litre	42,120	4,053,292	Rs. / annum
	10 Litre	35,100	5,066,615	Rs. / annum
Pesticide Bottles	250 Grams	140,400	2,702,195	Rs. / annum
	1 Litre	70,200	2,871,082	Rs. / annum
	4 Litre	46,800	3,377,743	Rs. / annum
	10 Litre	28,080	4,053,292	Rs. / annum
School Bottles	Normal Size	42,120	2,106,000	Rs. / annum

Gross Annual Sales	**38,191,557**	**Rs./ Annum**
Estimated Raw Material Inventory Cost	796,660	Rs
Estimated Finished Goods Inventory at the end of the Year	1,836,133	Rs
Total Realised Gross Annual Sales	**38,191,557**	**Rs.**
Sales on Credit **100% of the total**		
Sales on Cash		

2. COST CALCULATION

Description	Quantity	Cost	
Raw Material		**1,380,877**	Rs / Month
Electricity Consumption		**250,000**	Rs / Month
Gas Consumption		**40,000**	Rs / Month
Water Consumption		**15,000**	Rs / Month
Total Cost of Material and Electricity Consumed		**1,685,877**	***Rs. / Month***
TOTAL ANNUAL COST OF MATERIAL AND ELECTRICITY CONSUMED		***20,230,523***	***Rs. / annum***

BLOW MOLDING PLASTIC PRODUCTS

Projected Balance Sheet (Rs.)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
Current Assets											
Cash & Bank Balance	1,986,000	1,247,550	4,478,567	8,258,415	12,626,113	16,659,194	20,871,837	25,384,157	30,302,751	35,746,443	41,847,674
Raw Material Inventory	796,660	690,438	760,932	838,623	924,247	1,018,612	1,122,613	1,237,232	1,363,553	1,502,772	1,656,205
Finished Goods Inventory	0	1,836,133	1,964,662	2,102,188	2,249,341	2,406,795	2,575,271	2,755,540	2,948,428	3,154,818	3,375,655
Prepaid Rent Expense	1512000	1512000	1512000	1512000	1512000	1512000	1512000	1512000	1512000	1512000	1512000
Accounts Receivable	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	**4,294,660**	**5,286,121**	**8,716,162**	**12,711,227**	**17,311,701**	**21,596,601**	**26,081,720**	**30,888,928**	**36,126,731**	**41,916,032**	**48,391,534**
Fixed Assets											
Plant Machinery & Facility	4,140,000	3,726,000	3,353,400	3,018,060	2,716,254	2,444,629	2,200,166	1,980,149	1,782,134	1,603,921	1,443,529
Furniture & Fixtures	280,000	252,000	226,800	204,120	183,708	165,337	148,803	133,923	120,531	108,478	97,630
Vehicle	1,200,000	1,080,000	972,000	874,800	787,320	708,588	637,729	573,956	516,561	464,905	418,414
Total Fixed Assets	**5,620,000**	**5,058,000**	**4,552,200**	**4,096,980**	**3,687,282**	**3,318,554**	**2,986,698**	**2,688,029**	**2,419,226**	**2,177,303**	**1,959,573**
Other Asset											
Security Deposit	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**
Intangible Assets											
Preliminary Expenses	**350,000**	**280,000**	**210,000**	**140,000**	**70,000**	**-**	**-**	**-**	**-**	**-**	**-**
Total Assets	**11,264,660**	**11,624,121**	**14,478,362**	**17,948,207**	**22,068,983**	**25,915,155**	**30,068,419**	**34,576,957**	**39,545,957**	**45,093,335**	**51,351,106**
Owner's Equity	11,264,660	11,624,121	14,478,362	17,948,207	22,068,983	25,915,155	30,068,419	34,576,957	39,545,957	45,093,335	51,351,106
Current Liability		0	0	0	0	0	0	0	0	0	0
Long Term Liability	0	0	0	0	0	0	0	0	0	0	0
Total Equity & Liabilities	**11,264,660**	**11,624,121**	**14,478,362**	**17,948,207**	**22,068,983**	**25,915,155**	**30,068,419**	**34,576,957**	**39,545,957**	**45,093,335**	**51,351,106**

BLOW MOLDING PLASTIC PRODUCTS

Projected Income Statement (Rs.)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	**38,191,557**	**42,090,914**	**46,388,397**	**51,124,652**	**56,344,479**	**62,097,250**	**68,437,380**	**75,424,836**	**83,125,712**	**91,612,847**
Beginning Inventory	-	1,836,133	1,964,662	2,102,188	2,249,341	2,406,795	2,575,271	2,755,540	2,948,428	3,154,818
Ending Inventory	1,836,133	1,964,662	2,102,188	2,249,341	2,406,795	2,575,271	2,755,540	2,948,428	3,154,818	3,375,655
Gross Revenue	36,355,424	41,962,385	46,250,870	50,977,499	56,187,025	61,928,775	68,257,111	75,231,948	82,919,322	91,392,010
Sales on Credit	36,355,424	41,962,385	46,250,870	50,977,499	56,187,025	61,928,775	68,257,111	75,231,948	82,919,322	91,392,010
Sales on Cash	-	-	-	-	-	-	-	-	-	-
Bad Debt Expenses	727,108	839,248	925,017	1,019,550	1,123,741	1,238,575	1,365,142	1,504,639	1,658,386	1,827,840
Net (Adjusted Sales)	**35,628,316**	**41,962,385**	**46,250,870**	**50,977,499**	**56,187,025**	**61,928,775**	**68,257,111**	**75,231,948**	**82,919,322**	**91,392,010**
Cost of Sales	**29,290,523**	**31,990,259**	**34,945,281**	**38,180,227**	**41,722,154**	**45,600,773**	**49,848,713**	**54,501,815**	**59,599,447**	**65,184,858**
Raw material Cost	16,570,523	18,262,373	20,126,961	22,181,924	24,446,699	26,942,707	29,693,557	32,725,269	36,066,519	39,748,911
Other Production Cost	3,660,000	4,033,686	4,445,525	4,899,413	5,399,644	5,950,947	6,558,539	7,228,166	7,966,161	8,779,507
Labor (Production Staff)	8,520,000	9,116,400	9,754,548	10,437,366	11,167,982	11,949,741	12,786,223	13,681,258	14,638,946	15,663,672
Other Utilities	540,000	577,800	618,246	661,523	707,830	757,378	810,394	867,122	927,821	992,768
Gross Profit	**6,337,793**	**9,972,126**	**11,305,590**	**12,797,272**	**14,464,871**	**16,328,002**	**18,408,398**	**20,730,133**	**23,319,875**	**26,207,152**
Gross Profit Margin	**18%**	**24%**	**24%**	**25%**	**26%**	**26%**	**27%**	**28%**	**28%**	**29%**
General Administrative & Selling Expenses										
Salaries	1,560,000	1,669,200	1,786,044	1,911,067	2,044,842	2,187,981	2,341,139	2,505,019	2,680,370	2,867,996
Factory/Office Miscellaneous Expenses	120,000	128,400	137,388	147,005	157,296	168,306	180,088	192,694	206,182	220,615
Amortization of Preliminary Expenses	70,000	70,000	70,000	70,000	70,000	-	-	-	-	-
Depreciation Expense	562,000	505,800	455,220	409,698	368,728	331,855	298,670	268,803	241,923	217,730
Maintenance Expense	103,500	103,500	103,500	103,500	103,500	103,500	103,500	103,500	103,500	103,500
Selling & Distribution	3,562,832	4,196,239	4,625,087	5,097,750	5,618,703	6,192,877	6,825,711	7,523,195	8,291,932	9,139,201
Rent	1,512,000	1,587,600	1,666,980	1,750,329	1,837,845	1,929,738	2,026,225	2,127,536	2,233,913	2,345,608
Subtotal	***5,978,332***	***6,673,139***	***7,177,239***	***7,739,020***	***8,363,068***	***8,984,520***	***9,749,108***	***10,593,211***	***11,523,908***	***12,549,043***
Operating Income	**359,461**	**3,298,987**	**4,128,351**	**5,058,252**	**6,101,803**	**7,343,482**	**8,659,290**	**10,136,923**	**11,795,967**	**13,658,109**
Earnings Before Taxes	**359,461**	**3,298,987**	**4,128,351**	**5,058,252**	**6,101,803**	**7,343,482**	**8,659,290**	**10,136,923**	**11,795,967**	**13,658,109**
Tax	-	444,747	658,505	937,475	1,255,631	1,690,219	2,150,751	2,667,923	3,248,588	3,900,338
Net Profit	**359,461**	**2,854,241**	**3,469,845**	**4,120,776**	**4,846,172**	**5,653,264**	**6,508,538**	**7,469,000**	**8,547,379**	**9,757,771**
Monthly Profit After Tax	**29,955**	**237,853**	**289,154**	**343,398**	**403,848**	**471,105**	**542,378**	**622,417**	**712,282**	**813,148**
NP Margin	1%	7%	8%	8%	9%	9%	10%	10%	10%	11%

BLOW MOLDING PLASTIC PRODUCTS

Projected Statement of Cash Flows (Rs.)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cash Flow From Operating Activities											
Net Profit	0	359,461	2,854,241	3,469,845	4,120,776	4,846,172	5,653,264	6,508,538	7,469,000	8,547,379	9,757,771
Add: Depreciation Expense	0	562,000	505,800	455,220	409,698	368,728	331,855	298,670	268,803	241,923	217,730
Annual Rent Expense											
Amortization Expense	0	70,000	70,000	70,000	70,000	70,000	-	-	-	-	-
(Increase) / decrease in Receivables	-	0	0	0	0	0	0	0	0	0	0
(Increase) / decrease in RM	-	106,221	-70,494	-77,691	-85,623	-94,366	-104,000	-114,619	-126,321	-139,219	-153,433
(Increase) / decrease in FG Inventory		-1,836,133	-128,529	-137,526	-147,153	-157,454	-168,476	-180,269	-192,888	-206,390	-220,837
Increase / (decrease) in Payable		0	0	0	0	0	0	0	0	0	0
Net Cash Flow From Operations	**0**	**-738,450**	**3,231,018**	**3,779,848**	**4,367,697**	**5,033,081**	**5,712,643**	**6,512,321**	**7,418,593**	**8,443,692**	**9,601,231**
Cash Flow From Financing Activities											
Owner's Equity	11,264,660					-1,000,000	-1,500,000	-2,000,000	-2,500,000	-3,000,000	-3,500,000
Net Cash Flow From Financing Activities	**11,264,660**	**0**	**0**	**0**	**0**	**-1,000,000**	**-1,500,000**	**-2,000,000**	**-2,500,000**	**-3,000,000**	**-3,500,000**
Cash Flow From Investing Activities											
Capital Expenditure	-5,340,000					0					0
Factory/Office Furniture	-280,000										
Preliminary Operating Expenses	-350,000										
Raw Material Inventory	-796,660										
Rent	-1,512,000										
Security Deposit for rented space	-1,000,000										
Purchase of Land	0										
	0										
Net Cash Flow From Investing Activities	**-9,278,660**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
NET CASH FLOW	**1,986,000**	**-738,450**	**3,231,018**	**3,779,848**	**4,367,697**	**4,033,081**	**4,212,643**	**4,512,321**	**4,918,593**	**5,443,692**	**6,101,231**
Cash at the Beginning of the Period	**0**	**1,986,000**	**1,247,550**	**4,478,567**	**8,258,415**	**12,626,113**	**16,659,194**	**20,871,837**	**25,384,157**	**30,302,751**	**35,746,443**
Cash at the End of the Period	**1,986,000**	**1,247,550**	**4,478,567**	**8,258,415**	**12,626,113**	**16,659,194**	**20,871,837**	**25,384,157**	**30,302,751**	**35,746,443**	**41,847,674**

Small and Medium Enterprises Development Authority

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