

# Pre-Feasibility Study

## Plaster of Paris Tiles / borders, Trim & made-ups



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**Ministry of Industries & Production**

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## 1 INTRODUCTION TO SMEDA

The Small and Medium Enterprise Development Authority (SMEDA) was established with the objective to provide fresh impetus to the economy through the launch of an aggressive SME support program.<sup>1</sup>

Since its inception in October 1998, SMEDA had adopted a sector SME development approach. A few priority sectors were selected on the criterion of SME presence. In depth research was conducted and comprehensive development plans were formulated after identification of impediments and retardants. The all-encompassing sector development strategy involved recommending changes in the regulatory environment by taking into consideration other important aspects including financial aspects, niche marketing, technology up-gradation and human resource development.

SMEDA has so far successfully formulated strategies for sectors including, fruits and vegetables, marble and granite, gems and jewelry, marine fisheries, leather and footwear, textiles, surgical instruments, urban transport and dairy. Whereas the task of SME development at a broader scale still requires more coverage and enhanced reach in terms of SMEDA's areas of operation.

Along with the sector focus a broad spectrum of business development services is also offered to the SMEs by SMEDA. These services include identification of viable business opportunities for potential SME investors. In order to facilitate these investors, SMEDA provides business guidance through its help desk services as well as development of project specific documents. These documents consist of information required to make well-researched investment decisions. Pre-feasibility studies and business plan development are some of the services provided to enhance the capacity of individual SMEs to exploit viable business opportunities in a better way. This document is in the continuation of this effort to enable potential investors to make well-informed investment decisions.

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<sup>1</sup> For more information on services offered by SMEDA, please visit our website: [www.smeda.org.pk](http://www.smeda.org.pk)

## PURPOSE OF THE DOCUMENT

The objective of the pre-feasibility study is primarily to facilitate potential entrepreneurs in project identification for investment. The project pre-feasibility may form the basis of an important investment decision and in order to serve this objective, the document/study covers various aspects of project concept development, start-up, and production, finance and business management.

## 2 PROJECT PROFILE

The pre-feasibility is related to setting up Plaster of Paris tiles/boarders, Trims, medallions, Frieze & made-ups business highlighting its existing market scenario, the methodology and procedures involved in preparing the saleable products and then assessing the project profiles to give a clear concept of the project dynamics to SMEs for investment. The document highlights the marketing, management, and financial aspects required for the establishment and successful running of the project.

### 2.1 Project Brief

The project is related to the usage of Plaster of Paris to produce Tiles/ boarders, Trims, & Miscellaneous made-ups that is being utilized in the construction Industry for making roof designs, Ceiling & corner boarders, trims & medallions, Frieze, & miscellaneous other decorative items used in construction etc. Once the project starts, it could supply Plaster of Paris products of various designs addressing to the customized consumer needs & choices, hence proving its versatility & innovation. This document covers various business aspects of making plaster of Paris Tiles, boarders, Trims, medallions, Frieze & made-ups development, Start-up, Production, Marketing, Finance and Business Management.

The total project investment is Rs. 3.68 millions with a Project Internal Rate of Return (IRR) of 40 % against the Capital Cost (WACC) of 18%. The total project investment would be paid back in approximately 2.89 years.

### 2.2 HISTORY

In the early period of 1600s century Egyptians discovered the extraction of plaster of Paris from gypsum, while later on the Greeks started the use of this plaster of Paris for their construction purposes basically in their tombs and homes construction. The first scientific study on plaster was realized in 1768 by a French scientist named Lavoisier. In 1887, Le Chatelier, another prominent French scientist, was the first to study the hydration mechanisms of plaster. And then, plaster gradually became a fascinating research subject for scientists. In ancient India and China, renders in clay and gypsum plasters were used to produce a smooth surface over rough stone or mud brick walls.

History seems to indicate that, despite the name, plaster of Paris was invented by the Egyptians. It was used as an artistic decoration in many Egyptian tombs, and the Greeks

picked up the technique, using plaster in their own homes, temples, and works of art. Paris became synonymous with this type of plaster in the 1600s, the large deposit of gypsum made it easy to produce plaster of Paris. The substance was also used extensively in fireproofing; giving Parisian homes a distinctive appearance.

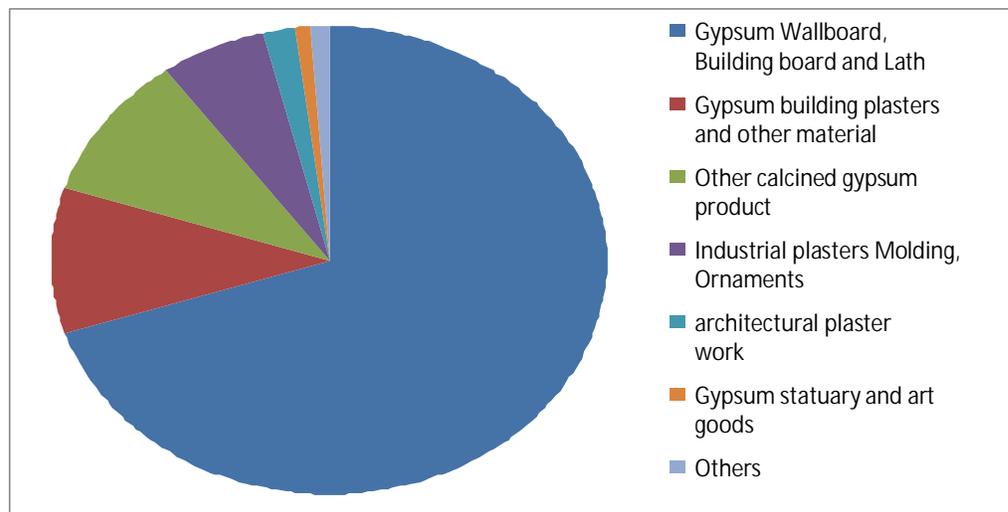
Plaster decoration was widely used in Europe in the middle Ages where, from the mid-13th century, gypsum was used for internal and external plaster. Hair was employed as reinforcement, with additives to assist setting or plasticity including malt, urine, beer, milk and eggs. In the 14th century, decorative trowelled plaster, called pargeting was used in South-East England to decorate the exterior of timber-framed buildings. This is a form of incised, molded or modeled ornament, executed in lime putty or mixtures of lime and gypsum plaster. During this same period, terracotta was reintroduced into Europe and was widely used for the production of ornament. In the 1700's, Paris was already the "capital of plaster" ("Plaster of Paris") since all the walls of wooden houses were covered with plaster, as a protection against fire.

### **Plaster of Paris usage in Art & Architecture**

Artists use plaster of Paris to create sculpture, make decorative items and as a painting surface. The Greeks and Romans used plaster to create replicas of their more famous artworks. The Egyptians perfected plaster casting methods and used them to make casts of the heads of the dead in order to recreate their likenesses. The use of finely ground gypsum plaster to create decorative molding was popular during the 18th and 19th centuries. Painting in fresco is the process of painting on a thin layer of wet plaster of Paris. A well-known example of fresco work is Michelangelo's ceiling in the Sistine Chapel. Plaster of Paris trim, medallions and friezes etc are used to bring a touch of old-world class, modern patterns & customized artwork to transform the plain ceilings/walls into desired designs to add value and sanctity to the building. Ceiling medallions made of plaster and wood were common accents in government buildings and upper class homes centuries ago.

Fig: 1 – Percentage of Gypsum usage in various products / services

Commodity	Percentage
Gypsum Wallboard, Building board and Lath	70
Gypsum building plasters and other material	10
Other calcined gypsum products	10
Industrial plasters Molding, Ornaments and architectural plaster work	6
Gypsum statuary and art goods	2
Others	1
	100



### 2.3 Defining Plaster of Paris

Gypsum has the very useful property of becoming plastic like mass when heated up to 175°C. At this temperature it loses about 3/4th of the water molecules. The product thus obtained is known as **Plaster of Paris**. It can be mixed with water, spread and cast into different forms and sizes. It can be mixed with expanded perlite and vermiculite and made into wall plaster and castings.

There are three qualities of Plaster of Paris used for making various items & for decorating purposes especially in construction industry are given as under;

Table 1: Qualities of Plaster of Paris

Type	Start of setting in	Setting time	Volume change
1.A-fast setting	2 min	15 min	+1%
2.B-regular setting	6min	30min	+1%
3.C-slow setting	20min	90min	+2%

Three grades of Plaster of Paris are generally known and manufactured:

- Surgical
- Technical
- Commercial

#### 2.4 *Plaster of Paris as Core Ingredient for its Made ups:*

Plaster of Paris is core raw material used for the making of Plaster of Paris Tile, Borders, Trims, Medallions and Misc Made ups. It is a sculpting material with a variety of decorative and practical applications. Plaster of Paris is inexpensive and simple to work with. It can be used to decorate a finished product with paint or embellish it with beads, stones and wire. Common uses for plaster of Paris include making castings for other artistic mediums, creating sculptures and making home décor objects.<sup>2</sup>

The Plaster of Paris is used in the following fields,

- Castings
- Architecture & Art
- Fireproof

#### **Castings**

One common use for plaster of Paris is to make decorative castings to be used as embellishments, jewelry charms and pendants. Select a flexible plastic mold from a craft store and apply a generous coating of a release agent to the mold before pouring the mixed plaster of Paris into it. Release agents can be common household supplies, such as petroleum jelly or nonstick cooking spray. Without a release agent, the plaster of Paris will be difficult to remove from the mold and will often break. Allow the plaster to set up in the mold for one hour, and then remove it. The molded plaster is still soft enough at this point to trim away any excess material from around the edges. Allow the cast piece to dry for at least 24 hours before decorating it.

#### **Art & Architecture:**

Plaster of Paris is used by artists for producing sculptures and decorative items and as a painting surface since ages. Today Plaster of Paris is being widely used in making abstract arts, canvas, sculptured paintings, wall paintings, decorative ceilings etc.

The Greeks and Romans used plaster to create replicas of their more famous artworks. The Egyptians perfected plaster casting methods and used them to make casts of the heads of

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<sup>2</sup> [http://www.ehow.com/list\\_6149563\\_common-uses-plaster-paris.html](http://www.ehow.com/list_6149563_common-uses-plaster-paris.html)

the dead in order to recreate their likenesses. The use of finely ground gypsum plaster to create decorative molding was popular during the 18th and 19th centuries. Painting in fresco is the process of painting on a thin layer of wet plaster of Paris.

A well-known example of fresco work is Michelangelo's ceiling in the Sistine Chapel. Plaster trim, medallions and friezes bring a touch of old-world class to your plain ceiling. Plaster of Paris usually dries hard but is relatively lightweight.

Plaster of Paris is also known as gypsum plaster. It is mainly used in architectures in historical monuments from the 16<sup>th</sup> century onwards. It is specially meant for decorative purposes. The modern plaster of Paris is used in the repair works of historic monuments. It is a wood substitute in the ancient world; for example, when wood became scarce due to deforestation on Bronze Age Crete, Plaster of Paris was employed in building construction at locations where wood was previously used. Due to its hardness & its unique characteristics of taking the shape of every mold type, it is widely used for home brewing and also as a filling agent in building cracks, holes, destroyed designed parts, etc.

Raised plaster stenciling added architectural elegance to stately homes and government buildings at the turn of the century. Artisans created beautiful plaster designs on the walls and ceilings of the White House in 1905. Raised plaster stenciling or relief stenciling is an elegant way to perk up any space. The designs can delicately accent wall and ceiling trims or add style to outdoor urns and furniture.

### **Fireproof:**

Plaster of Paris was use as fireproofing agent for protections from early decades. Plaster produces water vapor when it is exposed to fire thus slow down the spreading of fire<sup>3</sup>. It also acts as an insulator material to heat. Plasters have been in use in passive fire protection, as fireproofing products, for many decades. The finished plaster releases water vapor when exposed to flame, acting to slow the spread of the fire, for as much as an hour or two depending on thickness. It also provides some insulation to retard heat flow into structural steel elements that would otherwise lose their strength and collapse in a fire. Modern plasters fall into the following categories:

- Fibrous (including mineral wood and glass fiber)
- Cement mixtures either with mineral wool or with vermiculite

Gypsum plasters, leavened with polystyrene beads, as well as chemical expansion agents to decrease the density of the finished product.

The majority of plasters in current use within construction are based on retarded hemi-hydrate gypsum. The addition of different quantities of a retarding agent, usually keratin, is used to adjust the setting time for different products.

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<sup>3</sup> <http://www.tutorvista.com/chemistry/uses-of-plaster-of-paris>

## International usage of Moulds and Plaster of paris products:<sup>4</sup>

There are a variety of common molds for making Plaster of paris pieces:<sup>5</sup>

- **Baguette**<sup>6</sup> — Thin, half-round molding, smaller than an astragal, sometimes carved, and enriched with foliages, pearls, ribbands, laurels, etc. When enriched with ornaments, it was also called *chapelet*.
- **Bandelet** — Any little band or flat molding, which crowns a Doric architrave. It is also called a *tenia*.
- **Baseboard**, "base molding" or "skirting board" — used to conceal the junction of an interior wall and floor, to protect the wall from impacts and to add decorative features. A "speed base" makes use of a base "cap molding" set on top of a plain 1" thick board, however there are hundreds of baseboard profiles.
- **Batten or board and batten** — a symmetrical molding that is placed across a joint where two parallel panels or boards meet.
- **Bead molding** — narrow, half-round convex molding, when repeated forms *reeing*
- **Beading or bead** — molding in the form of a row of half spherical beads, larger than *pearling*
  - Other forms: Bead and leaf, bead and reel, bead and spindle
- **Beak** — Small fillet molding left on the edge of a larmier, which forms a canal, and makes a kind of pendant.
- **Bed molding** — a narrow molding used at the junction of a wall and ceiling. Bed moldings can be either sprung or plain.
- **Bolection** — a moulding which is raised, projecting proud of the face frame. It is located at the intersection of the different surface levels between the frame and inset panel on a door or wood panel. It will sometimes have a rebate (or rabbet) at the back, the depth of the difference in levels, so that it can lay over the front of both the face frame and the inset panel and can in some instances thus give more space to nail the moulding to the frame, leaving the inset panel free to expand or contract in varying climates, as timber is prone to do.
- **Cable molding or ropework** — Convex molding carved in imitation of a twisted rope or cord, and used for decorative moldings of the Romanesque style in England,

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<sup>4</sup> <http://www.gcmpinc.com/commonmolds.htm>

<sup>5</sup> [http://www.maragon.co.uk/arts-and-crafts.html?hl=en&source=hp&q=plaster+of+paris+%26+uk&meta=&aq=f&aqi=&aql=&oq=&gs\\_rfai=#Init](http://www.maragon.co.uk/arts-and-crafts.html?hl=en&source=hp&q=plaster+of+paris+%26+uk&meta=&aq=f&aqi=&aql=&oq=&gs_rfai=#Init)

<sup>6</sup> <http://www.aehf.com/articles/moldlist.htm>

France and Spain and adapted for 18th century silver and furniture design (Thomas Sheraton)

- **Cabled fluting** or **cabie** — Convex circular molding sunk in the concave fluting of a classic column, and rising about one-third of the height of the shaft
- **Casing** — Final trim or finished frame around the top, and both sides of a door or window opening.
- **Cartouche (French) *escutcheon*** — framed panel in the form of a scroll with an inscribed center, or surrounded by compound moldings decorated with floral motifs.
- **Cavetto** — **(Italian) *cavare***: "to hollow", concave, quarter-round molding sometimes employed in the place of the cymatium of a cornice, as in the Doric order of the theatre of Marcellus. It forms the crowning feature of the Egyptian temples, and took the place of the cymatium in many of the Etruscan temples.
- **Chair rail** — horizontal molding placed part way up a wall to protect the surface from chair-backs, and used simply as decoration.
- **Chamfer** — beveled edge connecting two surfaces.
- **Chin-beak** — Concave quarter-round molding. There are few examples of this in ancient buildings, but is common in more recent times.
- **Corner guard** — Used to protect the edge of the wall at an outside corner, or to cover a joint on an inside corner.
- **Cove molding** or **Coving** — a concave-profile molding that is used at the junction of an interior wall and ceiling
- **Crown molding** — a wide, sprung molding that is used at the junction of an interior wall and ceiling. General term for any molding at the top or "crowning" an architectural element.
- **Cyma** — molding of double curvature, combining the convex *ovolo* and concave *cavetto*. When the concave part is uppermost, it is called a *cyma recta* but if the convex portion is at the top, it is called a *cyma reversa*, When the crowning molding at the entablature is of the cyma form, it is called a cymatium.
- **Dentils** — Small blocks spaced evenly along the bottom edge of the cornice
- **Drip cap** — this is placed over a door or window opening to prevent water from flowing under the siding or across the glass
- **Echinus** — Similar to the ovolo molding and found beneath the abacus of the Doric capital or decorated with the egg-and-dart pattern below the Ionic capital
- **Egg-and-dart** — One of the most widely used classical moldings with egg shapes alternating with V-shapes and known from Ancient Greek temples (Erechtheion).

- Also: Egg and tongue, egg and anchor, egg and star
- **Fillet** — small, flat band separating two surfaces, or between the flutes of a column
- **Fluting** — Vertical, half-round grooves cut into the surface of a column in regular intervals, each separated by a flat *astragal*. This ornament was used for all but the Tuscan order
- **Godroon** or **Gadroon** — Ornamental band with the appearance of beading or reeding, especially frequent in silverwork and molding. It comes from the Latin word *Guttus*, meaning flask. It is said to be derived from raised work on linen, applied in France to varieties of the, bead and reel, in which the bead is often carved with ornament. In England the term is constantly used by auctioneers to describe the raised convex decorations under the bowl of stone or terracotta vases. The godroons radiate from the vertical support of the vase and rise half-way up the bowl.
  - Also: Gadrooning, lobed decoration, (k)nukked decoration, thumb molding
- **GUILLOCHE** — Interlocking curved bands in a repeating pattern often forming circles enriched with rosettes and found in Assyrian ornament, classical and Renaissance architecture.
- **Keel molding** — with a sharp edge, resembling in cross-section the keel of a ship. It is common in the Early English and Decorated styles.
- **Ovolo** — Simple, convex quarter-round molding that can also be enriched with the egg-and-dart or other pattern.
- **Picture Rail** - Functional molding installed 7–9 feet above the floor from which framed pictures and paintings are hung using picture wire and picture rail hooks.
- **Rosette** — Circular, floral decorative element found in Mesopotamian design and early Greek *stèle*. Part of revival styles in architecture since the Renaissance.
- **Scotia** — Concave molding with a lower edge projecting beyond the top and so used at the base of columns as a transition between two torus moldings with different diameters.
- **Screen molding** — this is a small molding that is used to hide the area where a screen is attached to the frame.
- **Shoe molding, toe molding** or quarter-round — often used at the bottom of the baseboard to cover a small gap or uneven edge between the flooring and the baseboard.
- **Torus** — Convex, semi-circular molding, larger than an astragal, often at the base of a column, which may be enriched with leaves or plaiting

- **Trim Molding** — A general term used for moldings that are used to create added detail or cover up gaps. They can include corner moldings, cove moldings, rope moldings, quarter rounds, and accent moldings.
- **Crown Pieces** — Crown pieces are most often used to decoratively finish off a room where the wall meets the ceiling. They are also used commonly at the top of kitchen cabinets.
- **Rop Pieces** — Rop pieces can also be used to create their own trimwork details, and are also a great way to add more dimension to crown pieces.

## 2.5 Opportunity Rationale

The construction industry plays an essential role in the socio economic development of a country. The activities of the industry have great significance to the achievement of national socio-economic development goals of providing infrastructure, sanctuary and employment. Housing construction is one of the largest sectors of most major economies in the world. The construction and sale of new homes make direct contribution to GDP, based on the value of the housing built.

Currently<sup>7</sup>, Pakistan has a serious housing crisis and needs about 7 million additional housing units now, according to the data presented at the World Bank Regional Conference on Housing. According to BMI research, the country's real estate sector continues to be dominated by the two major issues of a chronic shortage of housing against a backdrop of rapid urbanization and rising population, this creates a massive gap in the availability of houses and thus the demand for new housing is escalating.

The first of these factors remains as intractable as ever, with the most recent estimates identifying shortfall of 7.9mn houses. By some accounts, nationally there is an incremental demand for 700,000 units a year against the annual construction of just 150,000 units.

Construction is one of the most labor intensive economic activity requiring large numbers of workers, creating hundreds of thousands of jobs. And when the buyers move in, they will demand all kinds of products and services to furnish their homes, thereby creating further employment opportunities. All of this is offers a great recipe for reigniting economic growth and renewed prosperity in Pakistan.

Pakistan, with a population of more than 170 million people, has no formal gypsum plaster industry for construction purposes. According to the available literature, gypsum plaster and its products are energy saving, fire resistant, good insulating, cost effective and possess an excellent thermal, acoustical and aesthetic properties. Trends for the usage of Plaster of Paris tiles/boarders, Trims, medallions, Frieze & made-ups have increased in Construction

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<sup>7</sup> <http://southasiainvestor.blogspot.com/2009/12/pakistans-housing-and-economic-growth.html>

industry especially for decorative purposes. Gypsum plaster is widely used in the construction industry for construction purposes.

Due to the rising housing demand in the country and over all boom in the construction industry the potential for the growth of Plaster of Paris Tile, borders, trims, medallions & made ups business cannot be undermined.

### *2.6 Proposed Business Legal Status*

The business can be started as sole proprietorship or partnership because of great potential involved. Furthermore, comparatively fewer complications are involved in forming, administering and running the sole proprietorship or partnership businesses.

### *2.7 Proposed Product*

The manufacturer will make/produce different types of decorative items such as tiles, borders, trims, decorative cornices, ceiling roses / designs, false ceilings, columns, fire places and other made ups as per requirement of the customers.

### *2.8 Proposed Project Location*

The said project can be started in an Industrial Area. It is recommended to establish the project in an area where Raw Material is easily available. It may be in any Industrial Area of Lahore, Gujranwala, Karachi, Quetta or Islamabad. The proposed location of this Pre-feasibility is recommended to be Quetta since Quetta offers a somewhat diversified economy with an active construction sector. The abundant availability of raw material considerably increases the scope for establishment of the proposed project in the said region. Furthermore Quetta having dry weather almost round the year which is an added advantage because plaster of Paris deteriorates in very moist conditions.

From an international perspective the city has an edge to export to neighboring countries like Afghanistan and Baltic states.

### *2.9 Production Capacity*

The unit would have the capacity to process around 120,000 pieces of Plaster of Paris tiles, borders, trims & made-ups, however it is assumed that in first year of its operation the plant will produce around 84,000 pieces of Plaster of Paris tiles, borders, trims & made-ups at the rate of 70% capacity utilization. This production is based on single shift bases.

### *2.10 Project Investment*

The total project investment is Rs. 3.68 millions which includes Capital Cost of Rs. 2.42 million and working capital of Rs. 1.3 million. It is assumed that the project would be fully equity financed (100%).

### 2.11 Recommended Project Parameters

Table: 02: Project financial parameters

Capacity		Human Resource	Equipments/Tools	
120,000 pieces / year		10	Local Made	
Financial Summary				
Total Cost	IRR	NPV	Pay Back Period	Cost Of Capital (WACC)
Rs. 3.68M	40%	5.20 M	2.89 Years	18%

### 2.12 Environmental consideration

Working with Plaster is fairly safe if safety rules are observed when mixing plaster. Once hardened there is little or no hazard from handling plaster items;

- Plaster is very alkaline and exposure to high dust levels may irritate the skin, eyes, nose, throat, or upper respiratory tract. Wearing a dust mask, eye protection, and rubber gloves when mixing plaster reduces the risk.
- Contact lenses should be avoided when working with plaster.
- Plaster generates a lot of heat when setting – plaster should not be used for making casts of body parts.
- Plaster should be kept away from children and pets.

Air and water quality, noise pollution, disposal of waste and health care of the labors should be of minimum standard fall within the required principles and specifications.

### 2.13 Key Success Factors / Practical Tips for Success

- Easy set up of the business or unit.
- Availability of raw material in the local market.
- Availability of low price land / Rental premises for the establishment of the unit.
- Availability of locally made equipment, molds and spares.
- Increasing local trends towards use of Plaster of Paris items and its made-ups for decorative and construction purposes.
- Rehabilitation in Afghanistan.
- Availability of efficient labor.
- Easy transfer of the skills to the unskilled labors.

- Ample opportunity for exports.

#### 2.14 Strategic Recommendations

- Emphasizing on excellent services to its customers such as standardized products and timely order fulfillment.
- Focusing on strong marketing efforts for its products.
- Providing excellent after sales services to its customers.
- Providing latest designs of plaster of Paris items & if possible providing customized designs as per customer requirements.
- New equipments & latest design Molds (more No. of Molds) should be purchased in order to increase the Efficiency and Production.
- Adapting the rapid, social, economic and technological changes in order to avoid wastage of its raw material.
- Hiring of well-trained, specialized and experienced staff will add in the efficiency of the facility.
- Conducting periodical labors' skills development programs through trainings.
- Introducing team working concept in the business unit.
- Establishing sufficient monitoring and evaluation principles for the overall business activities of the unit.
- Using Fine quality Plaster of Paris Powder and other required items (certified through well reputed Laboratory) to get superior quality end product.
- Maintaining proper booking & Accounts of the business financials.

### 3 CURRENT INDUSTRY STRUCTURE

#### 3.1 Current Scenario

Plaster of Paris Tiles/ boarders, Trims, & Miscellaneous made-ups industry is pretty much aligned with the hype in the construction industry since the last decade. There are approximately twenty (20) small scale Plaster of Paris products manufacturing units in Quetta which are fully functional. Constructions of new housing schemes, public buildings and commercial shopping malls in the city have greatly increased the demand of Plaster of Paris decorative items. Therefore, it is very feasible to invest in the project since demand of the products is increasing as the construction industry in Balochistan is also growing. Furthermore, due to its uniqueness in deign/ patterns and low cost, trends of decorating homes with Plaster of Paris tiles, boarders, medallions etc have escalated throughout the province.

### 4 MARKET INFORMATION

#### 4.1 Utilization of Plaster of Paris

##### a. Use in Architecture:

Plaster of Paris made ups may also be used to create complex detailing for use in room interiors. These may be geometric (simulating wood or stone) or naturalistic (simulating leaves, vines, and flowers). These are also often used to simulate wood or stone detailing found in more substantial buildings.



##### b. Use in Arts:

Many of the greatest paintings in Europe, like Michelangelo's Sistine Chapel ceiling are executed in Fresco meaning they are painted on a thin layer of wet plaster, called intonaco (in fact the general term for plaster in Italian); the pigments sink into this layer so that the plaster itself becomes the medium holding them, which accounts for the excellent durability of fresco. Additional work may be added *a secco* on top of the dry plaster, though this is generally less durable.



Plaster may be casted directly into a damp clay mold. Creating this *moldmolds* (molds designed for making multiple copies) or *waste molds* (for single use) can also be made of plaster. This "negative" image, if properly designed, may be used to produce clay productions, which when fired in a kiln become terra cotta building decorations, or these may be used to create cast concrete sculptures. If a plaster positive was desired this would be constructed or cast to form a durable image artwork, which would be sufficient for stonecutters. If intended for producing a bronze casting the plaster positive could be further worked to produce smooth surfaces. An advantage of this plaster image is that it is relatively cheap; should a patron approve of the durable image and be willing to bear further expense, subsequent molds could be made for the creation of a wax image to be used in lost wax casting, a far more expensive process. In lieu of producing a bronze image suitable for outdoor use the plaster image may be painted to resemble a metal image; such sculptures are suitable only for presentation in a weather-protected environment.

Plaster of Paris expands while hardening, and then contracts slightly just before hardening completely. This makes plaster excellent for use in molds, and it is often used as an artistic material for casting. Plaster is also commonly spread over an armature (form), usually made of wire, mesh or other materials

Plaster of Paris made ups are often used in faux finishing to create textures for wall and furniture surfaces, as in Venetian Plaster and also in stenciling for raised details. For these processes, artists use limestone based plasters or new user friendly acrylic based plaster.

#### 4.2 Target Customers

The target customers for Plaster of Paris tiles, trims, borders, frieze, medallions and made ups include individuals, home furnishers, construction companies / contractors, architecture firms etc. Use of Plaster of Paris tiles & made ups makes a strong case for its manufacturing. In addition to Balochistan's own requirements, the items can also be exported to Afghanistan that is under rehabilitation & with an unprecedented construction boom.

#### 4.3 Market Potential

Demand for Plaster of Paris products is growing in Quetta due massive urban construction in the city. The increase in demand of Plaster of Paris products can be best tapped for economic benefits due to its affordable price, easy availability, cheap raw material, labor

availability, etc. since it is comparatively cheaper in cost than wood work, stone crafts and cement based designs etc.

The demand for Plaster of Paris products are continuously growing with the growth of construction industry. It is, therefore, imperative that a coordinated effort be made to improve quality & productivity of these products with innovative designs & idea in the country to serve the construction industry needs with the subsequent result of achieving job creation and economic growth.

#### 4.4 Market Entry Timing

Construction process is not affected by weather however, in winter the below freezing temperatures often slows it down. However, in few areas of the province the extreme cold weather slows down or sometimes even halts construction. However, the production process can be a round the year process.

It is proposed that the project should be started in spring so that it can achieve the required capacity in year one.

## 5 MANUFACTURING PLASTER OF PARIS ITEMS

### The Process Flow:

Plaster of Paris is used as an important raw material for making Tiles/ boarders, Trims, medallions, frieze, miscellaneous made-ups and decorative items etc.

The whole process of making Plaster of Paris decorative items is described below:

#### 5.1 Mold Oiling:

The process begins by initially applying an oil mixture on to the surface of the mould before pouring the liquid paste of the plaster of Paris. This oil mixture is used as a separating medium in order to easily extract the set Plaster of Paris shape (tiles, boarders, medallions, frieze etc) from the Mould. The oil mixture is prepared with the help of different ingredients, such as diesel, cooking oil, cutting oil, Mobile oil, water and Soap.

#### 5.2 Re-hydration (Filling of Mold with Plaster of Paris):

To make the paste of the plaster of Paris, water is added with plaster of Paris powder & mixed homogeneously with hands till a slurry paste is achieved, which is then ready to be poured in the plastic/fiber mold. When it solidifies it takes the shape of the mold & form tiles, ceiling boarders, medallions, frieze etc. The ratio of plaster of Paris powder & water is determined manually until a thick slurry paste is formed. The Plaster of Paris paste must be utilized immediately since it will set within few minutes and once it starts setting it cannot be utilized and will be wasted.

In this stage of production mold are partially filled with Plaster of Paris paste and spread on the mould so that every part of the mold receives equal proportion. Here the paste in the mould is leveled properly & some times the mold is tapped on the table/floor so that the paste reaches deep into every minute detailing of the design.

After leveling the surface, used Poly propylene plastic bags in which the powder plaster of Paris is supplied (or new ones purchased) are shredded in to strips and are spread & slightly dipped with hands on the partially poured plaster of Paris paste for the purpose of obtaining strength of the resultant piece of tiles, medallions, boarders, etc. Some manufacturers also use Coconut shell torn in to thread instead of Poly propylene (PP) bags which gives more strength then plastic. Since the coconut shells are expensive therefore, most of the manufacturers use the PP – Bags.

### 5.3 *Shaping & Treatment:*

After the plastic or coconut shell strips are dipped in the paste another layer of Plaster of Paris is poured to fill the mold & leveled by hand or a wood piece and surface is finalized.

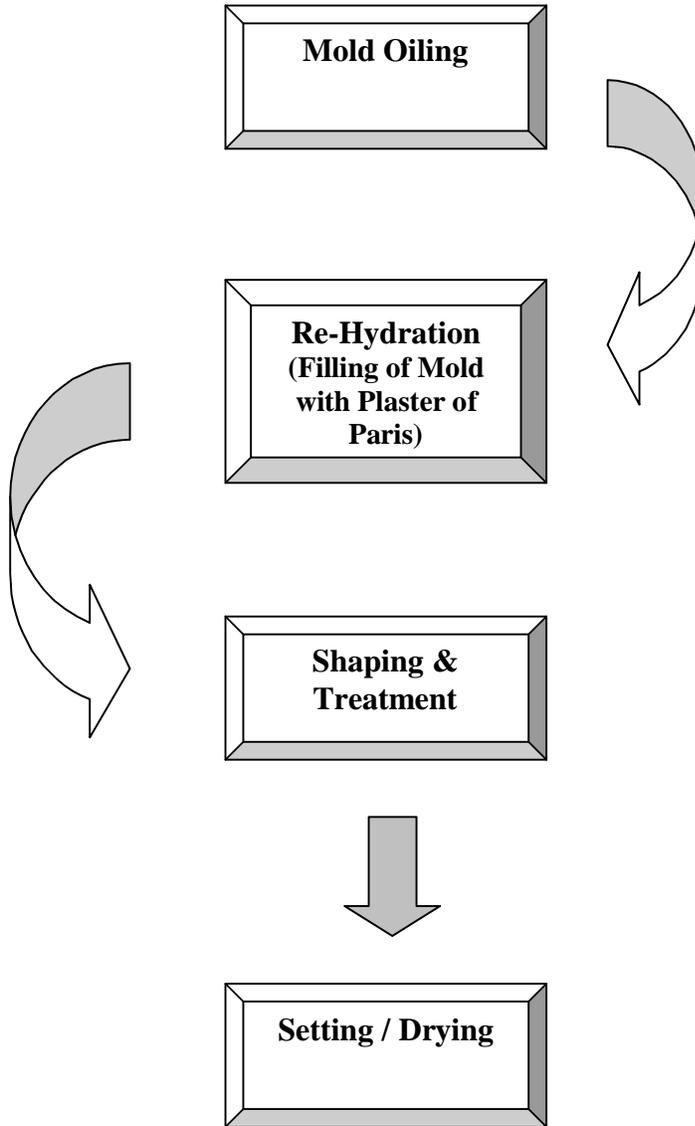
Here in this stage we fix hooks (made from iron wires) in all corners of the tiles. These hooks will aid in the installation or fixing of these tiles, boarders etc. on building ceilings.

### 5.4 *Setting / Drying:*

In this final stage the mold is left for setting for 5-20 minutes since plaster of Paris takes about 20 minutes to solidify. The set plaster of Paris is now extracted from the mould and placed in direct sunlight so that it gets complete dried. It may take 10-12 hours to completely dry out, consequent to the product's desiccation it is ready for sale, transportation, usage or installation.

5.5 **The production process of Plaster of Paris tiles / borders, trims and made ups:**

**Flow Chart:**



## 6 PROJECT INPUTS

Following are the basic requirements for Plaster of Paris products making.

### 6.1 Equipment & Tools

Table 6-1 Equipment & Tools Requirement

Description	Origin	Qty	Price/Unit	Total Price
Moulds	local	50	3000	150,000
Buckets	local	10	150	1,500
Iron Stands / tables	local	10	3000	30,000
Bowls	local	10	400	4,000
Oil Brushes	local	10	120	1,200
Misc. Tools	local	1	10,000	10,000
Water Tank (Plastic)	local	1	15,000	15,000
<b>Total</b>				<b>214,700</b>

### 6.2 Office Equipment

Table 6-2 Office Equipment

Description	Qty	Cost/Unit	Total Amount (PKR)
Computer	1	25,000	25,000
Computer printer	1	15,000	20,000
Office Stationary	1	1,000	2,000
Telephone with connection	1	2,000	2,000
<b>Total</b>			<b>49,000</b>

### 6.3 Furniture & Fixture

Table 6-3 Furniture and Fixtures

Description	Total Amount (PKR)
Furniture	25,000
Office Electric Wiring and Lighting	25,000
<b>Total</b>	<b>50,000</b>

### 6.4 Equipment Maintenance

All the Equipments / utensils / parts are available in Karachi, Lahore, Faisalabad, Gujranwala, Quetta and Peshawar.

### 6.5 Human Resource Requirement

The total human resource required for this project with their proposed / estimated monthly salaries is shown in the below table 8-1;

Table 7-1 Human Resource Requirement Details

Positions	Number	Salary / Month	Total Monthly Salary (Rs.)
Supervisor	1	15,000	15,000
Labor	5	10,000	50,000
Peon	1	7000	7000
Guards	2	7000	14,000
Driver	1	8000	8000
<b>Total</b>	<b>10</b>		<b>94,000</b>

### 6.6 Building Requirement

Building is proposed to be constructed for the project as per descriptions given in the table below:

Table 8-1 Civil Work Cost

Description	Area in Sq.ft	Cost/Sq.ft	Amount
Office (10'x12'), Control Room with bath room (6'x4')	168	1000	168,000
Manufacturing Sheds (50'x20')	1000	600	600,000
Boundary Wall	220	550	121,000
<b>Total</b>			<b>889,000</b>

### 6.7 Recommended Mode

It is recommended that the Plaster of Paris tiles, boarders and made ups business should be established in an area which is easily approachable to buyers. For differential marketing onsite supply of readymade products and onsite designing, manufacturing & its installation may be provided to the under construction buildings / houses. Latest computerized designs / patterns customized to customers needs, will boost the business.

### 6.8 Utilities and Infrastructure Requirement

Availability of all utilities is a requirement for the Plaster of Paris products business to operate.

## 7 PROJECT ECONOMICS

### 7.1 Project Cost

Description	Amount in (Rs.)
Land	780,000
Building/Infrastructure	889,000
Equipment & tools	214,700
Furniture & fixtures	50,000
Office equipment	49,000
Pre-operating costs	80,000
<b>Total Capital Costs</b>	<b>2,416,200</b>
Equipment spare part inventory	25,667
Raw Material inventory	712,250
Upfront Insurance Payment	28,410
Cash	500,000
<b>Total Working Capital</b>	<b>1,266,327</b>
<b>Total Investment</b>	<b>3,682,527</b>

### 7.2 Project Returns

Description	Equity	Project
IRR	40%	40%
MIRR	23%	23%
Payback Period (yrs)	2.89	2.89
Net Present Value (NPV)	5.18 million	5.18 million

### 7.3 Project Financing

Description	Percentage	Amount in Rs
Debt Financing	0%	
Equity Financing	100%	<b>3,682,527</b>
<b>Total</b>		<b>3,682,527</b>

## 8 FINANCIAL ANALYSIS

### 8.1 Project Cost

#### Financial Evaluation of Pre-feasibility Plaster of Paris Tiles, Boarders, Trims & Made-ups

SMEDA

##### Key Variables

Type of Machinery		Local
Total Investment in Project		3,682,527
Equity	100%	3,682,527
Debt	0%	-
Interest Rate		18%
Debt Tenure		5
Total Number of Employees		10

	Rs. in actuals									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Free Cash Flow to Equity (FCFE)	297,021	1,673,877	1,919,209	2,096,030	1,801,857	2,228,203	2,286,543	2,338,096	2,381,632	5,329,492
Free Cash Flow to Firm (FCFF)	297,021	1,673,877	1,919,209	2,096,030	1,801,857	2,228,203	2,286,543	2,338,096	2,381,632	8,723,365
Profit margin on sales	13%	15%	15%	15%	16%	15%	15%	14%	14%	14%
ROE	24%	27%	24%	20%	18%	15%	13%	12%	11%	10%

	Equity	Project
Internal Rate of Return (IRR)	40%	40%
Modified Internal Rate of Return (MIRR)*	23%	23%
Payback Period (yrs)	2.89	2.89
Net Present Value (NPV)	@ 18% 5,177,047	@ 18% 5,177,047

\*Re-investment rate has been taken to be the interest on cash in bank, which in this case is 4%

#### Statement Summaries

SMEDA

##### Initial Investment

Capital Investment	Rs. in actuals
Land	780,000
Building/Infrastructure	889,000
Equipment & Tools	214,700
Furniture & fixtures	50,000
Office equipment	49,000
Pre-operating costs	80,000
<b>Total Capital Costs</b>	<b>2,416,200</b>

Working Capital	Rs. in actuals
Equipment spare part inventory	25,667
Raw material inventory	712,250
Upfront insurance payment	28,410
Cash	500,000
<b>Total Working Capital</b>	<b>1,266,327</b>

<b>Total Investment</b>	<b>3,682,527</b>
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Initial Financing	Rs. in actuals
Debt	-
Equity	3,682,527

\* Provisioning for the first year installments

## 8.2 Projected Income Statement

Statement Summaries										SMEDA
Income Statement										Rs. in actuals
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	9,240,000	11,970,000	13,428,450	14,169,330	14,877,797	15,621,686	16,402,771	17,222,909	18,084,055	18,988,257
Cost of goods sold	6,540,600	8,463,835	9,543,587	10,166,036	10,775,998	11,422,558	12,107,912	12,834,386	13,604,450	14,420,717
Gross Profit	2,699,400	3,506,165	3,884,863	4,003,294	4,101,798	4,199,128	4,294,859	4,388,523	4,479,605	4,567,541
<i>General administration &amp; selling expenses</i>										
Administration expense	528,000	559,680	593,261	628,856	666,588	706,583	748,978	793,917	841,552	892,045
Utilities expense	15,600	16,536	17,528	18,580	19,695	20,876	22,129	23,457	24,864	26,356
Travelling & Comm. expense (phone, fax, etc.)	158,400	167,904	177,978	188,657	199,976	211,975	224,693	238,175	252,466	267,613
Office expenses (stationary, etc.)	63,360	67,162	71,191	75,463	79,991	84,790	89,877	95,270	100,986	107,045
Promotional expense	64,680	83,790	93,999	99,185	104,145	109,352	114,819	120,560	126,588	132,918
Insurance expense	28,410	23,802	19,193	14,585	9,976	29,021	23,217	17,412	11,608	5,804
Professional fees (legal, audit, etc.)	64,680	83,790	93,999	99,185	104,145	109,352	114,819	120,560	126,588	132,918
Depreciation expense	146,520	146,520	146,520	146,520	146,520	170,433	170,433	170,433	170,433	170,433
Amortization expense	16,000	16,000	16,000	16,000	16,000	-	-	-	-	-
Subtotal	1,197,125	1,288,786	1,362,539	1,427,710	1,495,800	1,599,701	1,675,334	1,755,725	1,841,152	1,931,910
Operating Income	1,502,275	2,217,379	2,522,324	2,575,583	2,605,998	2,599,427	2,619,525	2,632,798	2,638,453	2,635,631
Other income	25,940	65,358	137,220	217,525	295,483	376,084	466,379	558,872	653,266	807,489
Earnings Before Interest & Taxes	1,528,215	2,282,738	2,659,544	2,793,108	3,042,880	2,975,511	3,085,903	3,191,670	3,291,720	3,443,119
Interest expense	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	1,528,215	2,282,738	2,659,544	2,793,108	3,042,880	2,975,511	3,085,903	3,191,670	3,291,720	3,443,119
Tax	336,207	502,202	585,100	614,484	669,434	654,612	678,899	702,167	724,178	757,486
<b>NET PROFIT/(LOSS) AFTER TAX</b>	<b>1,192,008</b>	<b>1,780,535</b>	<b>2,074,444</b>	<b>2,178,624</b>	<b>2,373,447</b>	<b>2,320,898</b>	<b>2,407,005</b>	<b>2,489,502</b>	<b>2,567,541</b>	<b>2,685,633</b>
Balance brought forward		1,192,008	2,972,544	5,046,988	7,225,612	9,599,059	11,919,957	14,326,962	16,816,464	19,384,005
Total profit available for appropriation	1,192,008	2,972,544	5,046,988	7,225,612	9,599,059	11,919,957	14,326,962	16,816,464	19,384,005	22,069,638
Balance carried forward	1,192,008	2,972,544	5,046,988	7,225,612	9,599,059	11,919,957	14,326,962	16,816,464	19,384,005	22,069,638

## 8.3 Projected Balance Sheet

Statement Summaries											SMEDA
Balance Sheet											Rs. in actuals
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Assets</b>											
<i>Current assets</i>											
Cash & Bank	500,000	797,021	2,470,898	4,390,107	6,486,138	8,287,994	10,516,197	12,802,740	15,140,836	17,522,468	22,851,960
Accounts receivable	-	759,452	871,644	1,043,772	1,134,155	1,193,718	1,253,403	1,316,074	1,381,877	1,450,971	1,523,520
Finished goods inventory	-	594,600	712,744	799,217	847,170	898,000	951,880	1,008,993	1,069,532	1,133,704	1,201,726
Equipment spare part inventory	25,667	35,245	41,912	46,877	52,175	58,070	64,632	71,936	80,065	89,112	-
Raw material inventory	712,250	987,364	1,185,308	1,338,373	1,503,796	1,689,665	1,898,507	2,133,163	2,396,822	2,693,069	-
Pre-paid insurance	28,410	23,802	19,193	14,585	9,976	29,021	23,217	17,412	11,608	5,804	-
<b>Total Current Assets</b>	<b>1,266,327</b>	<b>3,197,483</b>	<b>5,301,699</b>	<b>7,632,931</b>	<b>10,033,409</b>	<b>12,156,467</b>	<b>14,707,836</b>	<b>17,350,317</b>	<b>20,080,740</b>	<b>22,895,129</b>	<b>25,577,206</b>
<i>Fixed assets</i>											
Land	780,000	780,000	780,000	780,000	780,000	780,000	780,000	780,000	780,000	780,000	780,000
Building/Infrastructure	889,000	844,550	800,100	755,650	711,200	666,750	622,300	577,850	533,400	488,950	444,500
Machinery & equipment	214,700	193,230	171,760	150,290	128,820	107,350	85,880	64,410	42,940	21,470	-
Furniture & fixtures	50,000	45,000	40,000	35,000	30,000	25,000	20,000	15,000	10,000	5,000	-
Office equipment	49,000	44,100	39,200	34,300	29,400	24,500	19,600	14,700	9,800	4,900	-
<b>Total Fixed Assets</b>	<b>2,336,200</b>	<b>2,189,680</b>	<b>2,043,160</b>	<b>1,896,640</b>	<b>1,750,120</b>	<b>2,076,663</b>	<b>1,906,230</b>	<b>1,735,798</b>	<b>1,565,365</b>	<b>1,394,933</b>	<b>1,224,500</b>
<i>Intangible assets</i>											
Pre-operation costs	80,000	64,000	48,000	32,000	16,000	-	-	-	-	-	-
<b>Total Intangible Assets</b>	<b>80,000</b>	<b>64,000</b>	<b>48,000</b>	<b>32,000</b>	<b>16,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTAL ASSETS</b>	<b>3,682,527</b>	<b>5,451,163</b>	<b>7,392,859</b>	<b>9,561,571</b>	<b>11,799,529</b>	<b>14,233,130</b>	<b>16,614,066</b>	<b>19,086,115</b>	<b>21,646,105</b>	<b>24,290,061</b>	<b>26,801,706</b>
<b>Liabilities &amp; Shareholders' Equity</b>											
<i>Current liabilities</i>											
Accounts payable	-	553,012	714,172	808,440	867,773	927,928	992,689	1,062,456	1,137,668	1,218,806	1,049,541
<b>Total Current Liabilities</b>	<b>-</b>	<b>553,012</b>	<b>714,172</b>	<b>808,440</b>	<b>867,773</b>	<b>927,928</b>	<b>992,689</b>	<b>1,062,456</b>	<b>1,137,668</b>	<b>1,218,806</b>	<b>1,049,541</b>
<i>Other liabilities</i>											
Deferred tax	-	23,617	23,617	23,617	23,617	23,617	18,894	14,170	9,447	4,723	-
Long term debt	-	-	-	-	-	-	-	-	-	-	-
<b>Total Long Term Liabilities</b>	<b>-</b>	<b>23,617</b>	<b>23,617</b>	<b>23,617</b>	<b>23,617</b>	<b>23,617</b>	<b>18,894</b>	<b>14,170</b>	<b>9,447</b>	<b>4,723</b>	<b>-</b>
<i>Shareholders' equity</i>											
Paid-up capital	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527	3,682,527
Retained earnings	-	1,192,008	2,972,544	5,046,988	7,225,612	9,599,059	11,919,957	14,326,962	16,816,464	19,384,005	22,069,638
<b>Total Equity</b>	<b>3,682,527</b>	<b>4,874,535</b>	<b>6,655,070</b>	<b>8,729,514</b>	<b>10,908,139</b>	<b>13,281,585</b>	<b>15,602,484</b>	<b>18,009,489</b>	<b>20,498,991</b>	<b>23,066,532</b>	<b>25,752,165</b>
<b>TOTAL CAPITAL AND LIABILITIES</b>	<b>3,682,527</b>	<b>5,451,163</b>	<b>7,392,859</b>	<b>9,561,571</b>	<b>11,799,529</b>	<b>14,233,130</b>	<b>16,614,066</b>	<b>19,086,115</b>	<b>21,646,105</b>	<b>24,290,061</b>	<b>26,801,706</b>

(0)

## 8.4 Projected Cash Flow Statement

(0)											
SMEDA											
Rs. in actuals											
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Statement Summaries</b>											
<b>Cash Flow Statement</b>											
<i>Operating activities</i>											
Net profit	-	1,192,008	1,780,535	2,074,444	2,178,624	2,373,447	2,320,898	2,407,005	2,489,502	2,567,541	2,685,633
Add: depreciation expense	-	146,520	146,520	146,520	146,520	146,520	170,433	170,433	170,433	170,433	170,433
amortization expense	-	16,000	16,000	16,000	16,000	16,000	-	-	-	-	-
Deferred income tax	-	23,617	-	-	-	-	(4,723)	(4,723)	(4,723)	(4,723)	(4,723)
Accounts receivable	-	(759,452)	(112,192)	(172,128)	(90,383)	(59,562)	(59,686)	(62,670)	(65,804)	(69,094)	(72,549)
Finished good inventory	-	(594,600)	(118,144)	(86,473)	(47,953)	(50,830)	(53,880)	(57,113)	(60,540)	(64,172)	(68,022)
Equipment inventory	(25,667)	(9,578)	(6,667)	(4,966)	(5,297)	(5,896)	(6,562)	(7,303)	(8,129)	(9,047)	89,112
Raw material inventory	(712,250)	(275,114)	(197,945)	(153,065)	(165,423)	(185,869)	(208,843)	(234,656)	(263,659)	(296,247)	2,693,069
Advance insurance premium	(28,410)	4,609	4,609	4,609	4,609	(19,045)	5,804	5,804	5,804	5,804	5,804
Accounts payable	-	553,012	161,160	94,268	59,334	60,155	64,761	69,767	75,212	81,138	(169,264)
Cash provided by operations	(766,327)	297,021	1,673,877	1,919,209	2,096,030	2,274,919	2,228,203	2,286,543	2,338,096	2,381,632	5,329,492
<i>Financing activities</i>											
Change in long term debt	-	-	-	-	-	-	-	-	-	-	-
Issuance of shares	3,682,527	-	-	-	-	-	-	-	-	-	-
Cash provided by / (used for) financing activ	3,682,527	-	-	-	-	-	-	-	-	-	-
<i>Investing activities</i>											
Capital expenditure	(2,416,200)	-	-	-	-	(473,063)	-	-	-	-	-
Cash (used for) / provided by investing activ	(2,416,200)	-	-	-	-	(473,063)	-	-	-	-	-
<b>NET CASH</b>	<b>500,000</b>	<b>297,021</b>	<b>1,673,877</b>	<b>1,919,209</b>	<b>2,096,030</b>	<b>1,801,857</b>	<b>2,228,203</b>	<b>2,286,543</b>	<b>2,338,096</b>	<b>2,381,632</b>	<b>5,329,492</b>
Cash balance brought forward		500,000	797,021	2,470,898	4,390,107	6,486,138	8,287,994	10,516,197	12,802,740	15,140,836	17,522,468
Cash available for appropriation	500,000	797,021	2,470,898	4,390,107	6,486,138	8,287,994	10,516,197	12,802,740	15,140,836	17,522,468	22,851,960
Cash carried forward	500,000	797,021	2,470,898	4,390,107	6,486,138	8,287,994	10,516,197	12,802,740	15,140,836	17,522,468	22,851,960

## 9 KEY ASSUMPTIONS

Table 11-1 Cost of Goods Sold per Unit of Production

<b>COGS 1</b>	<b>Rs. 74/ piece</b>
COGS 2	-
COGS growth rate	6%

COGS – 1 includes cost of raw material which is acquired in Kgs but calculated as per piece cost. The COGS growth rate is estimated @ 6 % per year.

Table 11-2 Revenue Assumptions

Sale price per Piece in year 1	Rs. 120 / piece
Sale price growth rate	5%

Table 11-3 Production Related Assumptions

Production capacity per year	120,000 pieces
Production capacity utilization in first year	70%
Production capacity utilization growth rate	10%
Maximum production capacity utilization	85%

Table 11-4 Economic Related Assumptions

<b>Inflation rate</b>	<b>6%</b>
Wage growth rate	6%
Electricity Growth Rate	6%
Water Price Growth Rate	6%

Table 11-5 Financing Assumptions

<b>Interest rate on long term debt</b>	<b>18%</b>
Debt	0%
Equity	100%
Tax rate (15% sales tax + 7% income tax)	22%
Required rate of return on equity	18%
WACC	18%

Table 11-6 **Expense Assumptions**

Communication Expense	30 %
Promotional Expense	0.7 %
Professional Fee (Legal, Audit etc)	0.7 %
Office Expense (Stationary, Entertainment, Janitorial Services)	12 %
Pre-Operational Expense	Rs. 80,000

Table 11-7 **Depreciation Rates**

<b>Furniture &amp; fixtures</b>	<b>10%</b>
Equipment & tools	10%
Office equipment	10%
Office Vehicle	20%

Table 11-8 **Cash Flow Assumptions**

Accounts Receivables Cycle (In Days)	30
Accounts Payable Cycle (In Days)	30
Cash in Hand	Rs. 500,000

Table 11-9 **Direct Operating Costs**

<b>Maintenance Cost / year</b>	<b>7,700</b>
Direct Electricity Cost / year	154,000
Direct Gas Cost / year	130,900
Direct Labor Cost / year	550,000