HOLLOW AND CEMENT CONCRETE BRICKS

1. INTRODUCTION:

Cement concrete dense/ hollow bricks and blocks are very popular and are extensively used in building construction throughout the country because of the many advantages such as durability, strength and structural stability, fire resistance, insulation and sound absorption it

Possess. The cement concrete blocks have an attractive appearance and are readily adaptable to any style of architecture. It lends itself to a wide variety of surface finishes for both exterior and interior walls. The blocks are used for both load bearing and non-load bearing walls. The hilly states of India have high humidity, dampness and rainfall, so the blocks are much useful for the N.E. Region, Himachal Pradesh, J&K, and U.P. etc. The blocks are made out of these blocks in masonry there is stone chips. With the use of these blocks in masonry there is saving in cement, stell, time and labour as compared with burnt bricks masonry. This saving, therefore, brings down the cost of construction considerably.

2. PRODUCT & ITS APPLICATION:

It is much needed in regions where traditional bricks are not easily available. It is also popular in case of requirement of low cost housing. The main advantage of concrete blocks is that their strength can be engineered to requirement. Thus making them relatively stronger than bricks by 15-20%. These blocks are 4-5 times bigger than burnt bricks; the size of the block or bricks used has a bearing on the strength of masonry. As the bigger size accounts for reduction in number of mortar joints, thereby increasing wall strength. Concrete blocks have an excellent thermal property, comparable to other masonry blocks. The cavities in the blocks provide better thermal protection and also do not need external or internal plastering. The performance of the blocks increases with increase in number of hollow cores, which may or may not be filled with some insulating

material. The hollow blocks provide an acceptable degree of sound insulation. Concrete blocks are inert, nontoxic and not prone to off gassing of volatile material. It has been observed that concrete blocks enable savings of approx. 8-9% per sq. mt. of masonry as compared with burnt brick. This is primarily because of the savings in mortar and faster construction speed, both due to larger block size and also due to the savings in plaster. Size optimization of concrete blocks also leads to increase in usable internal space, when compared to conventional fired brick construction. Construction technique involved is similar to other masonry units thus easily adaptable. Through decentralized local production it is easily available through a large number of manufacturers and distributors in most parts of the country in both rural and urban areas.

Applicability: Hollow concrete blocks are commonly used in Load bearing structure: - low rise residential and office buildings, bungalows, shelter units for rural housing, institutional buildings, godowns and warehouses etc.

In frame structures: - High rise residential apartment, office buildings, market complexes, Hospitals, Hotels etc.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Graduate in any graduate.

4. INDUSTRY LOOK OUT AND TRENDS

The global concrete block and brick manufacturing market is gaining from the booming construction sector worldwide. Rapid urbanization leading to the demand for new housing units in developing countries is stoking demand for concrete blocks and bricks. For instance, Brazil is a key domestic market in Latin America in terms of manufacturing volume of concrete blocks and bricks. Concrete blocks are preferred in the construction of walls as they are less susceptible to damage and provide insulation as well.

Apart from this, foreign direct investments in manufacturing and construction sectors in several countries of Asia Pacific have led to significant expansion of the concrete block and brick manufacturing market in recent years.
The emergence of eco-friendly building materials has been significant factor acting in favor of this market predominantly in developed regions. Countries in North America and Europe are increasingly shifting towards sustainable construction with the introduction of green building materials. Eco-friendly building materials such as autoclaved aerated concrete (AAC) are obtained from non-toxic ingredients and industrial waste that do not leave fumes, unlike synthetic building materials.

A report by Transparency Market Research (TMR) projects the global concrete block and brick manufacturing market to expand at a moderate 3.8% CAGR for the forecast period 2017-2027. At this pace, the market evaluated at 1,837.48 billion units in 2016 will become 2769.24 billion units by 2027 end.

5. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY:

The cement concrete dense/ hollow bricks and blocks are replacing conventional building bricks gradually due to the inherent properties like strength, size accuracy and insulation. These are used both for laying load bearing and non-load bearing walls. The cost of blocks is very much compared to the cost of red bricks and quite low, specially, in hilly regions where building bricks cannot be made whereas red bricks have to be procured from distant places thus incurring extra heavy transportation costs. Only in a few regions the good quality clay is available and red brick industry has come up there. But the cement building blocks can be made anywhere. The main raw material for production such as stone metals, sand grit etc. is abundantly available in any state. The blocks have some advantageous properties over the red building bricks. It is easy to construct wall that requires less mortar for inside and outside plaster and joining. It provides good insulation against heat and cold and resists vibration and absorbs sound. So considering all the above mentioned factors, one can foresee to set up a unit.

6. RAW MATERIAL REQUIREMENTS:

All the raw materials required by the unit are available throughout the year. The raw material can also be procured from the nearby districts and from other states. The stock and procurement period proposed in this scheme is for a period of 10 days. The details of requirement for 100% capacity utilization in the unit are tabulated as below. The raw material required by the unit is proposed to be arranged through local distributors.

Concrete is a mixture of ordinary Portland cement, mineral aggregate (sand and stone chips) and water. The water used in preparing the concrete serves two purposes: (1) It combines with the cement to form a hardened paste (2) It lubricates the aggregates to form a plastic and workable mass The water that combines with the cement varies from about 22 to 28% of the total amount of mixing water in concrete. Mineral aggregates (sand and stone chips) are normally divided into two fractions based on their particle size. Aggregate particles passing through the No.4 or 4.7 mm Indian Standard sieve are known as fine aggregate. The particles retained on this sieve are designated as coarse aggregate. Natural sand is often used as fine aggregate in cement concrete mixture. Coarse aggregate are crushed stone chips. Crushed stone chips broken into particle sizes passing through the 4.7 mm sieve may also be used as fine aggregate. The maximum size of the coarse aggregate that may be used in cement concrete hollow blocks is 12.5 mm. However, the particle size of the coarse aggregate should not exceed one third thickness of the thinnest web of the hollow blocks. Ordinary Portland cement is the cementing material used in cement concrete hollow blocks.

Cement is the highest priced material per unit weight of the concrete. Hence, the fine and coarse aggregates are combined in such proportions that the resulting concrete is workable and has minimum cement content for the desired quality.

7. MANUFACTURING PROCESS:

The process of manufacture of cement concrete hollow blocks involves the Following 5 stages; (1) Proportioning (2) Mixing (3) Compacting (4) Curing (5) Drying

(1) Proportioning: The determination of suitable amounts of raw materials needed to produce concrete of desired quality under given conditions of mixing, placing and curing is known as proportioning. As per Indian Standard specifications, the combined aggregate content in the concrete mix used for making hollow blocks should not be more than 6 parts to 1 part by volume of Portland cement. If this ratio is taken in terms of weight basis this may average approximately at 1:7 (cement: aggregate). However, there have been instances of employing a lean mix of as high as 1:9 by manufacturers where hollow blocks are compacted by power operated vibrating machines. The water cement ratio of 0.62 by weight basis can be used for concrete hollow blocks.

(2) Mixing the objective of thorough mixing of aggregates, cement and water is to ensure that the cement -water paste completely covers the surface of the aggregates. All the raw materials including water are collected in a concrete mixer, which is rotated for about 1 ½ minutes. The prepared mix is discharged from the mixer and consumed within 30 minutes.

(3) Compacting the purpose of compacting is to fill all air pockets with concrete as a whole

Without movement of free water through the concrete. Excessive compaction would result in formation of water pockets or layers with higher water content and poor quality of the product.

Semi-automatic vibrating table type machines are widely used for making cement concrete hollow blocks. The machine consists of an automatic vibrating unit, a lever operated up and down metallic mould box and a stripper head contained in a frame work. 5 Wooden pallets are kept on the vibrating platform of the machine. The mould box is lowered on to the pallet. Concrete mix is poured

into the mould and evenly leveled. The motorized vibrating causes the concrete to settle down the mould by approximately 1 ½ to 1 ¾ inches. More of concrete is then raked across the mould level. The stripper head is placed over the mould to bear on the leveled material. Vibration causes the concrete come down to its limit position. Then the mould box is lifted by the lever. The moulded hollow blocks resting on the pallet is removed and a new pallet is placed and the process repeated. The machine can accommodate interchangeable mould for producing blocks of different sizes of hollow or solid blocks.

(4) Curing: Hollow blocks removed from the mould are protected until they are sufficiently

Hardened to permit handling without damage. This may take about 24 hours in a shelter away from sun and winds. The hollow blocks thus hardened are cured in a curing yard to permit complete miniaturization for at least 21 days. When the hollow blocks are cured by immersing them in a water tank, water should be changed at least every four days. The greatest strength benefits occur during the first three days and valuable effects are secured up to 10 or 14 days. The longer the curing time permitted the better the product.

(5) Drying: Concrete shrinks slightly with loss of moisture. It is therefore essential that after curing is over, the blocks should be allowed to dry out gradually in shade so that the initial drying shrinkage of the blocks is completed before they are used in the construction work. Hollow blocks are stacked with their cavities horizontal to facilitate thorough passage of air. Generally a period of 7 to 15 days of drying will bring the blocks to the desired degree of dryness to complete their initial shrinkage. After this the blocks are ready for use in construction work.

8. MANPOWER REQUIREMENT:

The enterprise requires 15 employees as detailed below**:**

Sr. No.	Designation of Employees	Salary Per Person	Monthly Salary ₹	Number of employees required				
				Year-1	Year-2	Year-3	Year-4	Year-5
1	Machine Operators	12,000	24000.00	2	2	2	2	2
2	Helpers	8,000	48000.00	6	6	8	8	10
1	Production supervisor	15,000	15000.00	1	1	1	1	1
2	Accounts/Stores Asst	12,500	12500.00	1	1	1	1	1
3	Office Boy	9,000	9000.00	1	1	1	1	1
	Total		108500.00	11	11	13	13	15

9. IMPLEMENTATION SCHEDULE:

The project can be implemented in 3 months' time as detailed below:

Sr. No.	Activity	Time Required *(in months)*
1	Acquisition of premises	1.00
2	Construction (if applicable)	1.00
3	Procurement & installation of Plant & Machinery	1.00
4	Arrangement of Finance	2.00
5	Recruitment of required manpower	1.00
	Total time required *(some activities shall run concurrently)*	3.00

10. COST OF PROJECT:

The project shall cost ₹ 44.41 lacs as detailed below:

Sr. No.	Particulars	₹ in Lacs
1	Land	5.00
2	Building	5.00
3	Plant & Machinery	12.50
4	Furniture, Electrical Installations	0.50
5	Other Assets including Preliminary / Pre-operative expenses	1.25
6	Working Capital	20.16

	Total	**44.41**

11. MEANS OF FINANCE:

Bank term loans are assumed @ 75 % of fixed assets.

Sr. No.	Particulars	₹ in Lacs
1	Promoter's contribution	11.10
2	Bank Finance	33.31
	Total	**44.41**

12. WORKING CAPITAL CALCULATION:

The project requires working capital of ₹ 20.16 lacs as detailed below:

Sr. No.	Particulars	Gross Amt	Margin %	Margin Amt	Bank Finance
1	Inventories	10.08	0.25	2.52	7.56
2	Receivables	5.04	0.25	1.26	3.78
3	Overheads	5.04	100%	5.04	0.00
4	Creditors	-		0.00	0.00
	Total	20.16		8.82	11.34

13. LIST OF MACHINERY REQUIRED:

A detail of important machinery is given below: Power Requirement: 50 HP

Sr. No.	Particulars	UOM	Qtty	Rate (₹)	Value (₹ in Lacs)
	Plant & Machinery / equipments				
a)	***Main Machinery***				
i.	Hydraulically concrete block machine 15.5 HP	NOS.	1	400000	4.00

Sr. No.	Particulars	UOM	Qtty	Rate (₹)	Value
ii.	Concrete mixer: 10/7 cft 5 HP	Nos	1	300000	3.00
iii.	weighing scale 500 Kgs	Nos	2	100000	2.00
b)					
i.	Water dosing pump	Nos	1	60,000	0.60
ii.	Electrical and EB charges	NOS.	1	21000	2.90
	sub-total Plant & Machinery				**12.50**
	Furniture / Electrical installations				
a)	Office furniture	LS	1	10000	0.10
b)	Stores Almirah	LS	1	5,000	0.05
c)	Computer & Printer	L. S.	1	10000	0.35
	sub total				**0.50**
	Other Assets				
a)	preliminary and preoperative				1.25
	sub-total Other Assets				1.25
	Total				**14.25**

All the machines and equipment are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

- Kamdhenu Agro Machinery
  Plot No. 6, Near Power House,
  Wathoda Road, Wathoda
  Nagpur - 440035
  Maharashtra, India

- Future Industries Private Limited
  Shed No. 15, Ambica Estate,
  Corporation Municipal Plot,
  Opposite Sadvichar Hospital,
  Naroda, Ahmedabad - 382330,
  Gujarat, India

- The Global Pharma Equipments
  Star Industrial Estate,
  D-32, Naik Pada,
  Near Hanuman Mandir,
  Opposite Dwarka Industrial Estate,
  Vasai East, Vasai - 401208,
  Maharashtra, India

14. PROFITABILITY CALCULATIONS:

Sr. No.	Particulars	UOM	Year-1	Year-2	Year-3	Year-4	Year-5
1	Capacity Utilization	%	60%	70%	80%	90%	100%
2	Sales	₹. In Lacs	60.48	70.56	80.64	90.72	100.80
3	Raw Materials & Other direct inputs	₹. In Lacs	52.28	61.00	69.71	78.43	87.14
4	Gross Margin	₹. In Lacs	8.20	9.56	10.93	12.29	13.66
5	Overheads except interest	₹. In Lacs	4.46	4.74	5.30	5.47	5.58
6	Interest	₹. In Lacs	3.33	3.33	2.22	1.67	1.33
7	Depreciation	₹. In Lacs	8.75	6.25	4.38	3.13	2.81
8	**Net Profit before tax**	₹. In Lacs	**-8.35**	**-4.76**	**-0.97**	**2.04**	**3.94**

The basis of profitability calculation:
The growth of selling capacity will be increased 10% per year. (This is assumed by various analysis and study, it can be increased according to the selling strategy.)

Energy Costs are considered at Rs 7 per Kwh and fuel cost is considered at Rs. 65 per litre. The depreciation of plant is taken at 10-12 % and Interest costs are taken at 14 -15 % depending on type of industry.

15. BREAKEVEN ANALYSIS:

The project shall reach cash break-even at 50.60 % of projected capacity as detailed below:

Sr. No.	Particulars	UOM	Value
1	Sales at full capacity	₹. In Lacs	100.80
2	Variable costs	₹. In Lacs	87.14
3	Fixed costs incl. interest	₹. In Lacs	6.91
4	BEP = FC/(SR-VC) x 100 =	% of capacity	50.60%

16. STATUTORY / GOVERNMENT APPROVALS

As per the allocation of business rules under the Constitution, labour is in the concurrent list of subjects. It is dealt with by the MOLE at the Central and Departments of Labour under State Governments in respective States / UTs. The MOLE has enacted workplace safety and health statutes concerning workers in the manufacturing sector, mines, ports and docks and in construction sectors.

Further, other Ministries of the Government of India have also enacted certain statutes relating to safety aspects of substances, equipment, operations etc. Some of the statutes applicable in the manufacturing sector are discussed below:

The Static and Mobile Pressure Vessels (Unfired) Rules, 1981

These (SMPV) Rules are notified under the Explosives Act, 1884. These rules regulate storage, handling and transport of compressed gases. These rules stipulate requirements regarding construction and fitments, periodic testing, location, fire protection, loading and unloading facilities, transfer operations etc. in respect of pressure vessels whose water capacity exceeds one thousand litres. These rules are enforced by the Chief Controller of Explosives under the Ministry of Industry and Commerce, Govt. of India (PESO).

The Manufacture, Storage and Import of Hazardous Chemicals Rules (MSIHC), 1989

These MSIHC Rules are notified under the Environment (Protection) Act, 1986. These rules are aimed at regulating and handling of certain specified hazardous chemicals. The rules stipulate requirements regarding notification of site, identification of major hazards, taking necessary steps to control major accident, notification of major accident, preparation of safety report and on-site emergency plan; prevention and control of major accident, dissemination of information etc. These rules are notified by the Ministry of Environment and Forests (MOEF) but enforced by the Inspectorates of Factories of respective States / UTs in the manufacturing sector.

The Factories Act, 1948 and State Factories Rules

The Factories Act, 1948 is very comprehensive legislation dealing with the matters of safety, health and welfare of workers in factories. The Act places duties on the occupier to ensure safety, health and welfare of workers at work. Some of the salient provisions of the Act include:

- Guarding of machinery
- Hoists and Lifts; Lifting Machines and Appliances
- Revolving Machinery
- Pressure Plant
- Excessive Weight
- Protection of Eyes
- Precautions against dangerous fumes, gases etc.
- Explosive or inflammable dust, gas etc.
- Precautions in case of fire
- Safety of buildings and machinery
- Permissible limits of exposure of chemical and toxic substances

- Entrepreneur may contact State Pollution Control Board where ever it is applicable.

17. BACKWARD AND FORWARD INTEGRATIONS

Chemical companies often become integrated and undergo other activities outside the chemical industry. Increased competition prompts many companies to reduce supply chain costs by looking outside the chemical sector at suppliers and customers. While most companies within the chemicals sector primarily produce chemicals, some companies also conduct other manufacturing activities. The exact proportion of chemicals sector companies that are integrated with other sector activities is unknown, but many companies actively seek vertical integration. Many manufacturers pursue vertical integration to secure suppliers and customers for their products.

Mergers and acquisitions are a common way for companies to undertake new chemical ventures. By purchasing their chemical suppliers, some manufacturers secure future chemical feedstock for their products or other chemicals that they use in manufacturing. The company making the purchase obtains valuable expertise and equipment. Some mining and petrochemical production is more cost-effective when integrated within a chemical company.

Energy and feedstock costs are often a significant expense for chemical companies. Integrating chemical production with activities that secure supplies of chemical feedstock and energy is relatively common as chemical companies grow. Chemical companies are located near mines, oil fields, ammonia factories and water supplies. This reduces transportation costs and increases the reliability of supplies by reducing the distance between feedstock and the factory.

Some companies, such as Sino-Coking Coal and Coke Chemical Industries Incorporated, own their mines. BHP Billiton operates a broad range of mines and is primarily a mining company. It does, however, also produce petrochemical feedstock for the chemical industry and therefore operates within the chemical industry as well. These companies technically operate within both the chemical and mining industries in their normal business operations.

Integrating a chemical company with other activities provides several direct benefits for the company and is becoming increasingly common. High energy costs necessitate greater control of energy resources and minimal reliance on expensive transportation. Chemical companies experience volatile profitability due to fluctuations in feedstock and energy expenses. Some companies control this volatility through careful supply chain management and by charging supply surcharges. Actively researching and developing alternative feedstock and energy supplies helps the company reduce costs.

Vertical integration supports these activities by eliminating redundant activities at multiple companies and increasing efficiency. By consolidating activity among multiple, similar operations, chemical companies achieve cost savings that contribute to higher profitability. End products are often very profitable, and some chemical companies purchase their former customers to take advantage of the marked-up prices of products further along in the supply chain.

Integration may become more common for many chemical companies as competition strengthens and traditional feedstock becomes more expensive. Market demand for chemical feedstock increases as emerging market economies grow and result in increased consumer spending around the world.

18. TRAINING CENTERS AND COURSES

There is no such training required to start this business but, basic chemical bachelor's degree is plus point for enterpriser. Promoter may train their employees in such specialized institutions to grow up the business. There are few specialised Institutes provide degree certification in chemical Technology, few most famous and authenticate Institutions are as follows:

1. Department of chemical LD college of engineering
   No.120, Circular Road, University Area, Navrangpura,
   Opposite Gujarat University, Ahmedabad, Gujarat 380015

2. MIT College of chemical Engineering, Pune
   Gate.No.140, Raj Baugh Educational Complex, Pune Solapur Highway,
   Loni Kalbhor, Pune – 412201
   Maharashtra, India

Udyamimitra portal (link : www.udyamimitra.in) can also be accessed for handholding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates.

Disclaimer:

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any

inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.

Source:- Udyami Mitra/Sidbi