DEVELOPMENT AND FEASIBILITY OF BRICKS USING INDUSTRIAL WASTE

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Abstract - *This project studies the use of industrial waste material in production of unfired bricks. aims to study an enviornment friendly technology introduced for manufacture of bricks which can benefit society and nation, and helps in reduction of impact of solid waste and recycle in proper manner. The material used are fly ash from thermal power plant, gypsum, lime, quarry dust, cement are used in manufacturing. The main aim is to preserve the top soil which is used in manufacturing of conventional bricks and prevention of harmful emissions from kilns*

***Key Words*: unfired bricks, quarry dust, fly ash, lime, Gypsum, compressive strength, bulk density**

1.INTRODUCTION

India is the world's fastest developing country with an economic growth rate 7.4% in 2018(www.economictimes.indiatimes.com). Central Pollution Control Board (CPCB) has recognized the brick production industry as a high resource and energy intensive and polluting industry owing to the prevalence of obsolete production technologies, so it is important to use pollution reducing technologies and proper utilization of waste which are harmful to environment. Fly Ash bricks can be extensively used in all building constructional activities similar to that of common burnt clay bricks. Since fly ash is being accumulated as waste material in large quantity near thermal power plants. We have used fly ash as 40% of total material in all types of bricks. We have made three types bricks by taking different proportions in each type of bricks to check whether which proportion will give better results after testing. Types of bricks as
1.FCQ-Fly Ash,cement,quarry dust
2. FLQ-fly ash, Lime, Quarry dust brick.
3. FGLQ-fly ash, gypsum, quarry dust brick.

1.1 Material Specification

A) Cement:
The use cement ordinary Portland cement OPC (IS 12269-2013).

B) **Fly ash-** The fly ash was collected from Deepnagar Thermal Power Station, located near the city of Bhusawal, Maharashtra with total production capacity of more than 1000 MW

C) **Quarry dust:** It is the waste material obtained during quarrying process and crushing of aggregate. It is the form of fine aggregate and effectively used as filler material instead of fine aggregate

D) **Lime:** Commercially available slaked lime is sieved and used. Lime is not available in nature.

Fig 1-Lime

It is produced by burning of this material limestone, kankar and sea shells etc.

E)**Gypsum:** . It's procured from the industry. It is white crystalline substance. It is have a sufficient hardness and it is also one of the binding materials. Gypsum is quickly sets and harden .it's initial setting time is 4 to 6 minutes and final setting time is about 30 minutes.

1.2 Proportioning

a. Fly Ash is kept 40% constant for all proportions.
The proportion of water 0.25- 0.35% by weight of mix is constant.

Types and proportions:

TYPE I-FCQ	PROPORTION IN %
CEMENT	10
QUARRY DUST	50

Table 1

TYPE II	FLQ30	FLQ35	FLQ40	FLQ45	FLQ50
LIME %	30	35	40	45	50
QUARRY DUST%	30	25	20	15	10

Table 2

Type- III	FGLQ-0	FGLQ-5	FGLQ-10	FGLQ-15	FGLQ-20
LIME%	30	30	30	30	30
GYPSUM%	0	5	10	15	20
QUARRY DUST%	30	25	20	15	10

Table 3

1.2.1 MANUFACTURING OF BRICKS

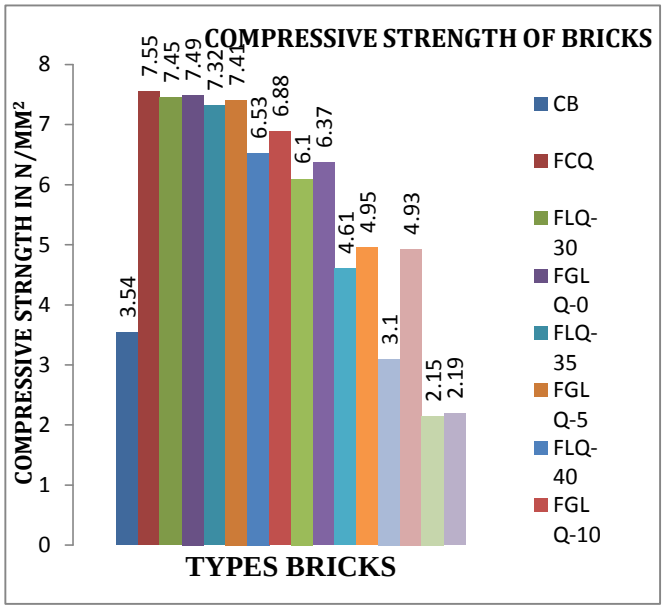
a) For this project we brought the materials on site ,then proper mixing of materials is done on the site with the help of their equipment's. The proportion of materials is done by weighing machine.

Fig no.2 -Mixing of materials

2. TEST RESULTS

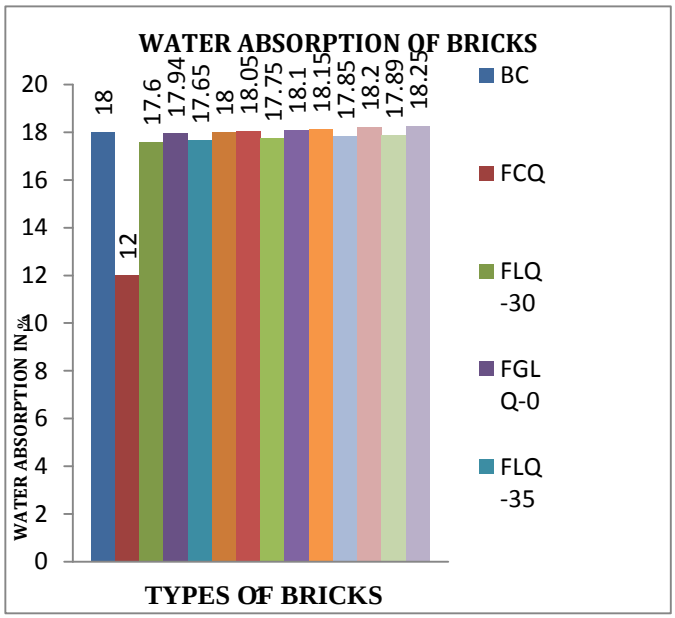
2.1 Compressive Strength Test (IS 3495-1992) Part 1

As we have given all types with their different proportions in table no. 1,table no.2, table no.3. After testing all the types of bricks with their proportion in UTM we got best results as given in graph.



Average compressive strength(28days)

2.2 WATER ABSORPTION TEST



Graph no 5.4 Water Absorption test

From the result obtained water absorption for optimal mix percentage is 18.18% which is within permissible limit according to IS and also observed that for maximum strength only good water absorption obtained.

3. CONCLUSIONS

Different types of bricks are compared, and optimum results are obtained for FLQ-40 and FGLQ-15.

In Type III FLQ-40 compressive strength is 6.53 N/mm^2 which is 13.50% less than FCQ. Water absorption is 17.7%, which are within permissible limits according to IS Codes.

In Type III FGLQ-15 compressive strength is 6.37 N/mm^2 which is 15.62 % less than FCQ and Water absorption 18.18% which are within permissible limits according to IS Codes.

Thus from this study an environmental friendly technology is introduced for the manufacture of bricks which can benefit the society and nation, through which the impact of solid waste on environment is reduced and material can recycle in proper manner.

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