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# An Investigation Bricks Manufacturing using RMC Partial Replacement

S R J SHANTHA KUMAR[1] and DHANASEKARAN S B[2]

[1]Engineering and Management Consultant and [2]Professor, Department of Mechanical Engineering, SVS College of Engineering, Coimbatore

## Abstract

In this project work has been made to study the behavior of brick by taking proportionsof RMC Waste, Cement, Lime, and Clay. In this project work six mix materials as RMC Waste, Cement, Lime, Clay are taken by following percentages 60, 10, 18 and 12% . After casting the bricks are allowed to tests Compressive Strength Test, Water Absorption Test was performed for the RMC waste bricks. In the current study, hoe planning and truck / mixer based waste amounts one meter cube (RMC) can be determined was presented. Towards this aim, the formation process of the fresh RMC waste in construction project was first introduced in a detailed manner, together with an in depth literature review in this specific domain of the construction engineering and management. Then, the measurement procedure of the waste amount or coefficient of the Fresh RMC was revealed and discuss as a practical and creative planning knowledge.Hence, the useful and realistic waste management perspective about the cost and potential environmental savings of RMC waste was drawn. The compressive strength of rubberized concrete can be increased by adding some amount of silica /to it.The ready mix waste is a promising material in the construction industry and the sole reason for this is the lightweight of the resulting concrete.

## 1. INTRODUCTION

Brick is one of the most important materials for the construction buildings.. The current practices for the disposal of concrete wash water include dumping at the job site, dumping at a landfill, or dump into a concrete wash water pit at the ready-mix plant. The availability of landfill sites for the disposal of truck wash water has been drastically reduced for the past ten years. In 1981, there were approximately 50,000 such sites in the United States; today, there are only about 5,000. In response to this reduction, most ready-mix batch plants have developed a variety of operational configurations to manage their own wash water. The alternatives include settling ponds, storm water detention/retention facilities and water reuse systems. Recognizing that typical batch plants generate an average of 20 gallons of wash water discharge per cubic yard of ready-mixed production and that the average concrete production rate for a batch plant is 250 cubic yards per day, the proper disposition of the wash water presents an important issue. If this wash water can be reused, it has been estimated that the volume per cubic yard of production that will require special disposal handling can be reduced to 5gallons.These numbers increases with the increase in the production of vehicles. Investigations have shown that contain materials that do not decompose under environmental conditions and cause serious problems. One choice of decomposition is burning, but it cause harmful results to the environment. Based on these problems, can be used as aggregate in concrete.

## 2. MATERIALS

The following materials wereused for making the brick: RMC waste:80%;Cement: 10%; Lime: 7%; and Clay: 3%.

### *RMC waste*

Disposal of waste water from Ready Mixed Concrete (RMC) operations is a great concern of the ready-mixed concrete producers. Most of the traditional disposal systems are no longer environmentally acceptable. Alternative solution is to recycle the waste. Every day 0.25m³ – 1m³ RMC wastes in sites. The ready mixed concretes are widely used in modern construction. It gives the high strength to the building.

### *Cement*

Cement, ingeneral, adhesive Ordinary Portland cement of 53grade is used in the investigation. The cement used has been tested for various proportions and found to be confirming to specifications given in IS 12269 – 1987.

**Figure 1 Cement**

### *Lime*

Lime is a calcium-containing inorganic material in which carbonates, oxides and hydroxides predominate. Strictly speaking, lime is calcium oxide or calcium hydroxide. It is also the name of the natural mineral (native lime) CaO which occurs as a product of coal seam fires and in altered limestone xenoliths in volcanic eject. The word "lime" originates with its earliest use as building mortar and has the sense of "sticking or adhering. These materials are still used in large quantities as building and engineering materials (including limestone products, concrete and mortar) and as chemical feed stocks, and sugar refining, among other uses.

**Figure 2Lime**

***Clay Soil***

Clay is finely – grained natural soil material that combines one or more clay minerals with possible traces of quartz, metaloxides, and organic matters. Geological clay deposits are mostly composed of phyllosilicate minerals. The clay can appear in various colours from white to dull grey or brown to deep orange red.

**Figure 3Clay soil**

***Aggregates***

Aggregate imparts greater volume stability and durability to concrete. The aggregate is used primarily for the purpose of providing bulk to concrete.

*Fine Aggregates*

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Fine aggregates generally consist of natural sand or crushed stone with most particles passing through a 4.75 mm sieve. The most important function of the fine aggregate is to assist in providing workability and uniformity in mixture. The fine aggregate also assists the polymer to hold the coarse aggregates in suspension. This action promotes plasticity in the mixture and prevents the possible segregation of paste and coarse aggregates.

**Figure 4Fine Aggregates**

*Coarse Aggregates*

Coarse aggregates are any particles greater than 4.75 mm, but generally range between 10 mm to 40 mm in size. Gravels constitute the majority of coarse aggregate used in concrete with crushed stone making up most of the remainder. Coarse aggregates provide strength, toughness and hardness to concrete. Presence of coarse aggregate increases the resistance of concrete to freezing and thawing, provides chemical stability and increases resistance to abrasion.

**Figure 5Coarse Aggregates**

## 3. EXPERIMENTAL WORKS AND RESULTS

***Compressive Strength Test***

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The compressive strength of the bricks is most important property. The compressive strength values give an overall picture of the quality of the brick and are an indication of the hardness of the hydrated cement paste that binds the various particles together. The main aim of the compressive strength tests was to determine the wet compressive strength values of the bricks. It is the wet compressive strength value, which is normally lower than the dry compressive strength, which is used in the structural design of buildings. The compressive strength test done is a standard test based on ASTM standards, Volume 04.08, Soil and Rock, 1996. After the 21 days curing period, the bricks of average dimension 230×110×70mm is measured and weighed. The main compression equipment used was the compression testing machine with a maximum load of 1000 kN.

**Figure 6 Compression test setup**

***Water Absorption Test***

The aim of the water absorption test was to determine the percentage moisture absorption capacity of the brick samples. Brick samples were weighed in the laboratory atmospheric condition ($W_d$) and, immersed in water for 24 hours, removed and weighed again ($W_W$). An accurate electronic weighing machine was used in case, to an accuracy of 0.05g. The percentage moisture absorption by weight was calculated from the formula:

$$M_c = (W_w - W_d)/W_d \times 100\ (\%)$$

Where, Mc = percentage moisture absorption (%), $W_w$= mass of wetted sample (g) and $W_d$ = mass of dry sample (g).Through the water absorption test, it should be possible to determine the ability and extent to which bricks can absorb moisture. Knowledge of the water absorption levels of bricks could serve as useful criteria for setting limits and for investigating possible ways of reducing the same in order to improve on the durability of bricks.

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**Figure 7 Water absorption test setup**

***Flexural Strength Test***

The flexural strength of concrete is done by casting the prism of (100×100×500 mm) and cured in water tank for 28 days and tested. It is tested by using the formula as follows.

The flexural strength of prism = $PL/bd^2$ ($N/mm^2$).


**Figure 8 Flexural Strength Test setup**

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**Figure 9 Experimental work photographs at laboratory**

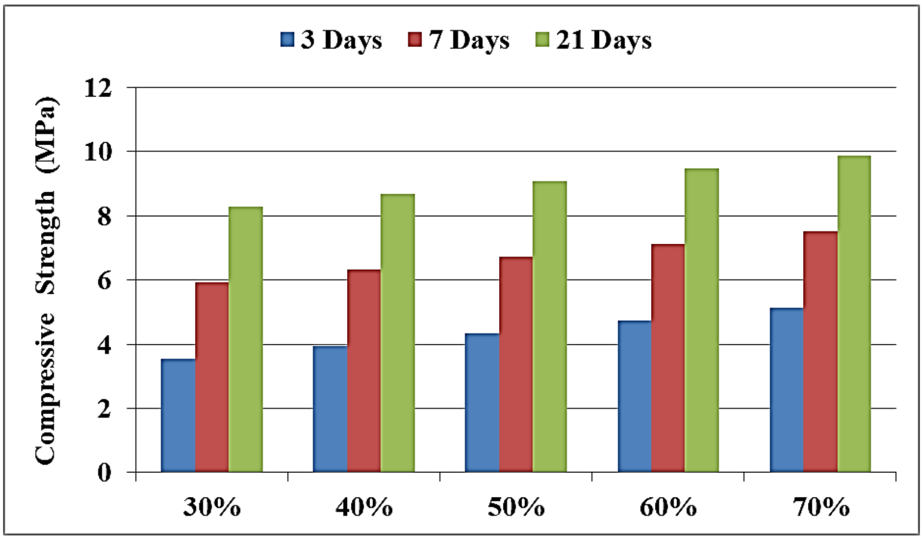


**Figure 10 Variation on compressive strength**

## 4. CONCLUSIONS

The following could be concluded from the test result obtained in the investigation. Based on the experimental study, following conclusions can be drawn regarding the strength behavior of brick. The study was conducted to find the optimum mix percentage of RMC Waste. However the brick specimen of size 230×110×70mm were cast for mix percentage And the specimens have been tested for mix proportions. The mechanical properties such as compressive strength were studied for mix proportions, at different curing ages. From the results it was inferred that, among the proportions the maximum optimized compressive strength is obtained for optimal mix percentage of RMC Waste-60%, Cement-10%,Lime-18% and Clay-12% 1 day as 1.95 N/mm², 4 days as 3.85 N/mm², 7 days 4.51 N/mm². We investigated that the bricks which manufactured by using partial replacement of RMC Waste can be used for two storied building & economical than normal bricks.

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