

# Effects of Waste Materials on The Performance of Bricks

Mr.Mohit Dhangar<sup>1</sup>, Mr.Omkar Irrabattin<sup>2</sup>, Mr.Ajit Tik<sup>3</sup>, Mr. Sushil Sonar<sup>4</sup>, Prof. Pragnya Shanbhag<sup>5</sup>

<sup>1,2</sup>Dept of Civil Engineering

<sup>1,2,3,4,5</sup> Anantrao Pawar College of Engineering & Research, Pune, India

**Abstract-** *The main aim of waste management system is to maximize economic benefits and at the same time protection of the environment. Marble processing industry generates a large amount of wastes mainly in the form of powder during sawing and polishing processes. These wastes are found to have environmental impacts and affect human health. Similarly rice mills generates large amount of rice husk which is then burnt to form an ash called rice husk ash. It is also essential to develop alternate methods of brick manufacturing in order to reduce the use of precious clay soil in brick manufacturing, thus protecting it for agricultural use. Utilization of rice husk ash and marble powder in brick manufacturing is reported. Rice husk ash and marble powder are added as partial replacement for clay at three different proportions for the manufacturing of bricks. In this work 19cmx9cmx9cm bricks were cast for combination of clay, Rice husk and marble dust and results were found to be good.*

**Keywords-** Utilizing Waste materials, Marble powder, Rice Husk Ash, Clay, Brick making, Low cost.

## I. INTRODUCTION

Brick is one of the most important construction elements. Burnt clay bricks are most utilizing brick in construction world due to its physical, chemical, mechanical properties. Since the large demand has been placed on building material industry especially in the last decade owing to the increasing population, which causes a chronic shortage of building materials; the civil engineers have been challenged to convert the industrial wastes to useful building and construction materials. The worldwide annual production and the demand for bricks is expected to be continuously rising. An important factor adding to the disadvantages of burnt clay brick is the environmental impact involved in the manufacturing process of clay bricks. To overcome these drawbacks an attempt has been made to increase the overall efficiency of clay brick by other suitable materials in the manufacturing process. Production of building materials, particularly bricks using rice husk ash and marble dust is considered to be one of the solutions to the ever-increasing RHA and MD disposal problem in the country.

RHA and MD bricks can be extensively used in all building constructional activities similar to that of common burnt clay bricks. These bricks are comparatively lighter in weight and stronger than common clay bricks. Since RHA and MD are being accumulated as waste material in large quantity near rice mill and marble cutting polishing centre and creating serious environmental pollution problems, its utilization as main raw material in the manufacture of bricks will not only create ample opportunities for its proper and useful disposal but also help in environmental pollution control to a greater extent in the surrounding areas. In view of superior quality and eco-friendly nature, the demand for these bricks can be picked up.

## II. LITERATURE REVIEW

Literature review related to the utilization of waste material . The objective was to know the existing utilization & use of waste materials . It was noticed that many researchers, engineers and consultants have worked extensively on converting waste material into bricks.

*1.Danupon Tonnyayopas, Perapong Tekasakul and Sarawut Jaritgnam, Effects of Rice Husk Ash on Characteristics of Lightweight Clay Brick, (TISD2008) Faculty of Engineering, Khon Kaen University, Thailand 28-29 January 2008*

The effects of rice husk ash (RHA) addition on the physical and mechanical properties of the lightweight building fired clay bricks were investigated. Different proportions of RHA from 10-50% by mass were mixed to the raw brick-clay. Higher RHA addition required a higher water content to ensure the right dry density. All test specimens were produced by uniaxial hydraulic press method and fired at 1050°C. The samples were tested by according to Thai Industrial Standard (TIS) methods and compared with its specifications. Up to 30% RHA addition was found to meet TIS. It can be utilized in fired building bricks by taking advantage of low cost and environmental protection.

*2. Mohammad Shahid Arshad, Dr. P.Y. Pawade International Journal of Scintific & Technology Research 2014 Volume 3, Issue 6, June2014 ISSN 2277-8616*

Bricks are a widely used construction and building material around the world. Bricks are prepared from natural waste material which comprises of orange peels and coconut waste. Clay is used as a binding material for natural waste material and paper mill waste. The main objective of the present study is to reduce the quantity of clay with natural waste material. The orange peels and coconut waste which otherwise is land filled has been utilized to make construction bricks that serves a purpose of solid waste management

3. Maneesh kumar CS, Ashik moulana S venkateshan, *M International Journal Of Advanced Research in Engineering & Management (IJAREM) Vol. 01 Issue 02 May 2015 43*

This experimental study investigates the use of recycle paper mill waste in brick. This investigation is mainly focused on making use of waste materials into a construction material. Nowadays the availability of construction materials become expensive due to increase of its need and overexploitation. This affects the middle class peoples as overall construction cost increased

4. R.Nithiya, Chris Anto, K.R. Vinod, Dr, Anbalgaon , *Experimental investigation on bricks by various waste materials ,International Journal of Latest trend in Engineering and Technology(IJLETET) Vol 6 Issue January 2016*

Majority of the people prefer burnt bricks for the construction purpose which emits nearly about 1 ton of CO<sub>2</sub>. The usage of environmental friendly, structurally sound and in expensive materials was used in the ancient centuries. The stabilized bricks are the one which have a low embodied energy of 0.42 MJ/kg and low carbon foot print. This paper presents the strength of the bricks by using different recyclable materials like coconut fiber, granite waste and egg shell powder.

5. Kannadason.R Jose Ravindra Raj.BPG scholar, *Department of Civil Engineering, Prist University, Trichy-Thanjavur Highway, Vallam, Thanjavur, Tamilnadu, India Volume 5, Issue 4, April (2017).*

The main aim of this work was to be comparing the compressive strength of the Marble and powder wastes is one of the major worldwide environmental problems. As a consequence of environmental and financial considerations, there is a growing demand for wastes to be re-used or recycled.

Therefore, this work intends to discuss the possibilities of using marble and granite sawing wastes as alternative raw materials in the production of bricks.

6. M.Kathiresan , M.Gunasekar , MS.T.Sonia, *Experimental study on manufacturing bricks by using marble sludge powder acid resistance test. SSRG International Journal of Civil Engineering-(ICRTCETM-2017)-Special Issue – April 2017*

Brick is one of the most common masonry units as a building material due to its properties. The rapid growth in today's construction industry has obliged the civil engineers in searching for more efficient and durable alternatives far beyond the limitations of the conventional brick production. Many attempts have been made to incorporate wastes into the production of bricks and recycling such wastes by incorporating them into building materials is a practical solution for pollution problem. So the proposed system is to the invention of waste marble sludge powder and bottom ash as the replacement of clay bricks regarding the strength and durability studies

7. Salman Shah, Vidya Jose (2018) *International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 03 | Mar-2018 p-ISSN: 2395-0072*

Reuse of waste generated from industrial and agricultural activities as building materials appears to be viable solution to problem of pollution and waste disposal. In India it has been estimated that nearly 30% of the daily production turns on waste during the manufacturing, transportation and usage. From decades burnt clay bricks have been used in the building construction and it helps to reduce the energy consumption of buildings due to its excellent thermal insulation property. As a result of this, there is still an existing demand for clay bricks and huge quantity of soil is being exploited for its production

8. Muhammad J. Munir, Safeer Abbas, Moncef L. Nehdi, Syed M. S. Kazmi, Anwar Khitab, *Development of Eco-Friendly Fired Clay Bricks Incorporating Recycled Marble Powder 10.1061/(ASCE) MT.1943-5533.0002259. © 2018 American Society of Civil Engineers*

This study explores the development of eco-friendly burnt clay bricks incorporating recycled waste marble powder (WMP). Waste marble powder was collected from the local marble industry and used to manufacture brick specimens at a local brick manufacturing facility with dosages ranging from 5 to 25% by clay weight. The mechanical and durability performance of bricks incorporating WMP were investigated.

The WMP produced lighter weight bricks with reduced linear shrinkage. It also decreased the compressive strength of bricks because of enhanced porosity, as shown by scanning electron microscopy (SEM) analysis. However, bricks incorporating up to 10% of WMP achieved compressive strength values within the specified limits of the local building code

9. B.Dhanalaxmi, K.N Sujatha, E.Rakesh Reddy *International Journal of Innovative Technology and Exploring Engineering (IJITEE)* ISSN: 2278-3075, Volume-8 Issue-4S2 March, 2019

Urbanization lead to a vast generation of solid waste and discharge of these waste materials became a major problem. Dumping and land filling of solid waste leads to environmental degradation i.e ground water contamination through leaching, which results in soil pollution and also impact on human health. In recent years, the utilization of solid waste as become more potential to recycle the valuable material and decrease the volume of solid waste, other pollutants and dumping cost. This paper is concern to reuse and recycle the available solid waste generated from paint industry. to find a socioeconomic, eco-friendly solution, waste trash can be recycled for the preparation of bricks, which sustain a cleaner environment. The increased quest for sustainable and eco-friendly materials in civil construction works. It is useful to provide sustainable and potential solution in the construction field

10. A. Oorkalan, S. Gopinath, V. Abhilash, M. Manikandan, P.U. Haran *international Research Journal of Engineering and Technology (IRJET)* e-ISSN: 2395-0056 Volume: 07 Issue: 03 | Mar 2020 p-ISSN: 2395-0072

The scope of our project is to utilize the waste products in the manufacturing process of bricks, it effectively reduces the cost as well as the waste production. Generally, the building bricks are typically rectangular in shape, solid in structure and made from a suitable type of clay. Bricks can also be manufactured from other types of materials. In this project, we are going to use Wood ash, Ceramic powder and Marble dust as partial replacement of clay for the manufacturing of bricks.

### III. METHODOLOGY

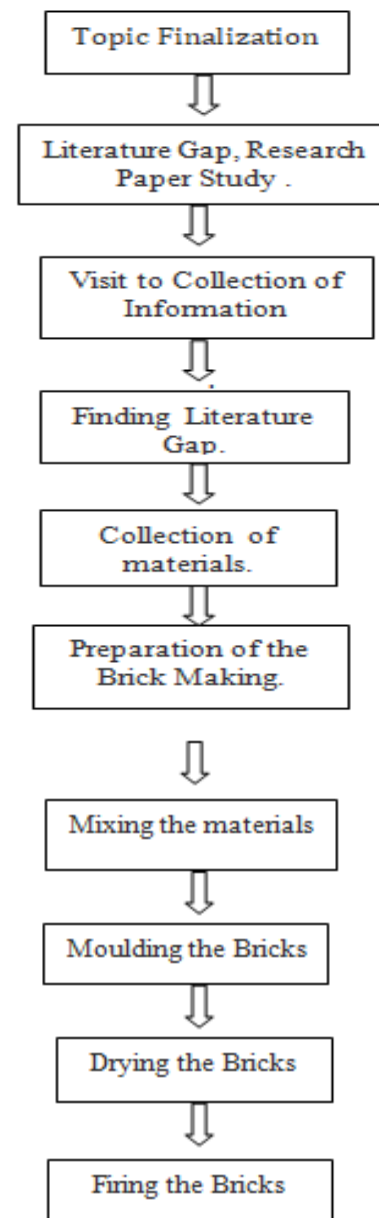
Methodology adopted mainly includes collection of existing data, experimental investigation and analysis of existing data.

Data was collected from the study area, review of literature and secondary source of information. The main aim is to identify materials and check the parameter of materials using

study. Material parameters are mainly used for design the mix as per code practices. Mix design can be calculated from the procedure for prepare the specimen. Brick will be Casted and burned. Finally specimen will be tested to get results

The test were conducted by starting the first test of collection of data Rice Husk Ash is collected from a rice mill in mulshi area and marble powder from katraj pune. From the review of literature we are testing the materials and analyse the properties. The mix proportions of brick were modified by using rice husk ash and the marble powder as a partial replacement of materials. The specimen was cast by replacing bricks with 10% to 15% of rice husk ash and marble powder and remaining percentage 75% to 80% were covered by clay.

#### 3.1 Work plan



#### IV. CONCLUSION

The marble powder-RHA-clay bricks offer strengths at par with conventional clay bricks. The optimum percentage of mixture of marble powder, rice husk ash and clay offering high strength is found to be clay 80% + marble powder 10% + RHA 10% (type I brick). The incorporation of marble powder has negligible effect on the mechanical properties, as these bricks yield similar mechanical and physical properties as that of conventional clay bricks. Increase in the percentage of rice husk ash decreases the compressive strength of the bricks. These bricks have low water absorption rates. Increase in the percentage of rice husk ash increases the water absorption rate. These bricks have reduced weight when compared with that of conventional clay bricks

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