# Mechanical Behaviour of M30 Grade Concrete by Incorporating Coconut Shell Egg Shell Powder Are the Replacement for the Cement

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*Abstract*— waste materials which are big resource of having cementious` properties They can be used in construction practice. This cementious property of different waste materials are increasingly important because need of more sustainable binding products is requiring. The environmental impact of construction materials is significant because its manufacturing units release huge amount carbon by products and greenhouse gases. egg shell and coconut shell are having good binding and pozzolonic properties which can partially replace the cement. The present study report egg shell powder and coconut shells are in powder form for partially replacing the cement. M-30 grade concrete designed later it is analysed mechanical behaviour at different curing periods the prominent tests are compressive strength, Tensile strength, etc. at normal temperature conditions.

***Keywords:*** M-30 Grade, Sustainable Materials, Waste Materials, Coconut Shell Powder, Eggshell Powder

## I. INTRODUCTION

Concrete is most used construction composite in construction industries and commonly used building material in the world. It has several advantages and disadvantages such as general availability, wide applicability and low cost. These advantages are useful in construction industry but unsafe to environmental burden. The billions of tons of raw materials mined and processed each year leave a mark on the environment. Furthermore, during the production of Portland cement large quantities of CO2 are released into the atmosphere and enormous amount of energy are required. Portland cement is one of the most important ingredients of concrete. With the global economic recession coupled with the market inflationary trends, the constituent materials used for these structures had led to a very high cost of construction. to a very large extent, on concrete as major construction material. The versatility, strength and durability of cement are of utmost priority over other construction materials. The basic materials for concrete are: cement, fine aggregate, coarse aggregate and water, the overall cost of concrete production depends largely on the availability of these constituents. Reduction in construction costs and the ability to produce light-weight concrete structures (LWC) are added advantages. The primary aim is to determining the suitability of partial replacement of cement with coconut shell Powder (CSP) and Egg shell powder (ESP) in concrete.

## II. OBJECTIVES OF THE STUDY:

The objectives of this study are as follows

1) Obtaining the possible output for M-30 grade concrete with these recycle materials.
2) To investigate the suitability of materials for the sustainability point of view
3) Assessing the output with normal concrete mix Vs M-30 mix
4) Suggesting these are the best replacements for the Study
5) Reducing the materials negative results on environmental impact.

## III. SCOPE OF THE STUDY

Reducing the usage of Portland cement prominently , We are incorporating the waste materials without compromising performance characteristics of normal concrete in sustainable criteria .present era is a full of negative impacts on environmental concern , The scope of this present study is to establish to achieve the objectives and this study will be mainly concentrated on experimental works.by conducting all mechanical tests on fresh and hardened concrete gives the proper idea about the properties ,all the conducted tests are specified according to IS code books only .

## IV. REVIEW OF LITERATURE:

Praveen Kumar, et.al., (2015) Shows that the Experiment is explained that the egg shell powder is replaced 10%,20% and 30% by cement in concrete in addition with 5%,10%,15% of weight of cement. The egg shell powder replacement is sufficient enough for getting higher strength. The flexural strength of the egg shell concrete increases with the addition of egg shell powder. The Split tensile strength of the egg shell powder concrete decrease with the addition of egg shell powder. This can be increase s used with reinforcement.

Shaik Akhil Masten et.al., (2015) Explained that the experimental study is an attempt to find the optimum usage of fly ash and egg shell powder in normal concrete by replacing the river sand 7%, 14%, 21%, 28%, &35 % by weight at various proportions. Fly ash & egg shell powder could be very conveniently used in structural concrete.

Olanitori LMet.al., (2015) Shows that the experiment is explained that using a mix design ratio of 1:2:4 and water binder ratio of0.63 concrete cubes were casted using varying Ordinary Portland Cement: Palm Kernel shell ash & Ordinary Portland cement: coconut shell ash ratios of 100:0, 90:10, 80:20, 70:30, 60:40, & 50:50 respectively. Reducing the production cost and the environmental pollution caused by the dumping of the agricultural waste Niya Eldhose et.al., (2015) Explained that the experiment is explained that the replacing the cement by egg shell powder (ESP) 5%, 10%, 15% and Fine aggregate by Crumb Rubber (CR) 2.5%, 5%, 7.5%&10%. The compressive strength of concrete decreased with increase in varying percentage of Crumb Rubber Result of

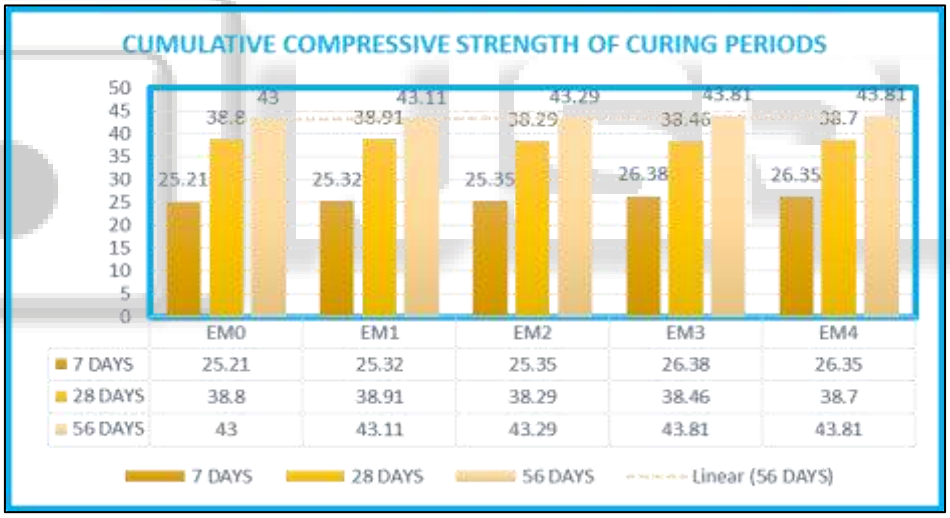
 

Replacing cement by 5% ESP in 10% Crumb Rubber replaced concrete shows increase in both flexural and split tensile strength.

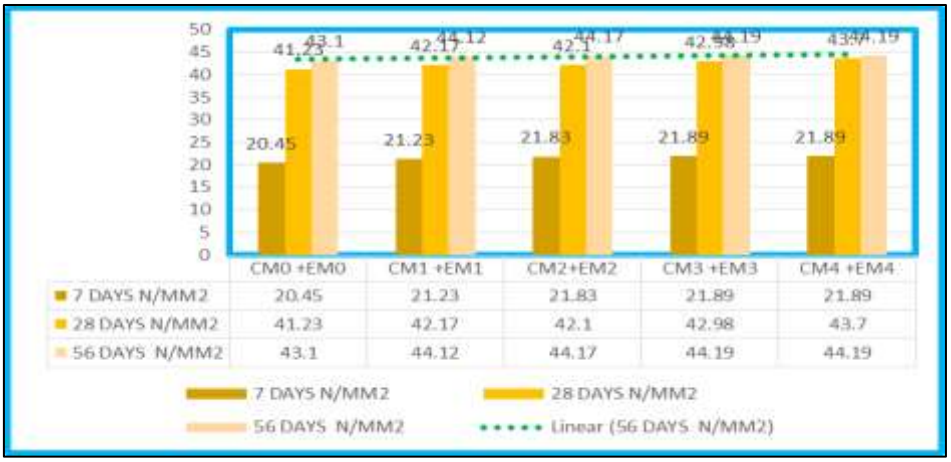
## V. COMPRESSIVE STRENGTH RESULTS:

### *A. Individual Mix (CSP) 7 Days, 28 Days, 56 Days*


### *B. Individual Mix (ESP) 7 Days, 28 Days, 56 Days*




### *C. Combined Mix (ESP + CSP) 7 Days, 28 Days, 56 Days*



*D. Split Tensile Strength Result*

| S.NO | CUBE ID | % OF REPLACEMNT | 28 DAYS |
|---|---|---|---|
| 1 | CE-I | 0 | 3.07 |
| 2 | CE-II | 5 | 3.26 |
| 3 | CE-III | 10 | 3.11 |
| 4 | CE-IV | 15 | 3.41 |
| 5 | CE-V | 20 | 3.45 |

| S.NO | CUBE ID | % OF REPLACEMNT | 56 DAYS |
|---|---|---|---|
| 1 | CE-I | 0 | 5.23 |
| 2 | CE-II | 5 | 5.45 |
| 3 | CE-III | 10 | 5.49 |
| 4 | CE-IV | 15 | 5.86 |
| 5 | CE-V | 20 | 5.76 |

## VI. DISCUSSIONS:

- Present study is the utilization of waste raw coconut shells and poultry waste are the replacements for the concrete mix.
- Many research papers succeeded while combining the These waste materials in a positive way.
- Coming to the current study I conducted compressive strength, tensile strength & upv tests on hardened concrete
- The results output was in a satisfactory manner, attained 68 % of compressive strength in 7 days, generally it was 65 % of target mean strength
- For 28 days' strength also attained 99 % of compressive strength that means these materials are suitable for cement upto 20 % of replacements only
- For 56 days curing period Satisfactory results, yet to be checked for creep loadings
- Based on research papers we known these replacements are good for flexure strength, but availability of laboratory yet to be found
- Conducted NDT test on cubes also all are tested obtained good results which are mentioned in results chapter 95 % of cubes shows "Good "Quality of concrete
- Further scope work will be it would be checked for fifty percentage replacements for the coconut shell and egg shell powder.

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*A. Books & IS Codes*

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