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# Experimental Investigation on Replacement of M Sand with Eco sand and Cement with Silica Fume

R. Sakthivel<sup>1</sup>, Nivethitha G<sup>2</sup>, Ramya N<sup>3</sup>, Ajeeth kumar N<sup>4</sup>, Dr. M. Sivaraja<sup>5</sup>

<sup>5</sup>Principal. <sup>1, 2, 3, 4</sup>Civil Engineering, N.S.N. College of Engineering and Technology, Karur-639 003

**Abstract:** *The concrete is a construction materials plays a vital role in the construction of the nation's infrastructure. The issue of environmental degradation and expensive nature of the M sand make us to switch on to the alternative sources. In the direction, an experimental investigation strength and durability was undertaken to use "Ecosand and silica fume" for replacement of fine aggregate and cement in concrete. Ecosand is a commercial by-product of cement manufacturing process. Silica fume concrete is used for concrete mixtures which possess workability, strength, high density, low permeability and resistance to chemical attack. Silica fume improves the long-term corrosion resistance and alkali silica expansion and also increases the carbonation of depth. Lots of researches has been done to replace the sand, In this study we replace the M sand with 20%, 40%, 60% by weight of ecosand and replace the cement with 5%, 10%, 15% by weight of silica fume. M<sub>25</sub> grade of concrete was used and the specimen were tested at 7 and 28 days.*

**Keywords:** *Silica fume, Ecosand.*

## I. INTRODUCTION

Concrete is widely used construction materials in the world, mainly due to its favourable features such as durability, satisfactory compressive strength, cost effectiveness and availability. The concrete being the main construction materials. Conventionally concrete is mixture of cement, sand and aggregate Properties of aggregate affect the durability and performance of concrete, so fine aggregate is an essential component of concrete. The construction industry is the base for all activities of development. Concrete and steel are the two most commonly used structural materials for construction. Concrete is one of the manmade materials, which finds wider application in the construction industry. The ingredients of concrete are cement, sand, coarse aggregate, water and admixtures. Hence manufactured sand and silicafume is the good alternative to the eco sand and cement.

## II. OBJECTIVE OF THE PROJECT

- A. The waste materials of ecosand and silicafume is used as a replacement materials.
- B. The main objective of the present work is to systematically study the replacement of manufactured sand and cement is respectively on the strength property is to find the compressive strength, flexural strength and split tensile strength of concrete.
- C. To systematically study the certain replacement of ecosand by M sand and silica fume by cement.
- D. The waste materials of ecosand and silicafume is used for construction cost reduction and reduce the sand demand.
- E. To approach towards the use of alternative Materials as concrete.

## III. EVALUATION

### A. Existing Model

The existing idea for the project is that the students should meet the project guide. The team should get the concurrence for the project idea which they are going to implement and make it as a project. The team should also get the concurrence from the Head of the department in the zeroth review.

Then the team should show half of the implementation after the one week to the project guide and the Head of the department. They must also submit the project report to the project guide as a hard copy in paper format for the first level correction. This also takes so much of time and money. Later, the team should submit their final report after correcting the errors in the project report which is submitted in the first level correction.

### B. Drawbacks

The existing idea takes more time for getting the concurrence for the project. This existing idea can also make some conflicts if the project guide is not available.

#### IV. IMPLEMENTATION PROPOSAL IDEA.

In order to remove the difficulties in existing idea, the details of the project are uploaded by the student in this idea. The proposed idea has a web application to upload and view the project details. Initially, the project guide can see the abstract of the project and the results. The implementation of the project can also be viewed by the guide as an result at anywhere and anytime. This reduces the inconvenience of the student as well as the project guide. The project report for first level correction can be done by using this idea. Then, the project guide can see the report in “pdf” format and can give the suggestions and the corrections in the project report. This saves money and time. Then, the student can easily get the review for their work from the project guide and the Head of the department.

##### A. Features

###### 1) Advantages

- a) Silica fume
  - i) Increased compressive strength
  - ii) Reduced water permeability
  - iii) Improved abrasion resistance
  - iv) Improved resistance to chemical attack
  - v) Improved stability in geothermal environments
  - vi) Reduced efflorescence

##### B. Ecosand

- 1) Energy efficient
- 2) Fire resistant
- 3) Reduction of dead load
- 4) Ecofriendly
- 5) Low

##### C. Managing The Projects

Initially, the team leader should register in this idea by giving some of the personal details. The team leader should select the allocated project guide. Then, he should register in this system. After completing the registration, the team leader should reach to go to the student work space.

The student workspace initially shows the field for the student. Then the leader goes to project details page to upload each and every detail of the project. The student should upload all the details in the pdf format except flow diagram and the result. The student can field out to the workspace.

The guide can enter into the guide workspace by entering into the idea. The project guide can view his own batch details. The project guide has the privilege to view all the details of the project and the level or the status of the project.

The project coordinator can go to his workspace by entering into the idea. They have the privilege to see the projects details partially.

But they can see project details of all batches. The project coordinator can see only the abstract, problem identification, solution and the flow diagram of the project. The coordinator does not have the privilege to see the result of all the projects.

The Head of the department can also use this idea to view the project. The HOD have been provided the privilege to see all the projects which are done in the department. But the head of the department can see only the abstract and the flow diagram of the batch. The head of the department can see the projects in the form of document and by clicking the documents they can see the project details.

#### V. RESULT AND DISCUSSION

In this project work mineral admixtures such as silica fume, ecosand combination of silica fume were 5%, 10%, 15% of replacement for cement and ecosand were replacement of 20%, 40%, 60% of replacement for sand. Based on various literature reviewed, combination of silica fume added at a proportion of replaced for cement. Hence, an attempt has been made in the present investigation to study the behavior of M-sand.

Result of mix proportion

S.no	Mix percentage	Mix			
		Cement	Silicafume	M-sand	Ecosand
1.	Conventional concrete	100%	0%	100%	0%
2.	Replacement 1	95%	5%	80%	20%
3.	Replacement 2	90%	10%	60%	40%
4.	Replacement 3	85%	15%	40%	60%

## VI. CONCUSION

The major of this investigation is to use silica fume, eco sand and M sand based on the present experimental investigation are the following conclusion

- A. The 28 days compressive, flexural and split tensile strength is found in silica fume (5%) & ecosand (20%).
- B. The 28 days maximum compressive, flexural and split tensile strength is found in silica fume (10%) & eco sand (40%) and strength should be increased. Compare than conventional concrete.
- C. The 28 days compressive, flexural and split tensile strength is found in silica fume (15%) & eco sand (60%) and strength should be decreased. Compare than conventional concrete.
- D. From experimental results, the optimum percentage eco sand and addition of silica fume (10%) & eco sand (40%) for achieving maximum benefits in compressive strength, split tensile, strength and flexural strength.
- E. Use of ecosand reduces the amount of fine aggregate content as well as heat hydration in a mortar mix. Thus, the construction work with ecosand concrete becomes environmentally safe and also economical.
- F. Modification of mix design due to reduction in water content results in reduction of cement and fine aggregate.

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