

Review on Experimental Analysis of Concrete Using Alccofine and Marble Dust to Determine the Compressive and Flexural Strength

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ABSTRACT: Concrete is the most widely used construction material in civil engineering industry because of its high structural strength and stability. Leaving the waste materials to the environment directly can cause environmental problem. Waste can be used to produce new products or can be used as admixtures so that natural resources are used more efficiently and the environment is protected from waste deposits. Hence the reuse of waste material has been emphasized. The overall performance of reinforced concrete composite material is affected then the individual performance of the concrete itself. This led to the search for new material. In this research the mechanical properties of concrete is studied by replacing cement with GGBS and addition of Alccofine with different weight fractions with respect to cement. The concrete industry is constantly looking for supplementary material with the objective of reducing the solid waste disposal problem.

In this paper Alccofine is used, the research is carried out by using M20 grade concrete with replacement of 2.5%,5%,7.5%,10%, Alccofine by keeping marble dust as 5%,7.5%,10%,12% constant and is carried out to determine the optimum percentage of replacement at which maximum C S, F S is achieved, the properties of the material are analyzed.

KEYWORDS : Alccofine,, Compressive strength, Split tensile strength, Flexural strength, Coarse Aggregate, Fine aggregate,

I. INTRODUCTION

1.1 General

Blended cements based on the partial replacement of Portland cement clinker (PC) by wastes have been the subject of many investigations in recent years. The use of the replacement materials offer cost reduction, energy savings, arguably superior products, and fewer hazards in the environment. These materials participate in the hydraulic reactions, contributing significantly to the composition and microstructure of hydrated product. In building industry, Marble has been commonly used for various purposes like flooring, cladding etc., as a building material since the ancient times. The industry's disposal of the marble powder material, consisting of very fine powder, today constitutes one of the environmental problems around the world. In India, marble dust is settled by sedimentation and then dumped away which results in environmental pollution, in addition to forming dust in summer and threatening both agriculture and public health. Therefore, utilization of the marble dust in various industrial sectors especially the construction, agriculture, glass and paper industries would help to protect the environment.

1.2 Background of Marble Dust and Alccofine

1.2.1 MarbleDust

Construction materials are more judged by their ecological characteristics because of the continual depletion of quarry aggregates. In India huge amount of marble waste is being generated because of lack of technology and also unscientific methods of quarrying marble. Due to generation of marble waste there is a direct exposure of this material with the environment because of which serious environmental problems occur. Fig. 1 shows the marble dust powder. Also the marble cutting industry generates a high volume of wastes



Fig. 1. Marble Dust Powder

Importance of using Marble dust in concrete-

- Reduces the cement content which results in cost reduction.
- Helps in improving durability.
- Helps in attaining and maintaining strength at specific days.

Need of using Marble dust-

Huge amount of marble waste is being generated from marble cutting plants and mineral industries. As these wastes have adverse effect on our environment, it is very essential to find the safe disposal method for this type of waste or to find a proper solution for the utilization of this waste. The research presents an eco-friendly solution for the utilization of marble waste and helps in preserving our ecosystem.

Advantages of Marble dust-

It intensifies the properties of mortar and concrete.

Huge amount of Marble waste is generated and so cost of procuring of this waste is low

Disadvantages of Marble dust-

- Marble does not take part in the hydration process.
- Marble waste is not available in all regions and so additional transportation cost will be added for its procurement.

1.2.2 Alccofine:

Alccofine is a revolutionary material, used as a substitute to Micro Silica / Silica Fumes. Alccofine is a new generation supplementary cementations material (SCM) with a built-in high tech content. In spite of its high fineness it does not increase water demand at the dosage range of 5 to 15 percent of normal OPC in general. In fact concrete slump is seen to be improved, due to the dense packing of cementations material, producing low void content. The use of Alccofine results in hydrated cement matrix to comprise of very small pores.

Alccofine is a specially processed product based on high glass content with high reactivity obtained through the process of controlled granulation. The raw materials are composed primary of low calcium silicates. The processing with other select ingredients results in controlled particle size distribution (PSD). The computed blain value based on PSD is around $12000\text{cm}^2/\text{gm}$ and is truly ultra-fine. Due to its unique chemistry and ultra-fine particle size, Alccofine 1203

provides reduced water demand for a given workability, even up to 70% replacement level as per requirement of concrete performance. Alccofine 1203 can also be used as a high range water reducer to improve compressive strength or as a super workability aid to improve flow.

If the advantages of Alccofine are observed in the concrete mix design, the initial rate of strength development is found to be increased. Durability test measuring the water permeability shows better results with Alccofine mix than in OPC. In case of chloride permeability Alccofine with OPC, the results show less permeability in case of Alccofine than that of OPC.

There are two types of Alccofine: -

Alccofine 1203: - It is an alccofine with low calcium silicate. Alccofine 1200 series is of 1201, 1202, 1203 which represents fine, micro fine, ultrafine particle size respectively.

Alccofine 1203 is a slag based SCM having ultra-fineness with optimized particle size distribution. Alccofine 1203 provides reduced water demand for a given workability, even up to 70% replacement level as per requirement of concrete performance

Alccofine 1101: - It is an Alccofine with high calcium silicate. It is a micro finer cementations grouting material for soil stabilization and rock anchoring. The performance of Alccofine is superior to all other admixtures used in India. Due to high calcium oxide (Cao) content

Advantages of using Alccofine in Concrete: The Empire State Building, Burj Khalifa, Burj Al Arab, etc. are all buildings that will leave you in admiration of their architecture and design. Apart from that you will also be bowled over by their towering height and just how strong their structure comes across as. Their beautiful architecture too is designed in a way that gives them an aesthetic character without compromising on their sturdiness. So what is it that sets these buildings apart from others. To start with, it's the planning and designing along with the use of premium-quality construction materials like high strength concrete. Here are 3 advantages of using premium quality concrete for constructing buildings.

Durability – Concrete is used to give a form to the skeleton of the building. It is a material that is used right from the very foundations of the building. For this reason, use of the right cement, one that is of premium-quality, is integral to defining the durability of the building. Premium-quality concrete will ensure that the building has strength built in to it right from the very roots and also as its form is developed. Use of these good materials means that the building will have a sturdy structure that can withstand the test of time and can also combat any harsh climatic conditions. Weather is something that no-one has control over so the best way to cope with it is to ensure that the building can endure weathering as well as a little bit of bad weather conditions.

Robust structure – High strength concrete will give the building a structure that is more robust than other structures. A robust structure is one that gives the building an impressionable form and helps that form last for years to come. It ensures that the concrete is not the porous kind, which can make it hollow, but rather is strong and sturdy that can withstand any cracks caused by bad weather conditions or by any renovations and attachment of fixtures. Often buildings seem sturdy and as though they can endure nearly every kind of pressure, however, once they begin to be inhabited, the footfall or any renovation, fixtures, etc. seem to cause significant damage to the building, internally as well as externally

Cost-effective – The cost of something serves as a huge influencer in whether people make a purchase and people often choose to opt for the cheaper way out. However, the more important thing is to take into consideration the 'cost-effectiveness' rather than just the cost itself and then make a decision. As is understood, using such kind of concrete would not only impact the overall costing of constructing the building but also improve the quality of the building and make it more sturdy, robust and durable. The cost-effectiveness of using high strength concrete is a major reason why construction companies should make use of high quality concrete while constructing

1.3 Problem Statement

The demand of better concrete is increasing day by day. Improved quality of concrete will only perform better if concrete improves workability, durability, flow ability & resistance to chemical attack/corrosion and reduce w/c ratio, heat of hydration & segregation mainly. For the fulfilment of above properties waste produced from the marble

industries & other industries are used for effective & efficient strength & durability of concrete with the addition of Alccofine

1.4 Scope of project

The scope of this research work is limited to the development of the samples prepared on by addition of marble dust with 1.5% by weight of concrete and 5%, 7.5% and 10% with Alccofine only.

The main aim of this project is to highlight the importance of Alccofine as Supplementary cementations material in construction industries and to increase the use of marble powder waste in concrete.

1.5 Objective

1. To study the physical properties concrete combined with Marble powder and Alccofine 1203 by conducting workability tests
2. To study the flexural behaviour of Marble powder and Alccofine 1203 mixed concrete beams by experimental investigations.
3. To conduct compression tests on Marble powder and Alccofine 1203 mixed concrete cubes
4. To compare the flexural performance of Marble powder and Alccofine 1203 composite beam with conventional steel reinforced concrete (SRC) beams.

II. LITERATURE REVIEW

2.1 General

The basic objective of this chapter is to get inside into the previous findings so that it will help to know the gap in earlier studies and to justify the research problem selected by me for the study purpose. The idea of adding a waste or fibres into concrete in order to increase strength and fracture energy goes back to a patent dated 1918 by H. Alfsen and this fact is reported by Katzer. Alfsen described a process to improve the tensile strength by adding longitudinal bodies (fibres) of different materials into the concrete. Afterwards several patents of different fibres and waste materials were proclaimed. In this chapter the literature is reviewed on Marble dust and Alccofine, experimental behaviour of concrete added with marble dust and mix design manuals for design purposes and on experiments/development/practices. The prominent areas covered in the present literature of reviewed are studies related to concept, model, system, functions, experimental tests and IS code recommendations, specifications, guidelines for detailed analysis and casting of beam and cube specimens. Indian and international studies are studied

2.2 The Research Carried Out by Various Researchers

The extensive literature review was carried out by referring standard journals, reference books, I.S. Code and conference proceeding. The major work carried out by different researchers is summarized below:

1) Investigation on Strength Properties of Concrete with Partial Replacement of Cement by Marble Powder and Fine Aggregate by Granite Powder

R. Anuradha et al, have studied the mechanical properties of concrete mixtures in which fine aggregate (sand) and cement were partially replaced with Granite powder and marble powder. The replacement is done by 5%, 10%, 15%, 20%, and 25% of cement by marble powder and 5%, 10%, 15%, 20%, 25% of fine aggregate by granite powder to evaluate the effect of presence of these replacement materials on the strength of specimens. This project also describes the feasibility of using the marble sludge and granite powder in concrete production as partial replacement of cement and fine aggregate. It should be designed to have a higher workability, high mechanical properties and greater durability than those of traditional concrete.



Fig2.1. Marble dust

Experimental investigation:

Mix proportions:

The following table shows the mix proportions of aggregates and marble dust and granite dust

Table 2.1. Mix proportions

mix	Materials		Mix proportions
	%marble	%granite	C:fa:ca
M40	5	5	1:1.8:3.5
	10	10	1:1.8:3.5
	15	15	1:1.8:3.5
	20	20	1:1.8:3.5
	25	25	1:1.8:3.5

Table 2.2. Number of specimens

Mix	% of replacement of marble and granite powder	Number of cube specimen		Number of cylinder specimens	
		7 days	28 days	7 days	28 Days
M40	5	3	3	3	3
	10	3	3	3	3
	15	3	3	3	3
	20	3	3	3	3
	25	3	3	3	3

Results

a) Compressive Strength. On partial replacement of OPC by 5% and 10% of marble powder and fine aggregate by granite powder gives a gradual increase in compressive strength when compared to conventional mix. Whereas at 15% the compressive strength is equal to that of conventional concrete compressive strength decreases at 20% and 25%

b) Split tensile strength On partial replacement of OPC by 5% and 10% of marble powder and fine aggregate by granite powder gives a gradual increase in tensile strength when compared to conventional mix. Whereas at 15% the tensile strength is equal to that of conventional concrete tensile strength decreases at 20% and 25%.

2) Partial Replacement of Cement with Marble Dust Powder

Mr. Ranjan Kumar et al, have studied that, the effect of marble dust powder (MDP) in concrete on strength is presented. Five concrete mixtures containing 0%, 5%, 10%, and 20% MDP as cement replacement by weight basis has been prepared. Water/cement ratio (0.43) was kept constant, in all the concrete mixes. Compressive strength, split tensile strength & flexural strength of the concrete mixtures has been obtained at 7 and 28 days. The results of the laboratory work showed that replacement of cement with MDP increase, up to 10% for compressive strength, & up to 15% for split tensile strength & flexural strength of concrete.

Objective of investigation

In this project main objective was to study the influence of partial replacement of cement with MDP. The compressive strength, tensile strength & flexural strength of ordinary M25 grade of concrete are obtained. Similarly compressive strength, tensile strength & flexural strength were obtained for 5%, 10%, 15%, & 20% replacement of cement with MDP by weight. The water cement ratio (0.43) kept constant throughout the investigation of this project work.

- To study the physical properties of Marble dust powder
- To characterize the particle size of Marble dust powder
- MDP as a replacement of cement material.
- To study the effect of MDP inclusion on the properties of concrete.

Results

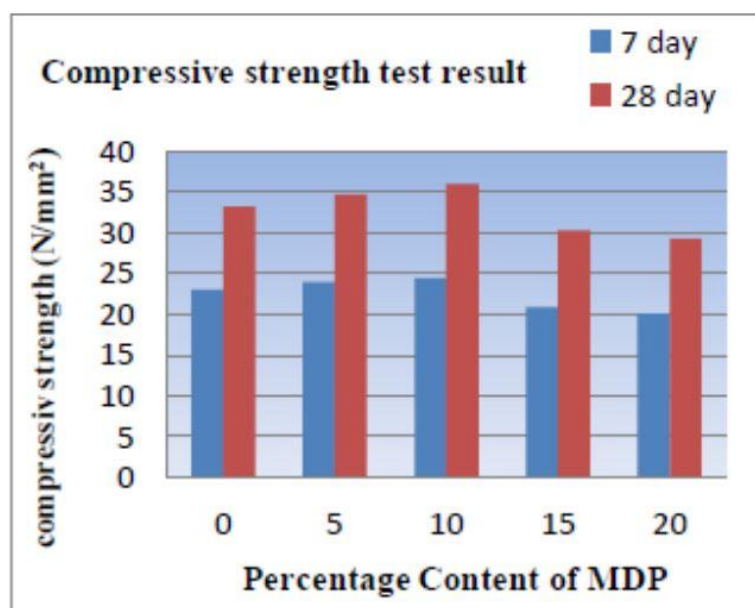


Fig 2.1 Graph: (Bar chart) %age replacement of MDP vs Compressive strength (N/mm2) of M25 grade of concrete

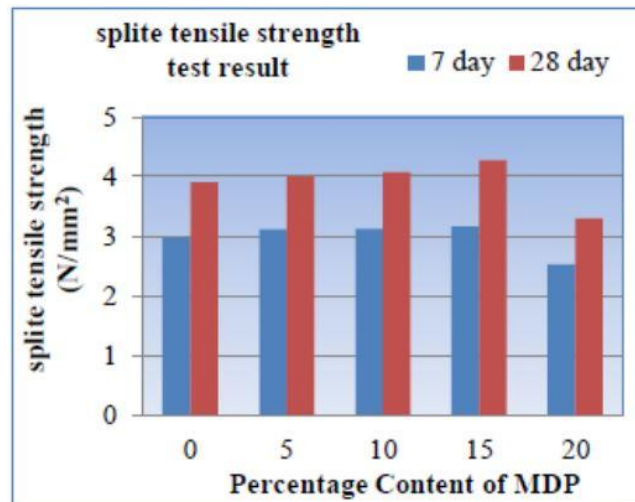


Fig 2.2 Graph. (Bar chart) %age replacement of MDP vs Flexural strength (N/mm²) of M25 grade of concrete

Conclusion drawn from this research

The usage of MDP in concrete improved its quality in terms of strength. The following conclusions were based on the study on the test result.

- a) The Compressive strength of Concrete increases up to 10% replacement of cement by MDP and further increasing of percentage of MDP leads to decrease in compressive strength of concrete.
- b) The Split tensile strength of concrete increases up to 15% replacement of cement by MDP & further increasing of percentage of MDP leads to decrease in Split tensile strength of concrete.
- c) The Flexural strength increases up to 15% replacement of cement by MDP and further increases in the percentage of MDP leads to decrease in flexural strength.
- d) It is concluded that the MDP can be used as a replacement material of cement, and 10% replacement of cement with MDP gives an excellent result in strength, as compared to the normal concrete.
- e) Use of these waste material leads to sustainable development in construction industry.
- f) To save the environment, MDP may be used as better partial substitute as a replacement of cement in concrete.

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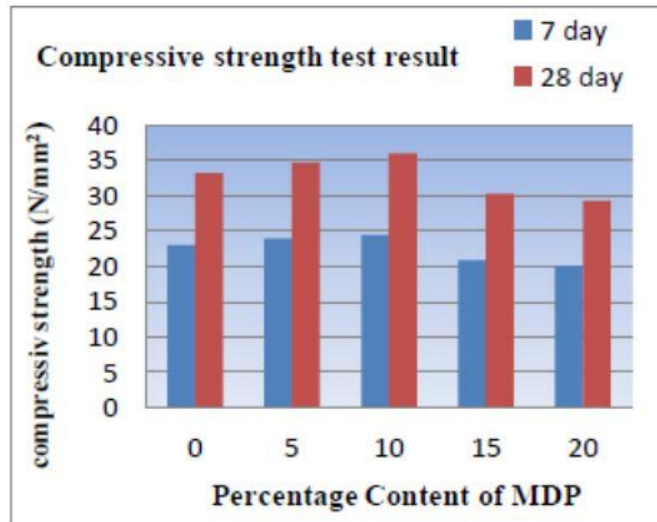


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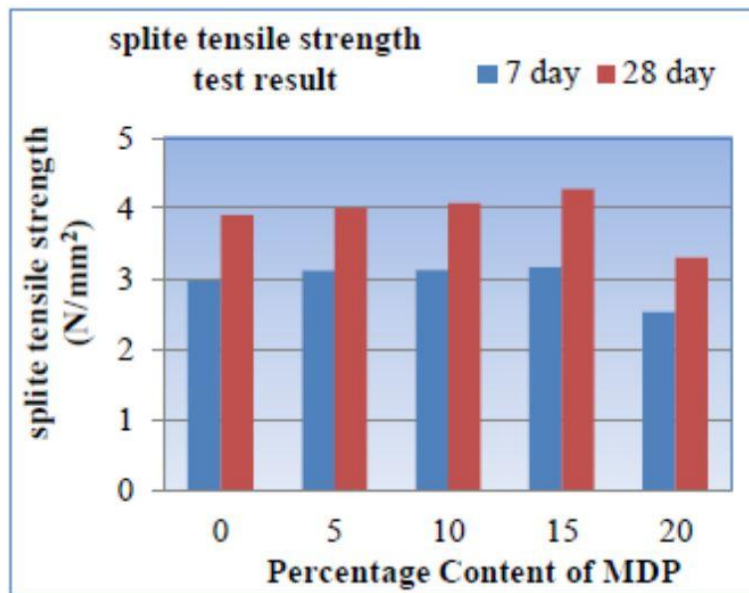


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- b) The Split tensile strength of concrete increases up to 15% replacement of cement by MDP & further increasing of percentage of MDP leads to decrease in Split tensile strength of concrete.

c) The Flexural strength increases up to 15% replacement of cement by MDP and further increases in the percentage of MDP leads to decrease in flexural strength.

d) It is concluded that the MDP can be used as a replacement material of cement, and 10% replacement of cement with MDP gives an excellent result in strength, as compared to the normal concrete.

e) Use of these waste material leads to sustainable development in construction industry. f) To save the environment, MDP may be used as better partial substitute as a replacement of cement in concrete.

3) Study on Marble Powder as Partial Replacement of Cement in Normal Compacting Concrete

Dr. B. Krishna Rao et al, have studied that, the 40% of marble waste is generated worldwide during quarrying operations in the form of rock fragments and 30% waste generated during processing. It is being dumped either in nearby empty pits, roads, riverbeds, pasturelands, agricultural fields or landfill leading to wide spreading environmental pollution. Marble powder contains high calcium oxide content of more than 50%. The potential use of marble dust can be an ideal choice for substituting in a cementations binder as the reactivity efficiency increases due to the presence of lime. A total of five concrete mixes, containing 0%, 5%, 10%, 15% and 20% partial replacement of cement with marble powder are investigated in the laboratory. These mixes were tested to determine compressive strength, split tensile strength and flexural strength for 7, 28 and 56days.

Conclusions:

It can be seen from the results of this study that use of marble dust replacement of cement in the production of concrete for the construction industry should be encouraged where there comparative cost advantage, the following conclusions can be made from this study. • The workability increased with increase of marble powder.

- The mechanical properties increased with increasing of curing days.
- The compressive strength increased with increase of marble powder up to 10% replacement
- It was observed that 2.81%, 2.92% and 4.58% of strength increased compared to normal mix with 10% replacement of marble powder at 7, 28 and 56days respectively.
- It was observed that 0.43%, 11.6% and 5.6% of spilt tensile strength increased at 10% of marble powder compared to normal mix at 7, 28 and 56days respectively.
- It was noticed that 11.22%, 20% and 14.8% of flexural strength increased at 10% replacement of marble powder compared to normal mix at 7, 28 and 56days respectively.
- Considerable reduction in strength was observed at 15% and 20% replacement of marble powder.
- For compressive strength, spilt tensile strength and flexural strength 10% replacement with marble powder is found to be a best alternative for replacement as increase in percentage of strength is high compared to other variations in the mix.

4) Use of marble powder as a partial replacement of cement:

Mrs. Shalaka S. Utkar et al, have studied that, improving the properties of concrete by addition of waste marble powder is becoming more popular now a day because it helps in achieving the economy and is a superior alternative for the concrete ingredient, which offers high strength. In this project we are going to test the cubes with varying percentage of waste marble powder and then test them on Compression Testing Machine (CTM). The focus of our project will be strengthening concrete by replacing cement by marble powder in the most economical way by using the proper grade of concrete for increasing Load Carrying Capacity

Objectives of this research:

1. To study the influence of partial replacement of cement with waste marble powder, and to compare it with the compressive strength of ordinary M20 concrete.

2. To determine and find the percentage of marble powder replaced in concrete that makes it economical. 3. As marble powder acts like a pollutant so by partially replacing cement with marble powder there will be reduction in pollution. From above graph we get clear idea about the compressive strength variation of concrete.

Conclusion:

The compressive behaviour of Concrete of cube was studied. The Cubes of varying percentages like 0% 5%, 10%, 15%, 20% and 25% were casted and cured at specific days of internal and tested on Compressive Testing Machine. After the testing the result analysis is made and cost analysis is made from that result following Conclusion is made.

1. Due to waste marble powder, it proved to be very effective in assuring very good cohesiveness of mortar and concrete.
2. From the above study, it is concluded that the waste marble powder can be used as a partial replacement material for cement; and 20% replacement of marble dust gives an excellent result in strength aspect and quality aspect and it is better than the conventional concrete.
3. The results showed that the substitution of 20% of the cement content by waste marble powder induced higher compressive strength, and improvement of properties related to durability.
4. The best possible way of disposal of waste material like waste marble powder can be by using it in concrete, which will reduce environmental burden

5) Effect of using Marble Powder in Concrete Mixes on the Behaviour and Strength of R.C. Slabs

Noha M. Soliman et al, have studied that, in recent years Marble is considered one of the most important decorative building materials. Marble powder is one of the materials which severaltly affects the environment and health problems. It is produced from sawing, shaping, and polishing process. This research aims to study the effect of using marble powder as partially replace of cement on the properties of concrete. The influence of using marble powder on the behaviour of reinforced concrete slabs is also investigated. The main variable taken into consideration is the percentage of marble powder as partial replacement of cement content in concrete mixes. The experimental results showed that, using definite amount of marble powder replacement of cement content increases the workability, compressive strength and tensile strength. Using marble powder enhanced also the structural performance of the tested slabs as it increased the stiffness and the ultimate strength compared to the control slabs.

Analysis and Discussion of the Test Results:

The following conclusions are derived based on the conducted experiments

1. Workability was increased by using small amount of marble powder ratio as a replacement of cement and leads to increase the compaction and the strength of concrete.
2. The increasing of marble powder ratio as a replacement of cement over the optimum dosage leads to the segregation of aggregate and bleeding of cement and aggregates lead to decrease the resistance of concrete.
3. Increasing the marble powder ratio replacement of cement led to the increasing as the compressive strength by about (25% and 8%) for the marble powder replacement ratios (5% and 7.5%) compared to the control mix.
4. Increasing the marble powder ratios higher than 5% decreased the compressive strength of concrete mixes.
5. Increasing indirect tensile strength and modulus of elasticity was recast of the by using marble powder ratios (5% and 7.5%) compared to the control mix.
6. Increasing the marble powder up to 7.5% decreased the indirect tensile strength and the modulus of elasticity.
7. Increasing in the initial crack and the ultimate load values were recorded when using 5% of marble powder replacement of cement in reinforced concrete slabs compared to the control slab.
8. Using 5% marble powder replacement of cement decreased the deflection of the R.C.Slabs compared to the control slabs.

9. Using 5% marble powder replacement of cement increased and the stiffness of the concrete slabs

III. METHODOLOGY

3.1 Overview

This project aims to study the physical properties of concrete mixed marble dust and alccofine 1203 by conducting durability tests on cubes prepared of concrete of size 150mm x 150mm. This study also aims to study the flexural behaviour by experimental investigations conducted on the beams by conducting four point bending test on the beams. The ultimate load bearing capacity will be determined for both the beams. All the above tests conducted on concrete mixed marble dust and alccofine 1203 are compared with the flexural performance conventional steel reinforced concrete (SRC) beams and cubes.

Types of test specimens were used in this project:

1] Concrete mixed marble dust and alccofine 1203 cubes with dimensions 150x150mm for M20

Four groups of specimens were prepared, each subject to one of the following proportioning scenarios of marble dust:

5%

7.5%

10%

12%

Within each group, specimens were tested after the 28 day moist curing period. Group one contained three sub-groups of Two cubes for experiment. The tests for the cubes and beams each will be cast in the Structures lab.

The same grouping is done for the remaining two proportions

For obtaining physical properties the following tests on the cubes will be carried out:

1. Standard Consistency
2. Initial Setting Time
3. Final Setting Time
4. Fineness of Cement
5. Density of Cement
6. Soundness of Cements

The following tests will be carried out on the FFRC and CFRC beams:

1. Compressive strength test
- 2 Flexural strength test

3.2 Problem Statement:

Ecological concerns have resulted in a renewed interest in natural materials and recycled materials, and such issues as recyclability and environmental safety have become increasingly important for the introduction of new materials and products. Structural polymer composites are traditionally utilizing man-made fibres (such as glass or carbon fibres) as reinforcement, but environmental issues have generated a considerable interest in waste materials. Marble waste procured from quarry operations can be dangerous and environmentally detrimental. Looking at the current scenario, the cost of material is increasing and so the use of the waste material in the concrete decreases the price of production which helps in achieving economy of our concrete

In India, around 6 million tons of wastes from marble industries are being generated from marble cutting, polishing, processing and grinding. Direct exposure of the waste material to the environment can cause many environmental problems and because of which many countries are still working on usage of waste materials

Hence this project aims to combine the products of alccofine and marble dust as in concrete gradually by 2.5%, 5% and 7.5% 10% & marble dust 5%, 7.5% and 10% 12% and observe the physical as well as strength characteristics.

3.3 Methodology:

The project study involved two stages. The primary data was gathered through a Literature survey targeted by web searches and review of eBooks, manuals, codes and journal papers. After review the problem statement is defined and sample preparation is taken up for detail study and analysis purposes. This project execution follows the flow chart given below: The following flow chart describes the layout of this project briefly:

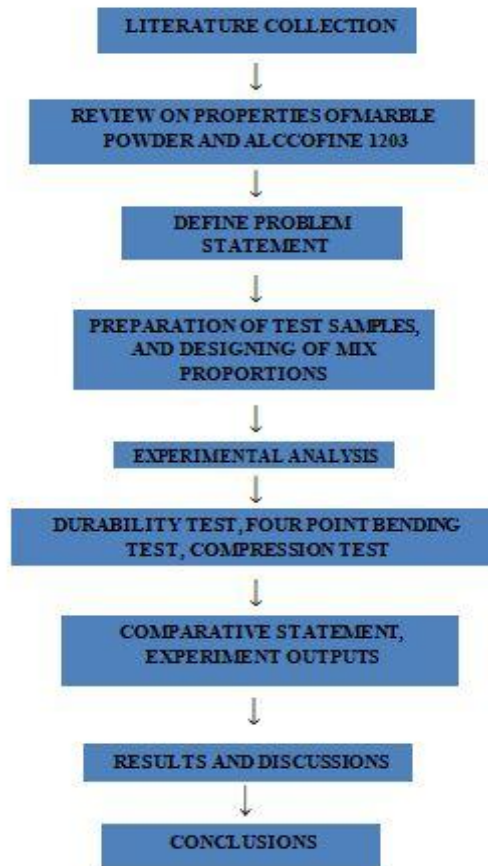


Fig 3.1 Methodology

3.4 Materials Properties:

3.4.1 Materials used in Concrete:

The materials used in the study are:

Portland cement (PPC): Shankar cements

M-Sand: Clean River sand purchased from Siddeheshwar transport

Marble dust : Waste powder - procured from Jain Marble Industries (Established in the year 2017, Maharashtra) which is in Ambegaon Budruk, Pune is a top company in the category Marble Dealers, also known for Granite Dealers, Stone Dealers

Water: Collected from local fresh water sources

Coarse aggregate: Aggregates passing through 20mm IS sieve

Alccofine 1203 Concrete Additive: Counto Microfine Products Private Limited Mumbai, Maharashtra

M-Sand:

Getting good quality of M-sand which should be free from organic impurities. While adding the M-sand to the mix, it should be in uniform size i.e. all the M-sand particles should be fine. The M-sand obtained from local resource is used in production of fly ash based geopolymer bricks. The physical and chemical properties of M-sand obtained by testing the samples as per Indian Standards.



Fig. 3.2 M-Sand

Table 3.1 Properties of M- Sand

Property	M-sand
Specific Gravity	2.58
Bulk Density (kg/m ³)	1600
Absorption (%)	1.25
Fine particles less than 0.075 mm (%)	15
Sieve Analysis	Zone-II

Cement:



Fig. 3.3 Cement

Portland cement conforming to IS 12269-1987 was used. Chetnad cement 53 Grade procured from single source, properties in the laboratory. Cement is a fine, grey powder. The cement was of uniform colour and was free from any hard lumps. The quantity of cement required for the experiments was collected from one single source and the bags were stored in nearly air tight container. Summary of the various test conducted on cement. Above Fig.3.3 shows cement

Coarse aggregate:

IS 383-1970 defines coarse aggregates as Aggregates most of which is retained on 4.75 mm IS Sieve and containing only so much finer material as is permitted for the various types described in this standard Figure 3.4



Figure 3.4. Coarse aggregate

Water:

According to IS 456 : 2000, water used for mixing and curing shall be clean and free from injurious amounts of oils, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel. Potable water is generally considered satisfactory for mixing concrete. The pH value of water shall be not less than 6





IV. RESULT AND DISCUSSION

4.1 General

The compressive and flexural performance of concrete confined with marble dust and alccofine structures will be investigated in detail. The mass content of marble dust considered will be 5% and 7.5%, 10% and 12% and alccofine considered will be 2.5% and 5%, 7.5% and 10% of total mix proportion.. Test results for the both (conventional and marble dust mixed concrete) for axial compressive strength, for its flexural behaviour. In flexure, the marble dust is expected to increases the lateral load bearing capacity and the deflection several times larger than the concrete cubes with the addition of alccofine. This experimental investigation is carried out under mix proportion i.e. M20 and the results of the durability tests are compared with the same mix proportionated concrete cubes.

This section discusses of the results from hardened concrete i.e. 7 & 28 days. For getting the final results all the sample results are compared to other i.e. to standards. In this work we have done mix design of M20 grade & the high strength are achieved in final results are obtained.

Methods Adopted For The Testing Of Sample:

In this the characteristics properties of substance testing includes compressive, split tensile force, flexural force of the material.

4.2 Result of Compressive testing of the Cubes

The compressive force tell us the material quality gives a strength of will be unswervingly of correlated of the hydrated structure which is the cement glue. The test is conducted to determine the strengths of hardened state concrete which is for developing the specimens of the concrete is very much important concrete.

Table 4.1 Result of Compressive Strength of 5% Marble Dust

MIXING MATERIAL WITH % OF (METAKOLIN, MARBLE DUST)	COMPRESSIVE STRENGTH (N/MM ²)	
	7Days	28Days
CC	37.193	58.26
MIX ₁ (2.5%, 5%)	58.04	64.21
MIX ₂ (5%, 5%)	58.38	64.93
MIX ₃ (7.5%, 5%)	59.58	66.32
MIX ₄ (10%, 5%)	64.12	70.2

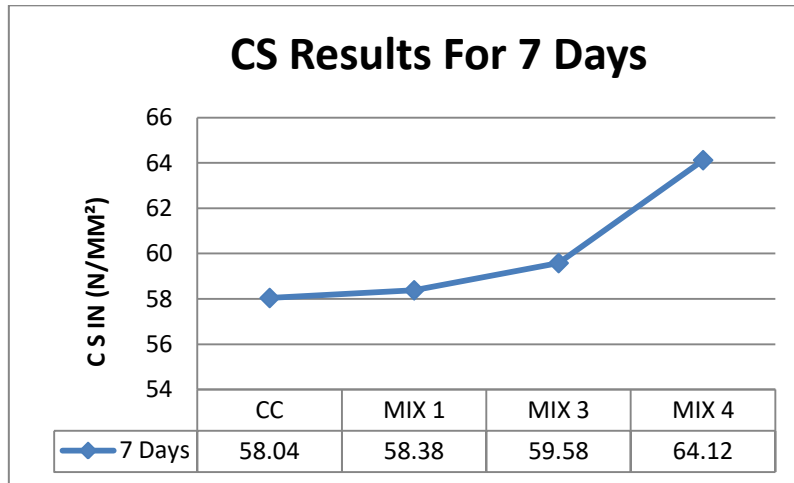


Fig No 4.1 Shows 7days C T results with various mixes of Alccofine.

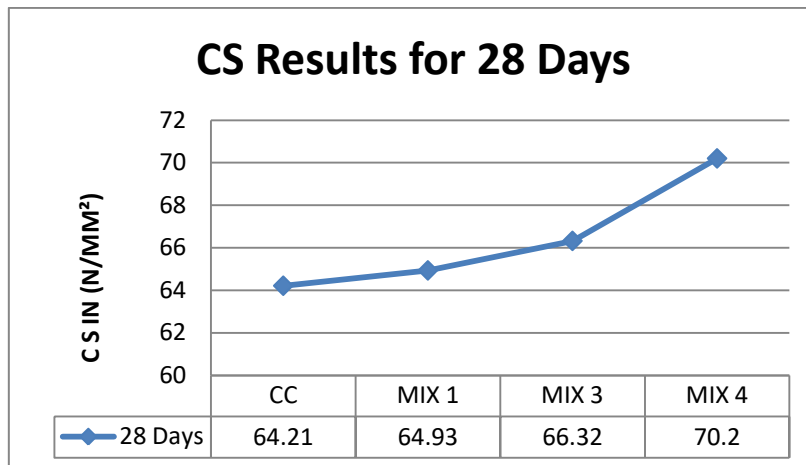


Fig No 4.2 Shows 28 days C T results with various mixes of Alccofine.

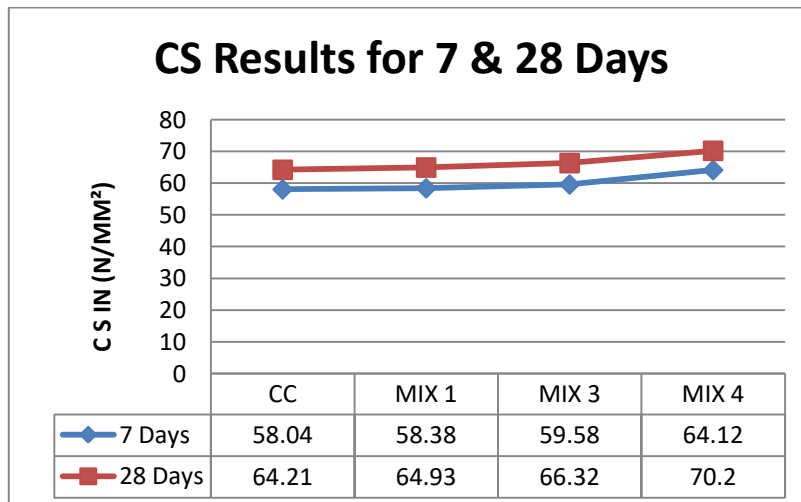


Fig No 4.3 Shows 7 & 28 days C T results with various mixes of Alccofine



Table 4.2 Result of Compressive Strength of 7.5 % Marble Dust

MIXING MATERIAL WITH % OF (METAKOLIN, MARBLE DUST)	COMPRESSIVE STRENGTH (N/MM ²)	
	7Days	28Days
CC	37.193	58.26
MIX ₁ (2.5%, 7.5%)	59.22	67.11
MIX ₂ (5%, 7.5%)	60.45	68.44
MIX ₃ (7.5%, 7.5%)	63.39	69.86
MIX ₄ (10%, 7.5%)	73.9	80.39

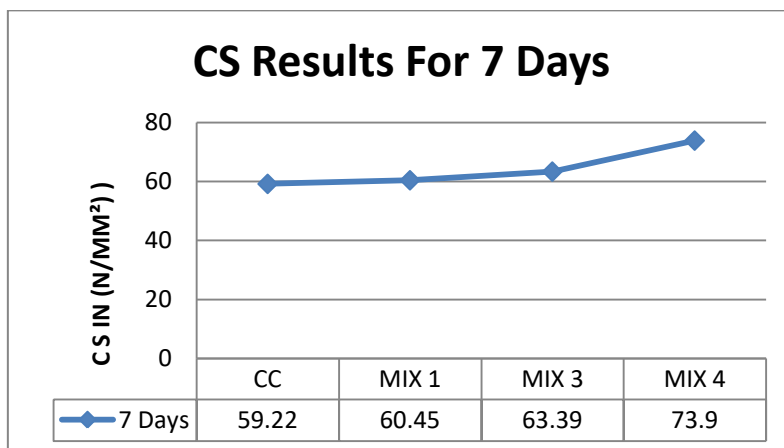


Fig No 4.4 Shows 7 days C T results with various mixes of Alccofine.

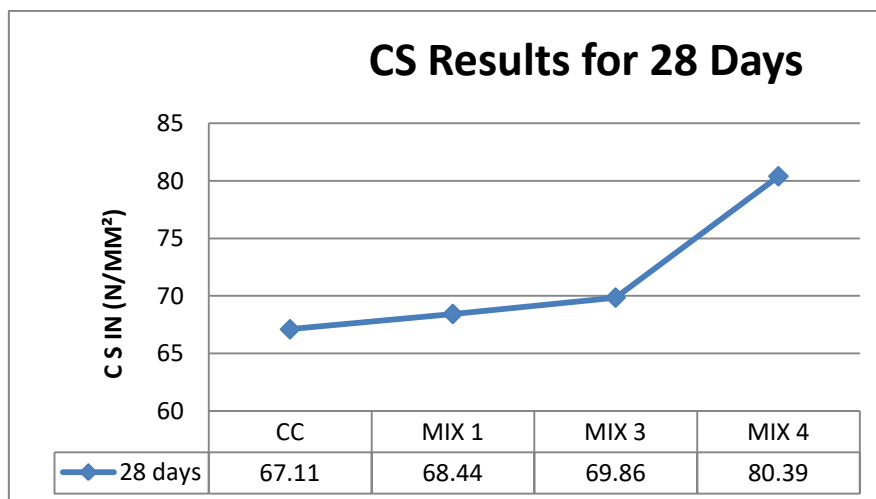


Fig No 4.5 Shows 28 days C T results with various mixes of Alccofine.

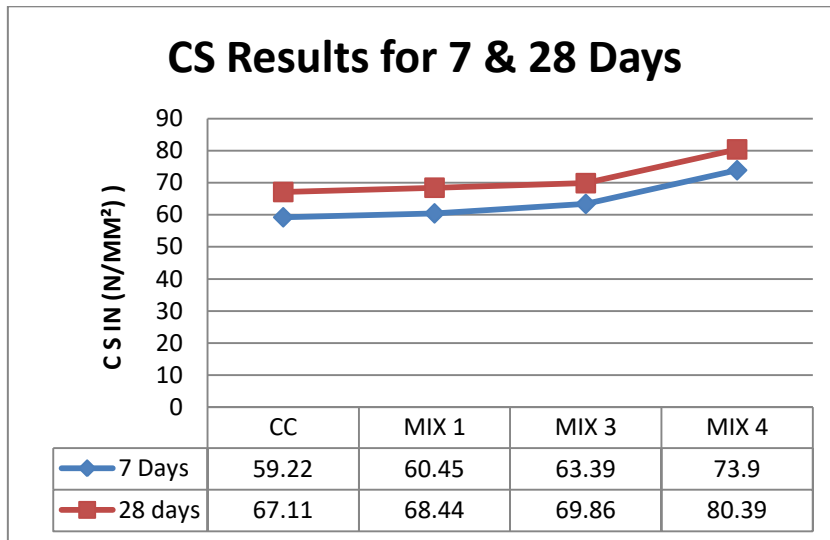


Fig No 4.6 Shows 7 & 28 days C T results with various mixes of Alccofine

Table 4.3 Result of Compressive Strength of 10 % Marble Dust

MIXING MATERIAL WITH % OF (METAKOLIN, MARBLE DUST)	COMPRESSIVE STRENGTH (N/MM ²)	
	7Days	28Days
CC	37.193	58.26
MIX ₁ (2.5%, 10%)	60.35	68.91
MIX ₂ (5%, 10%)	62.66	69.33
MIX ₃ (7.5%, 10%)	65.48	70.32
MIX ₄ (10%, 10%)	76.6	81.22

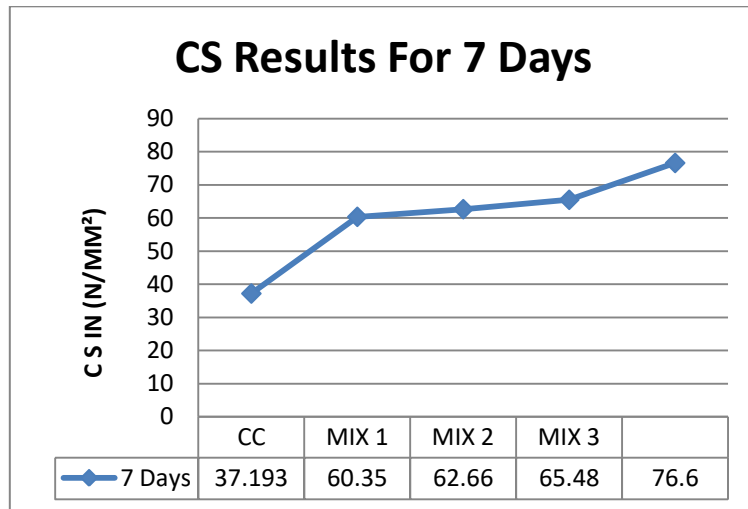


Fig No 4.7 Shows 7 days C T results with various mixes of Alccofine.

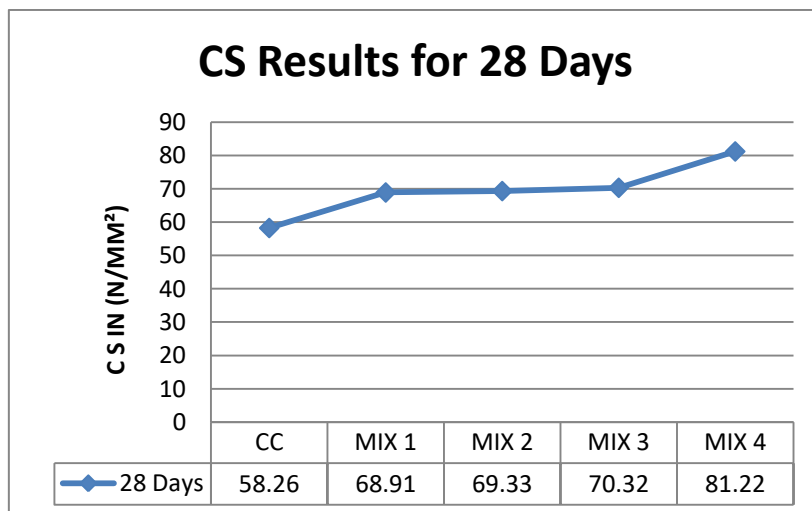
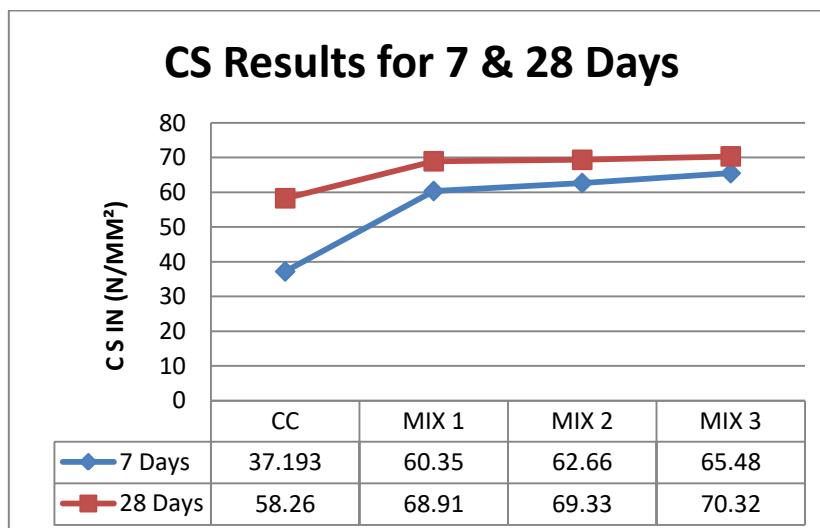


Fig No 4.8 Shows 28 days C T results with various mixes of Alccofine.



V. CONCLUSION

The good results will be founded by the substitution of Alccofine & Marble dust i.e. 7.5%, 10% .

To find the force of concrete, the concrete evaluated for the test of compression force of high strength concrete in which the replacement of material Alccofine & Marble dust testing 7days, 28days.

In every trail mix of our concrete mix will be tested by compressive, flexural Test.

The Compressive Strength increases with the use of Alccofine material .The maximum strength achieved in concrete having 7.5% Alccofine, 10% marble Dust i.e., Mix 3.the strength increased 2.3% as compare to CC.

The Flexural-Strength(force) also shows the enhancing in concrete strength with the presence of Alccofine, The maximum strength achieved in concrete having 10% Alccofine, 12% GGBS i.e., Mix4.the strength increased 1.6% as compare with the normal concrete.

Hence for an above experimental research has concluded that cement with Alccofine 10% & Marble Dust 12% partial replacement gives an optimum good result of forces and also helps in the strength & durability improvement properties of high strength concrete.

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