

EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF CEMENT BY MARBLE POWDER AND QUARRY DUST

R.MAHADEVI¹, BINOY MATHEW SAM², ILAVARASAN.K³, MOHAN KUMAR .P⁴

RAMACHANDRAN.M⁵

Asst. Professor¹ Dept .of civil Engineering, The Kavery Engineering College, Salem, Tamil Nadu, India.

UG Student^{2,3,4,5} Dept .of civil Engineering, The Kavery Engineering College, Salem, Tamil Nadu, India.

Anna University, Chennai, Tamil Nadu, India .

Abstract: This paper present the study of concrete mix design using marble powder and quarry dust . This disposal of marble powder from the marble industry is of environmental problem today. Then the used for replacement process 25 grade concrete . The partial replacement of mix design of concrete . As percentage replacement of 20% , 25% , 30% are used in marble powder and quarry dust increases for workability reduce.

KEYWORDS: CEMENT , MARBLE POWDER , QUARRY DUST ,COARSE AGGREGATES .

1.INTRODUCTION

This project deals with the advanced construction technique by concrete technology replaced by different waste materials. Wastes marble powder and quarry dust is generated as a by product cutting marble powder and quarry dust. The waste generated every year is in tones which dumped open space. The environmental problems attributed by waste marble powder and quarry dust imposes to physical, chemical, biological components of environments. It is therefore very important to reuse the marble powder and quarry dust which solve most of problem . This report describes the feasibility of using the waste of marble powder and dust as a partial replacement of cement.

2. MATERIAL PROPERTIES:

2.1 MARBLE POWDER

2.2 QUARRY DUST

2.1 MARBLE POWDER :

Marble is a metamorphic rock composed of recrystallized carbonate minerals most commonly calcite or dolomite. Marble may be foliated. Geoygists use the term marble to refer to metamorphosed limestone. Marble is commonly used for sculpture and as a building material. marble powder was collected from the dressing and processing unit . It was initially in wet from after that it is dried by exposing in the sun and finally sieved by IS -90 micron sieve before mixing in concrete .



FIG(1). MARBLE POWDER

2.2 QUARRY DUST :

A quarry is a place from which dimension stone, rock, construction aggregate, riprap, sand, gravel or slate has been excavated from the ground. A quarry is a same thing as an open pit mine from which minerals are extracted. The quarry can also include the underground quarrying for stone such as bath stone. quarry dust as a by- product from crushing process during quarrying activities is one of those Material that have recently gained attention to be used as concreting aggregates , especially as fine aggregate . In concrete production in could be used as a partial or full replacement of nature sand.



FIG(2). QUARRY DUST

**MARBLE POWDER MATERIAL PROPERTIES:
CHEMICAL COMPOSITION OF MARBLE POWDER:**

MATERIAL	MARBLE POWDER
Cao	32.23
Fe2o3	1.09
Al2o3	1.09
Sio2	4.99
mgo	18.94
So3	0.02
K2o	0.91
Na2o	0.63

PHYSICAL COMPOSITIO MARBLE POWDER:

FINE AGGREATE:

Sand was collected from nearby river Zone-III is used as a fine aggregate is passed through the sieve of 4.75mm. IS: 383(1970) is followed for fine aggregate.

AGGREGATE:

Crushed coarse aggregates with nominal sizes of 12mm and 20mm maximum size obtained from the local crushing plants Fine aggregate (sand) is sourced from a local supplier, the coarse and fine aggregates had a specific gravity of 2.6 respectively.

CEMENT:

Locally available Ordinary Portland Cement (OPC) of 53grade has been used .

WATER:

Water cement ratio (W/C) of 0.45 was used in the preparing of concrete and for this purpose portable water used for mixing and curing purpose.

3.EXPERIMENTAL METHODOLOGY:

The concrete mix design was done in accordance IS: 10262(1982). In this project M_{25} grade are used the mix ratio is 1:1.1:2.2. By using this proportion value the volume of cement, fine aggregate and coarse aggregate are estimated. The Ordinary Portland Cement (OPC-53GRADE), Good stone aggregate and natural sand of Zone-III was used as coarse aggregate and fine aggregate. For this study cubes (150×150×150mm), cylinder (150mm dia&300mm height) and beam (100×100×500mm) were casted by replacement of cement by marble powder and quarry dust increasing the strength then further test are conducted such as workability then it will be casted.

4. CURING OF CONCRETE:

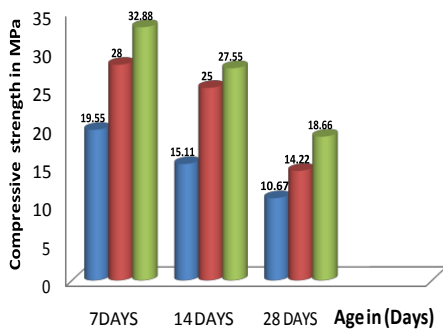
Casting of concrete after the completion of 24 hours mould will be removed then cured by using portable water. The specimen is fully immersed in portable water for specific age of 7, 14, 28 days. After the completion of curing it will be tested.

6. Results and Tables:

TABLE-1 TESTING ON COMPRESSIVE STRENGTH

S.NO	MIX	AVG. COMPRESSIVE STRENGTH (N/mm ²)		
		7 days	14 days	28days
1	0%	19.40	23.59	31.70
2	20%	19.55	28.00	32.88
3	25%	15.11	25.77	27.55
4	30%	10.67	14.22	18.66

CHART(1) COMPRESSIVE STRENGTH TEST



5. TESTING ON HARDERED CONCRETE

1. Compressive strength test
2. Split tensile strength test
3. Flexural Strength Test

TABLE (2) SPLIT TENSILE STRENGTH

S.NO	MIX	AVG SPLIT TENSILE STRENGTH (N/mm ²)		
		7 days	14 days	28days
1	0%	2.02	2.58	3.20
2	20%	4.58	5.72	4.58
3	25%	5.44	4.29	5.44
4	30%	4.80	5.15	5.15

CHART(2) SPLIT TENSILE TEST

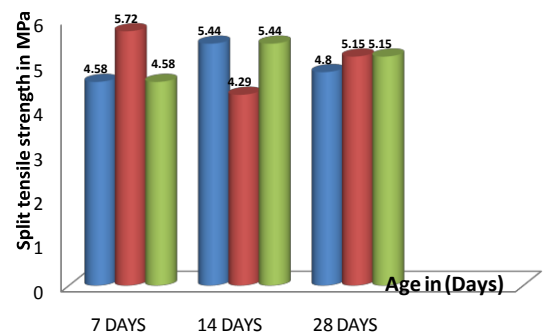
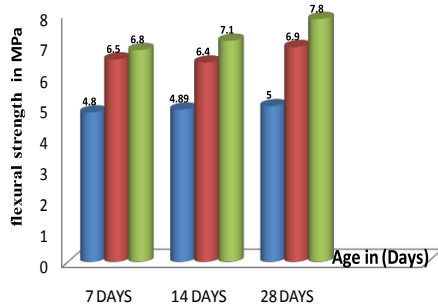


TABLE 3. FLEXURAL STRENGTH TEST

S.NO	MIX	Avg. flexural strength (N/mm ²)		
		7 days	14 days	28 days
1	NC	3.4	4.8	6.5
2	20%	4.8	6.5	6.8
3	25%	4.89	6.4	7.1
4	30%	5	6.9	7.8



7.CONCLUSION

The following conclusion can be drawn from the results obtained from the experimental investigations.

The specimen cast with 20% marble powder and quarry dust replacement by cement gives better compressive strength of 1.1% increased, split tensile strength of 1.06% increased, and flexural strength of 1.29%. when to compare to conventional concrete.

The specimen cast with 25% marble powder and quarry dust replacement by cement gives better compressive strength of 1.18% increased, split tensile strength of 1.11% increased, and flexural

strength of 1.22%. when to compare to conventional concrete.

The specimen cast with 30% marble powder and quarry dust replacement by cement gives better compressive strength of 1.13% increased, split tensile strength of 1.18% increased, and flexural strength of 1.13%. when to compare to conventional concrete.

Comparison to three different percentages of replacements, the strength will not reduce when compare to conventional concrete.

8. REFERENCE:

- 1) RS.Bansal "An partial replacement of cement by marble powder in concrete" ISSN2394-3777 mar ,2016 .P.Bhuvaneshwari An partial replacement of cement by with waste marble powder in concrete"" ISSN: 2320-8163 Apr. 2015
- 2) Ranjan kumar partial replacement of cement by with marble Dust powder in concrete" ISSN: 2348-9622 Aug. 2015
- 3) K.Maithili experimental study on durability properties of concrete using quarry dust as partial replacement of cement" Volume 3 - Aug. 2015
- 4) Rohit kumar use of marble powder as partial replacement of concrete in concrete mixing" ISSN: 2347-4718 sep. 2016
- 5) P.Bhuvaneshwari An partial replacement of cement by with waste marble powder in concrete"" ISSN: 2320-8163 Apr. 2015
- 6) D.suji experimental study on concrete using waste marble powder and quarry dust as partial replacement of cement and fine aggregate" ISSN:2348-7607. Volume 3 - sep. 2016
- 7) Ramya raju partial replacement of cement by with marble powder in concrete" ISSN: 2347-2812 Apr. 2016
