

# A Review on concrete mix by adding Marble Waste Powder and Fly Ash

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**Abstract:** There are many waste generated at construction sites. By using waste material in concrete we can save our cement and natural aggregate (sand) at some extent. Waste material and admixtures are used in concrete to strengthen up the strength of concrete. We can use admixtures like silica fume, fly ash and slag and waste material like recycled aggregates, waste marble powder and crushed tiles etc. Cement and sand are used in large amount like for building purpose, bridges, dams etc. This study aim is to check the compressive strength, split tensile strength and flexural strength of concrete by replacing cement and fine aggregates by Fly Ash and waste marble powder with constant water cement ratio 0.38.

**Key words:** Marble Waste Powder, Fly Ash, admixture, OPC 43 Grade.

## 1. Introduction

Cement is mostly used in construction sector. Concrete is the mixture of coarse aggregates, fine aggregates, cement, water and in some cases admixture is also used. Fine aggregate is a natural sand which is used widely in making concrete structures. So, we can reduce the consumption of natural aggregates by using waste construction material in place of sand. We are using Waste Marble Powder in this study as a replacement of fine aggregates. Marble waste generated during polishing, cutting, shaping and sawing. As we all know cement emits CO<sub>2</sub> gas into the atmosphere, this extends to pollution. Fly Ash is used as a replacement of cement. Waste construction material are eco-friendly to our environment, we can use them in a beneficial way and in an economical way. This is good for our sustainable construction. Waste construction material will reduce pollution and the use of consumption of our material like cement and sand.

## 2. Material

### 2.1 Cement

OPC (Ordinary Portland cement) 43 grade cement is used in this study.

### 2.2 Coarse aggregate

Coarse aggregate passed through 10mm sieve.

### 2.3 Fine aggregate

Natural sand is used, passing through 4.75 sieve.

### 2.4 Waste Marble Powder

Waste Marble Powder produced during grinding, cutting, polishing and shaping from marble process.

### 2.5 Fly Ash

Fly Ash is generated from the combustion of coal.

### 2.6 water

For mixing and curing purposes potable water is used.

## 3 Literature Review

**3.1. Mr. Lokesh Kumar, Prof. Gautam Bhadoriya :** Cement is replaced by Fly Ash and fine aggregates is replaced by stone dust and marble dust. Experiment is done by adding 25% and 35% Fly Ash in cement and by adding marble dust and stone dust up to 40%. At M3 maximum strength of concrete is attained by adding 25% of Fly Ash and at M9 maximum strength is attained by adding 35% of Fly Ash.

**Table 1: Control Mix**

Water (Liters)	Cement (Kg)	Fine Aggregates (Kg)	Coarse Aggregate (Kg)
0.45	1	1.44	2.90
183	406	585	1181

**Table 2: Detail of Samples Strength by Adding 25% And 35% Fly Ash.**

S. No.	Mix	7 days Avg. Strength(N/mm <sup>2</sup> )	28 days Avg. Strength (N/mm <sup>2</sup> )
1	C	27.55	39.20

2	M1	20.88	29.80
3	M2	23.55	32.00
4	M3	26.66	37.35
5	M4	21.33	30.25
6	M5	22.22	31.55
7	M6	20.88	29.80
8	M7	19.55	28.00
9	M8	20.44	28.90
10	M9	23.11	33.35
11	M10	19.55	27.55
12	M11	17.77	25.80
13	M12	18.66	26.70

**3.2 Raman Kumar, Ankit Mahajan :** Fine aggregates is replaced by marble waste powder in the proportion 0%, 10%, 15% and 20%. Superplasticizer AURAMIX 400 was used at constant 0.06. Curing was done for 7, 14 and 28 days. At 15% maximum compressive strength is 40.5, split tensile strength is 6.03, flexural strength is 5.92 and strength is start decreasing at 20% (after 28 days of curing).

**3.3 Bhupendra Singh Kalchuri<sup>1</sup>, Dr. Rajeev Chandak, R.K.Yadav :** Partial replacement of sand by marble waste powder in the proportion of 10%, 20%, 30% and 40% for 7, 28 and 90 days of curing. Compressive strength is performed. At 20% maximum compressive strength is attained. Maximum compressive strength in 7 days is 27.18, in 28 days is 41.04 and in 90 days 54.1. Specific gravity of cement is 3.10 and specific gravity of marble powder is 2.577.

**Table 3: Compressive Strength**

Sr. No.	% Replacement	7 days strength N/mm <sup>2</sup>	28 Days Strength N/mm <sup>2</sup>	90 Days Strength N/mm <sup>2</sup>
1	0	27.04	39.55	54.08
2	10	27.11	40.59	54.67
3	20	27.18	41.04	54.81
4	30	25.92	36.15	45.33
5	40	23.85	33.48	43.85

**3.4 Dr S L Patil, J N Kale , S Suman :** Replacement of cement is done by Fly Ash in the proportions of 0%, 5%, 10%, 15%, 20% and 25%. Maximum compressive strength is achieved at 10% in 90 days. Hence, this is proof we can use cement as a partial replacement of cement to protect our environment from harmful gases CO<sub>2</sub>.

#### 4 Conclusion

1. Increase in water cement ratio decrease the strength of concrete.
2. With addition of Fly Ash initial and final setting time get decreased.
3. Reuse of waste construction material Fly Ash and Marble Waste Powder reduced environmental problems at some extend.
4. Up to 20% compressive strength is increased in Marble Waste Powder as a partial replacement of fine aggregates .

#### 5 References

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