International Journal of Research Publication and Reviews, Vol 6, Issue 9, pp 1308-1325 September, 2025

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Combined Influence on Mechanical Properties of High Strength Cement Concrete by Partial Replacement of Cement with Silica Fume and Marble Powder

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ABSTRACT

Concrete is the most widely used construction material worldwide, but its reliance on ordinary Portland cement (OPC) contributes to high carbon emissions and rising costs. This research investigates the combined effect of silica fume (SF) and marble powder (MP) as partial replacements for cement in high-strength concrete (HSC). Six concrete mixes were designed for M30 and M40 grades, replacing OPC with 5–25% combinations of SF and MP. Various mechanical properties, including compressive strength, split tensile strength, and flexural strength, were evaluated at 7, 14, and 28 days. Workability was also studied using slump tests. Results revealed that the inclusion of SF enhanced strength and durability due to its pozzolanic activity, while MP contributed to improved packing density. The optimum replacement level was found to be 15% SF with 5% MP, showing significant improvements in compressive, tensile, and flexural strengths compared to conventional concrete. The study demonstrates that SF and MP can serve as sustainable alternatives to OPC, reducing environmental impacts while maintaining or enhancing mechanical performance.

Keywords: High-strength concrete, Silica fume, Marble powder, Mechanical properties, Sustainable materials

1. Introduction

Concrete, a composite material made of cement, sand, coarse aggregates, and water, is an indispensable material in modern construction. It is used in multi-storey buildings, roads, dams, and offshore structures. The performance of concrete depends on several factors such as the quality and proportion of its constituents, mixing, curing, and compaction methods. However, ordinary Portland cement (OPC) production is highly energy-intensive and a major source of CO_2 emissions. The increasing demand for concrete has prompted researchers to explore supplementary cementitious materials (SCMs) that can partially replace cement while enhancing performance. Industrial by-products such as fly ash, silica fume, steel slag, and marble powder have shown potential. Among these, silica fume (SF), a by-product of silicon alloy industries, is an ultrafine material with strong pozzolanic properties. Marble powder (MP), generated in large quantities as waste during marble cutting and processing, poses environmental challenges when discarded improperly. This study focuses on the combined influence of SF and MP as partial replacements of cement in high-strength concrete (HSC). By utilizing these waste materials, the dual goals of sustainability and improved performance can be achieved.

2. Objectives of the Study

1. To ascertain the silica fume and marble powder comparative investigation.
2. To assess the workability of concrete at various grades both with and without silica fume and marble powder in various amounts.
3. In order to determine the compressive strength of concrete at different classes, with or without silica fume and marble powder in different proportions.
4. To calculate the split tensile strength of concrete in different grades, both with and without marble powder and silica fume in different proportions.
5. To determine the flexural strength of concrete at various grades both with and without silica fume and marble powder in varying amounts.
6. To determine the ideal ratio of marble powder to silica fume in order to maximize concrete's strength.
7. Comparative analysis of the behaviour of marble powder and silica fume in and on concrete.

3. Materials and Methodology

- **Cement:** Ordinary Portland Cement (OPC, 43 grade) conforming to IS 8112:1989.
- **Fine Aggregate:** River sand (Zone II).
- **Coarse Aggregate:** Natural crushed aggregate (20 mm nominal size).
- **Silica Fume (SF):** By-product from silicon alloy industry, ultrafine particle size.
- **Marble Powder (MP):** Waste from marble cutting and polishing units.
- **Water:** Potable water conforming to IS 456:2000.

Methodology

Mix Design: M30 and M40 grades, OPC partially replaced with 5–25% SF and MP combinations. Water-cement ratio = 0.40.

Table 3.1 Formulation of Mix Design

MIX	**OPC (%)**	**SF (%)**	**MP (%)**
BM-1	100%	0%	0%
BM-2	90%	5%	5%
BM-3	85%	10%	5%
BM-4	80%	15%	5%
BM-5	75%	20%	5%
BM-6	70%	25%	5%

Tests on Workability

MIX	**OPC (%)**	**MP (%)**	**SF (%)**
BM-1	100%	0%	0%
BM-2	90%	5%	5%
BM-3	85%	10%	5%
BM-4	80%	15%	5%
BM-5	75%	20%	5%
BM-6	70%	25%	5%

Workability is the ability of plastic concrete to be mixed, handled, transported, and—above all— placed with the least degree of loss of homogeneity. It specifies, more precisely, that it can be totally compacted with the least amount of energy. In a workable concrete, there should be no indications of bleeding or segregation. To ascertain the workability of every concrete mix used in this project, slump tests were employed; Fig. 3.1 shows the test equipment. All of the mixes' slump values were seen to be within the permissible range of 20 to 80 mm.

Fig.3.1- Slump cone apparatus

Compressive Strength Test

The test was conducted using 150 x 150 x 150 mm cubes (for mortar and concrete). At 7, 14, and 28 days following curing, the specimens were taken out of the curing tank. After that, surface water was allowed to drop. Figure 3.2 shows the specimens being tested on a 200-ton Compression Testing Machine (CTM). The cube was positioned perpendicular to the casting position during testing. The axes of the specimens were carefully aligned with the center of thrust of the spherically seated plates. The load was applied gradually and without shock, increasing steadily at a rate of 3.5 N/mm2/minute until the specimen collapsed. For every batch of concrete, the average of three samples was used to get the representative value of compression strength. By dividing the highest compressive load by the cube specimens' cross sectional area, the compressive strength was computed. As a result, the compressive strength of several specimens was discovered.

Fig. 3.2- Compressive testing machine

Splitting Tensile Test

In a compression testing equipment, a cylindrical specimen is placed horizontally between the loading surfaces (Fig. 3.3). The cylinder is then loaded along its vertical diameter until it breaks. The test was carried out using 300 mm long and 100 mm diameter cylinders. After 28 days of water curing, specimens were removed from the curing tank. Then surface water was permitted to fall. After that, the specimens were put through a Compression Testing Machine (CTM) with a 200 ton capacity. and conduct tests in accordance with IS: 1199 and 516. Figure 3.4 displayed various specimen kinds that were created.

The following formula was used to calculate the split tensile strength.

2P / ΠDL Where, P = Splitting Load in KN = Split Tensile Strength (MPa) D is the cylindrical sample's diameter and

L is the cylinder sample's length.

Fig. 3.3- Split tensile test

Flexural Strength Test

In the "Structural Engineering" segment, every beam specimen was tested using a Universal testing machine with a 2000 KN capability. The same procedure was used to test each beam specimen. The beams' surface was polished using sand paper following a full 28-day curing period. After that, the specimens received a white wash and an identification number. The white wash was used to make it easier to find cracks during testing at various loading levels. Two point transverse loading was used to test the beam specimens. It is convenient to load two points simultaneously.

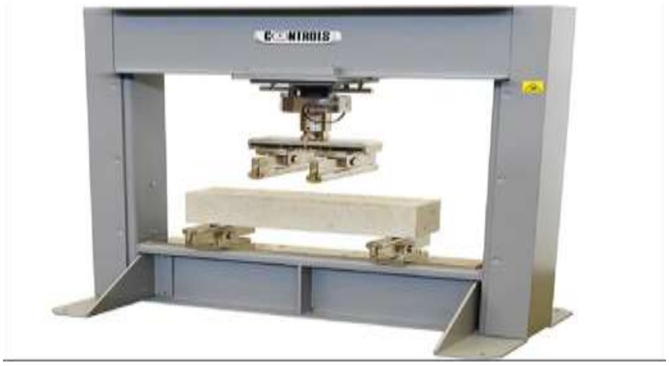


Fig. 3.4- Flexural strength test

4. Results and Discussion

General: I have used marble powder (MP) and silica fume (SF) in varied ratios, ranging from 0 to 25%, to partially replace cement. After casting nine cubes, six beams, and six cylinders using conventional concrete—that is, concrete containing cement (C), sand (S), and natural coarse aggregate (NCA)—the cement percentage is reduced to 75%, and the remaining 25% of the cement binder is substituted with a different ratio of silica fume (SF) and marble powder (MP).

Result of tested materials: Based on the previously mentioned technique, the testing material's result is displayed below:

Consistency test:

Initial and Final setting time test

Table 4.1 - Initial and Final setting time Test

Sr. No	Trial Mix	Setting Time (minutes)		Depth of Penetration (mm)
		Initial	Final	
1	BM-1	33	587	7
2	BM-2	35	575	7
3	BM-3	41	591	7
4	BM-4	45	588	7
5	BM-5	51	538	7
6	BM-6	45	543	7

Workability of Concrete Mixes

Sr. No	Trial Mix	Setting Time (minutes)		Depth of Penetration (mm)
		Initial	Final	
1	**BM-1**	**31**	**583**	**7**
2	**BM-2**	**35**	**509**	**7**
3	**BM-3**	**39**	**565**	**7**
4	**BM-4**	**46**	**540**	**7**
5	**BM-5**	**48**	**544**	**7**
6	**BM-6**	**44**	**547**	**7**

Slump test was used to determine whether concrete mixes were workable. The water-to-cement ratio (W/b) for each type of concrete mixes was maintained at 0.5. Table displayed the workability results for various concrete mixes.

Table 4.2 All Mixes Workability Result

Mix No.	Description-M30	Slump (mm)
BM-1	100%OPC+0%SF+0%MP	86
BM-2	90%OPC+5.00%SF+5%MP	70
BM-3	85%OPC+10%SF+5%MP	62
BM-4	80%OPC+15.00%SF+5%MP	50
BM-5	75%OPC+20.00%SF+5%MP	42
BM-6	70%OPC+25.00%SF+5%MP	40

Table 4.3 All Mixes Workability Result

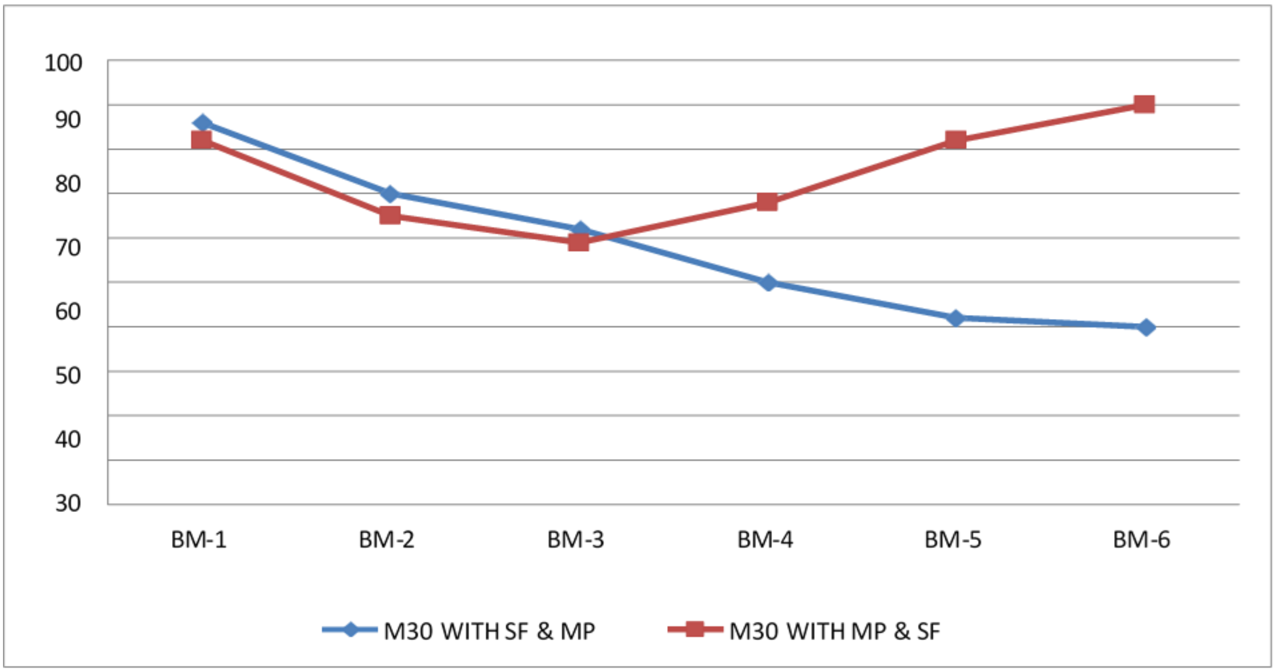
Mix No.	Description-M40	Slump (mm)
BM-1	100%OPC+0%SF+0%MP	98
BM-2	90%OPC+5.00%SF+5%MP	83
BM-3	85%OPC+10%SF+5%MP	70
BM-4	80%OPC+15.00%SF+5%MP	58
BM-5	75%OPC+20.00%SF+5%MP	55
BM-6	70%OPC+25.00%SF+5%MP	45

Table 4.4 All Mixes Workability Result

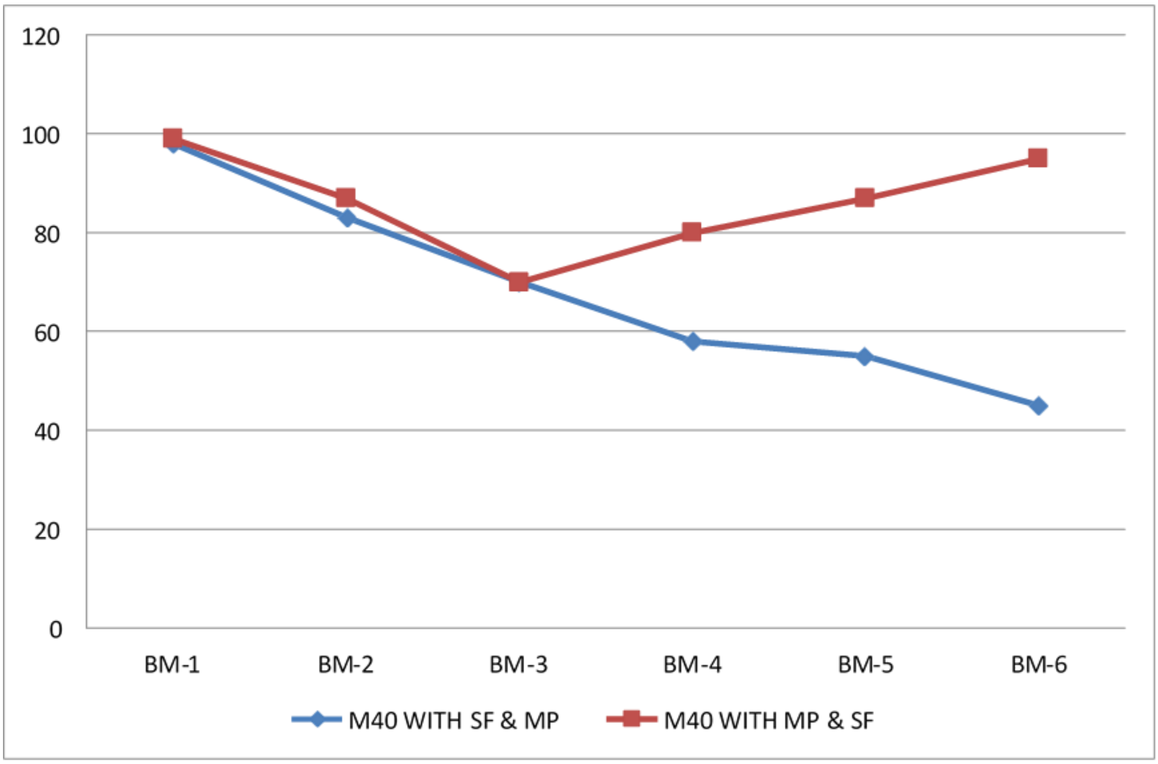
Mix No.	Description-M30	Slump (mm)
BM-1	100%OPC+0%MP+0%SF	82
BM-2	90%OPC+5.00%MP+5%SF	65
BM-3	85%OPC+10%MP+5%SF	59
BM-4	80%OPC+15.00%MP+5%SF	68
BM-5	75%OPC+20.00%MP+5%SF	82
BM-6	70%OPC+25.00%MP+5%SF	90

Table 4.5 All Mixes Workability Result

Mix No.	Description-M40	Slump (mm)
BM-1	100%OPC+0%MP+0%SF	99
BM-2	90%OPC+5.00%MP+5%SF	87
BM-3	85%OPC+10%MP+5%SF	70
BM-4	80%OPC+15.00%MP+5%SF	80
BM-5	75%OPC+20.00%MP+5%SF	87
BM-6	70%OPC+25.00%MP+5%SF	95



Graph 4.1 Combined Workability of M30 grades concrete



Graph 4.2 Combined Workability of M40 grades concrete

Compressive Strength Test Results

The results of the compressive strength tests conducted on concrete specimens of different mixes that were cured at different ages are shown and discussed in this section. Compressive strength tests were conducted after 7, 14, and 28 days of cure. The compressive strength test results for each mix at different curing ages are shown in the table. After 7, 14, and 28 days, respectively, the graph shows the difference in the compressive strength of the concrete mix compared to the control mix (100%OPC+0%SF+0%MP). Additionally, it displays the differences in compressive strength between all of the mixtures that were cured for 7, 14, and 28 days.

Table 4.6 Results for compressive strength (MPa) for each mix at various curing ages

Mix No.	*Description-M30*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%SF+0%MP*	***22.95***	***27.26***	***36.12***
BM-2	*90%OPC+5.00%SF+5%MP*	***22.12***	***25.39***	***35.36***
BM-3	*85%OPC+10%SF+5%MP*	***22.98***	***28.23***	***36.92***
BM-4	*80%OPC+15.00%SF+5%MP*	***25.98***	***30.31***	***39.12***
BM-5	*75%OPC+20.00%SF+5%MP*	***25.38***	***28.64***	***37.25***
BM-6	*70%OPC+25.00%SF+5%MP*	***24.29***	***29.12***	***36.02***

Graph:4.3 Compressive Strength for all curing days for M30

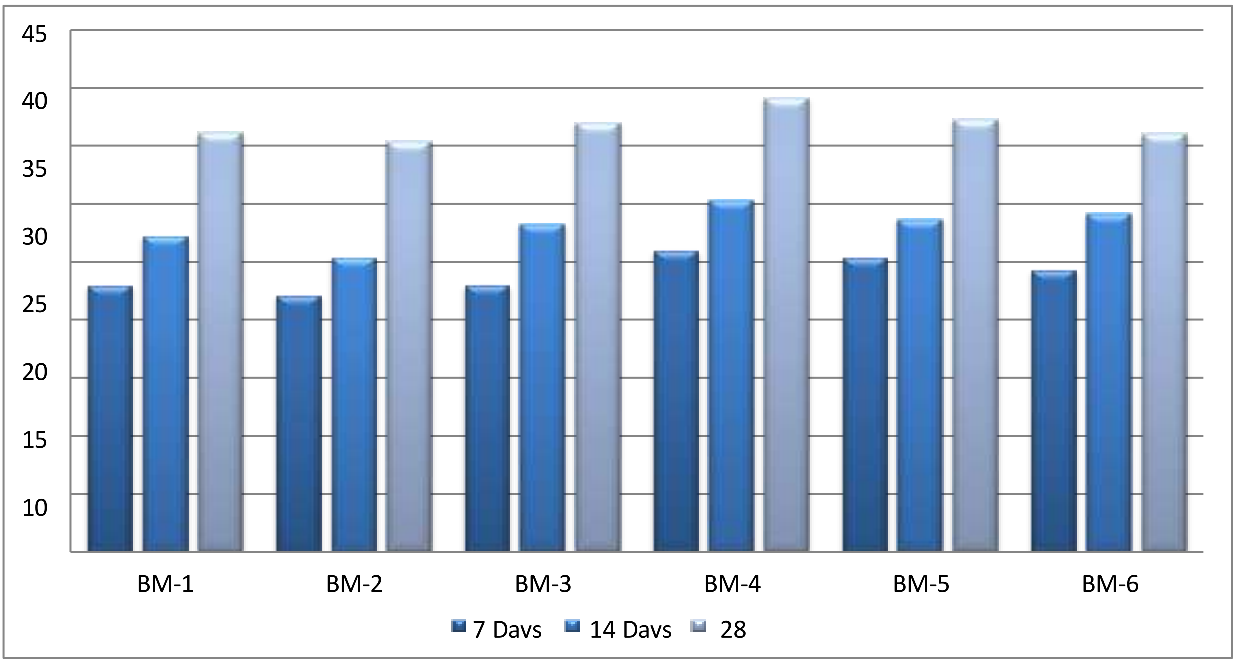


Table 4.7 Results for compressive strength (MPa) for each mix at various curing ages

Mix No.	*Description-M30*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%MP+0%SF*	***23.45***	***27.98***	***35.98***
BM-2	*90%OPC+5.00%MP+5%SF*	***25.56***	***30.25***	***37.45***
BM-3	*85%OPC+10%MP+5%SF*	***26.86***	***30.56***	***38.94***
BM-4	*80%OPC+15.00%MP+5%SF*	***25.38***	***28.14***	***36.56***
BM-5	*75%OPC+20.00%MP+5%SF*	***23.32***	***27.93***	***34.97***
BM-6	*70%OPC+25.00%MP+5%SF*	***22.96***	***26.75***	***33.38***

Graph:4.4 Compressive Strength for all curing days for M30

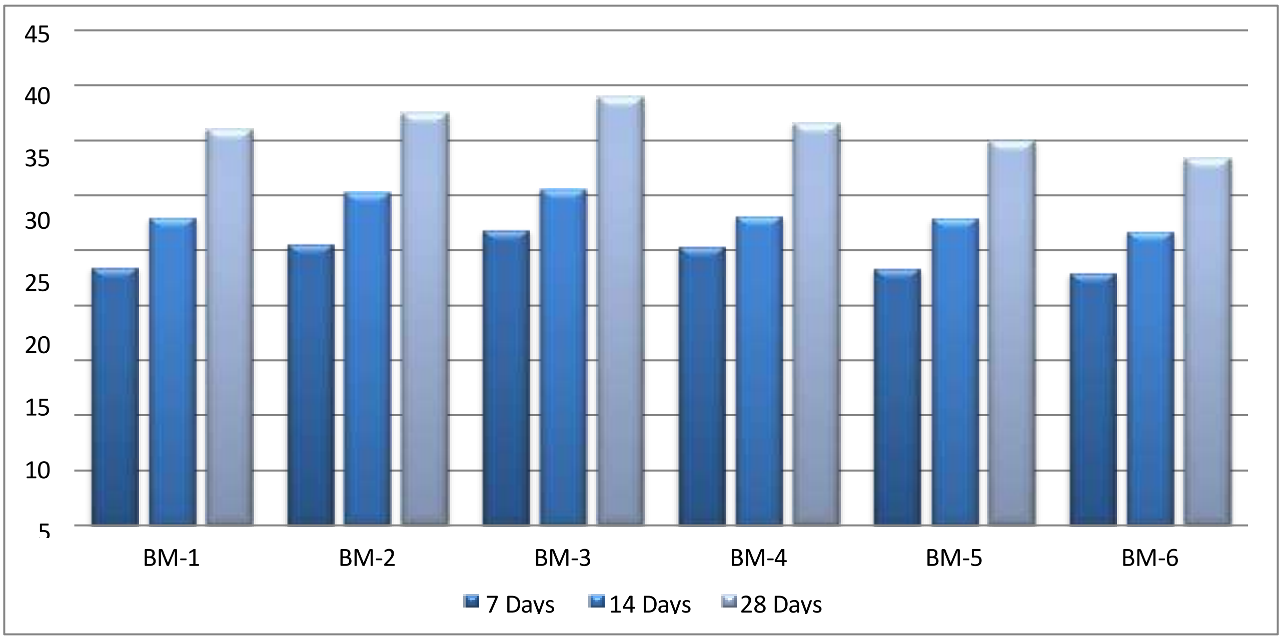


Table 4.8 Results for compressive strength (MPa) for each mix at various curing ages

Mix No.	*Description-M40*	*7 days*	*14 days*	*28 days*
BM-1	***100%OPC+0%SF+0%MP***	***29.76***	***35.54***	***45.31***
BM-2	***90%OPC+5.00%SF+5%MP***	***27.94***	***34.46***	***43.22***
BM-3	***85%OPC+10%SF+5%MP***	***31.46***	***35.52***	***46.41***
BM-4	***80%OPC+15.00%SF+5%MP***	***32.87***	***38.43***	***48.21***
BM-5	***75%OPC+20.00%SF+5%MP***	***31.32***	***37.43***	***47.12***
BM-6	***70%OPC+25.00%SF+5%MP***	***31.12***	***36.98***	***46.84***

Graph:4.5 Compressive Strength for all curing days for M40

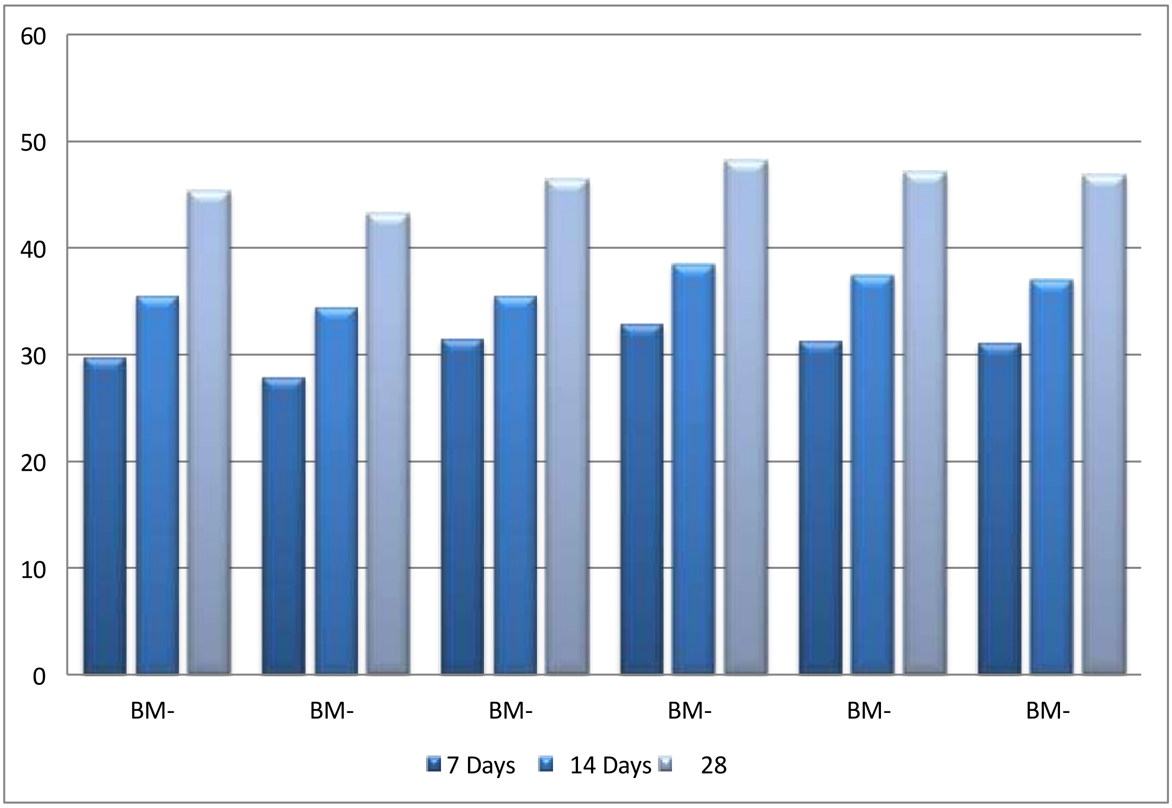


Table 4.9 Results for compressive strength (MPa) for each mix at various curing ages

Mix No.	***Description-M40***	***7 days***	***14 days***	***28 days***
BM-1	***100%OPC+0%MP+0%SF***	***29.32***	***37.10***	***45.12***
BM-2	***90%OPC+5.00%MP+5%SF***	***31.21***	***37.42***	***46.48***
BM-3	***85%OPC+10%MP+5%SF***	***31.72***	***38.34***	***47.34***
BM-4	***80%OPC+15.00%MP+5%SF***	***30.31***	***35.87***	***45.23***
BM-5	***75%OPC+20.00%MP+5%SF***	***28.41***	***34.74***	***44.32***
BM-6	***70%OPC+25.00%MP+5%SF***	***26.51***	***32.48***	***41.36***

Graph:4.6 Compressive Strength for all curing days for M40

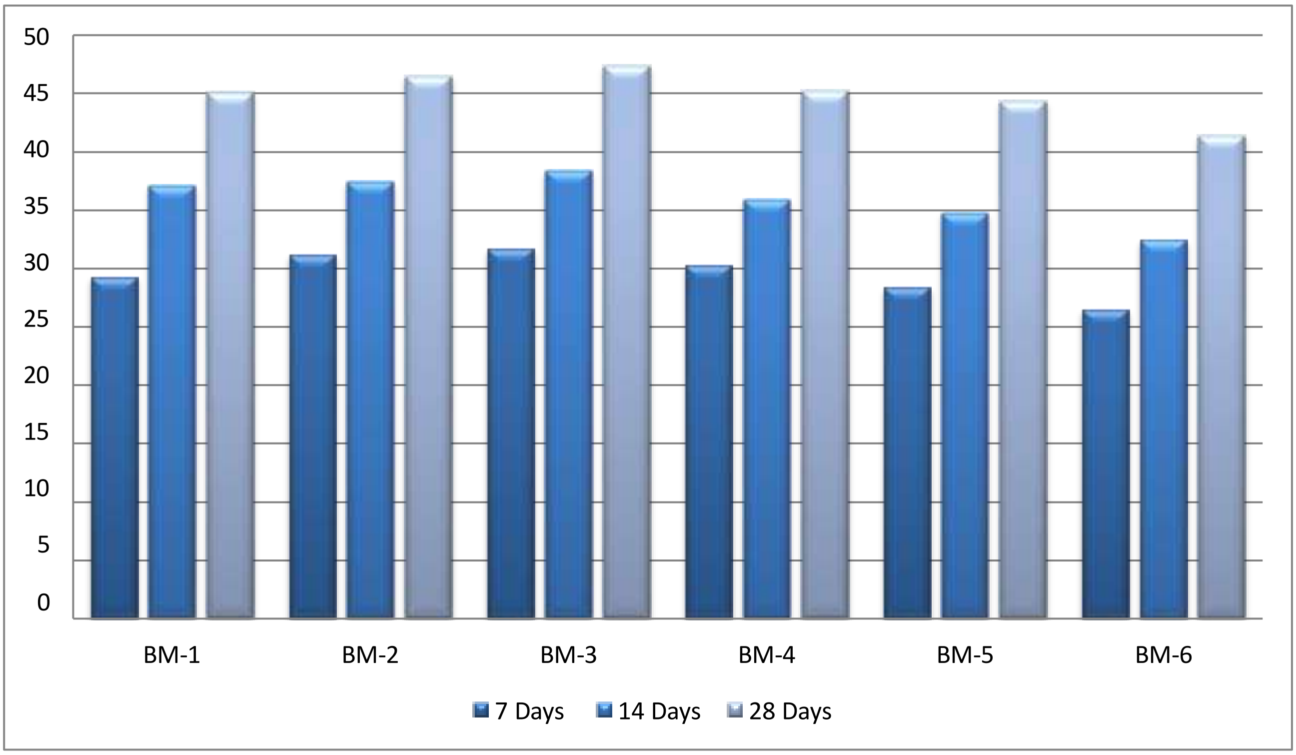


Table 4.10 Results for Split Tensile Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M30*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%SF+0%MP*	***2.92***	***3.79***	***4.52***
BM-2	*90%OPC+5.00%SF+5%MP*	***2.69***	***3.62***	***4.27***
BM-3	*85%OPC+10%SF+5%MP*	***2.85***	***3.92***	***4.65***
BM-4	*80%OPC+15.00%SF+5%MP*	***3.10***	***4.29***	***4.91***
BM-5	*75%OPC+20.00%SF+5%MP*	***2.94***	***4.15***	***4.81***
BM-6	*70%OPC+25.00%SF+5%MP*	***2.70***	***3.78***	***4.40***

Graph:4.7 Split Tensile Strength for all curing days for M30

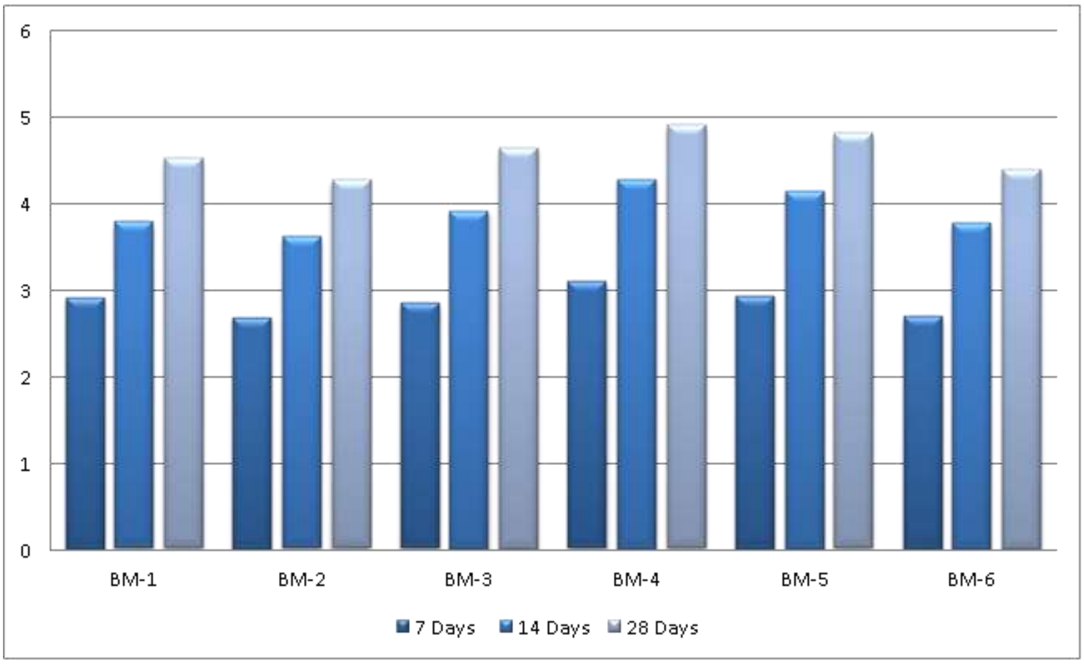


Table 4.11 Results for Split Tensile Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M30*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%MP+0%SF*	***2.93***	***3.87***	***4.51***
BM-2	*90%OPC+5.00%MP+5%SF*	***3.03***	***3.76***	***4.34***
BM-3	*85%OPC+10%MP+5%SF*	***3.24***	***4.13***	***5.15***
BM-4	*80%OPC+15.00%MP+5%SF*	***3.10***	***3.83***	***5.10***
BM-5	*75%OPC+20.00%MP+5%SF*	***2.95***	***3.72***	***4.63***
BM-6	*70%OPC+25.00%MP+5%SF*	***2.78***	***3.33***	***4.18***

Graph:4.8 Split Tensile Strength for all curing days for M30

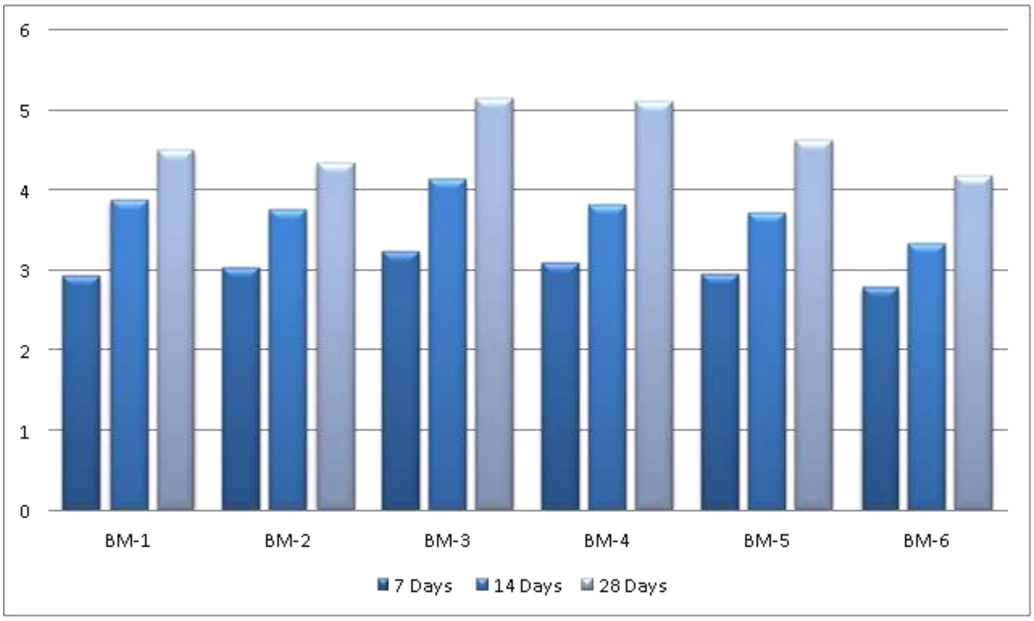


Table 4.12 Results for Split Tensile Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M40*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%SF+0%MP*	***3.43***	***4.44***	***5.55***
BM-2	*90%OPC+5.00%SF+5%MP*	***3.28***	***4.51***	***5.32***
BM-3	*85%OPC+10%SF+5%MP*	***3.62***	***4.73***	***5.82***
BM-4	*80%OPC+15.00%SF+5%MP*	***3.60***	***4.62***	***5.78***
BM-5	*75%OPC+20.00%SF+5%MP*	***3.38***	***4.34***	***5.43***
BM-6	*70%OPC+25.00%SF+5%MP*	***3.19***	***4.12***	***5.21***

Graph:4.9 Split Tensile Strength for all curing days for M40

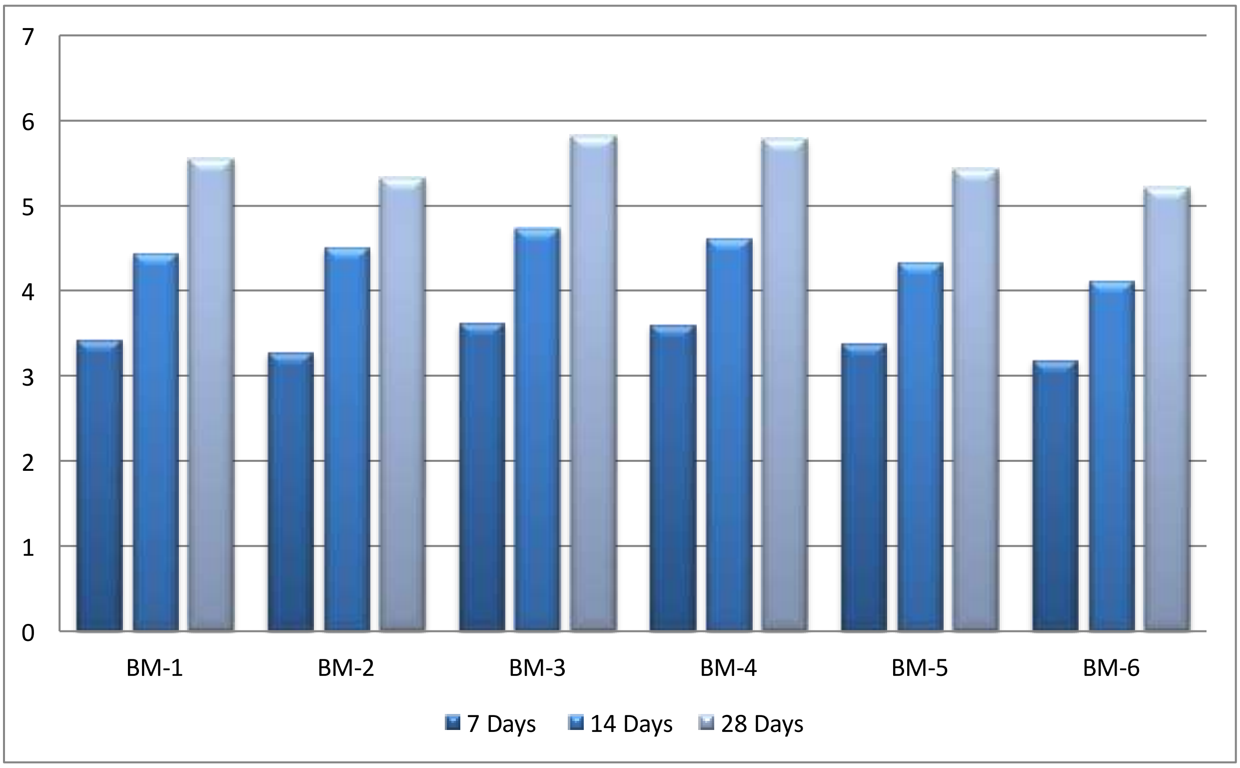
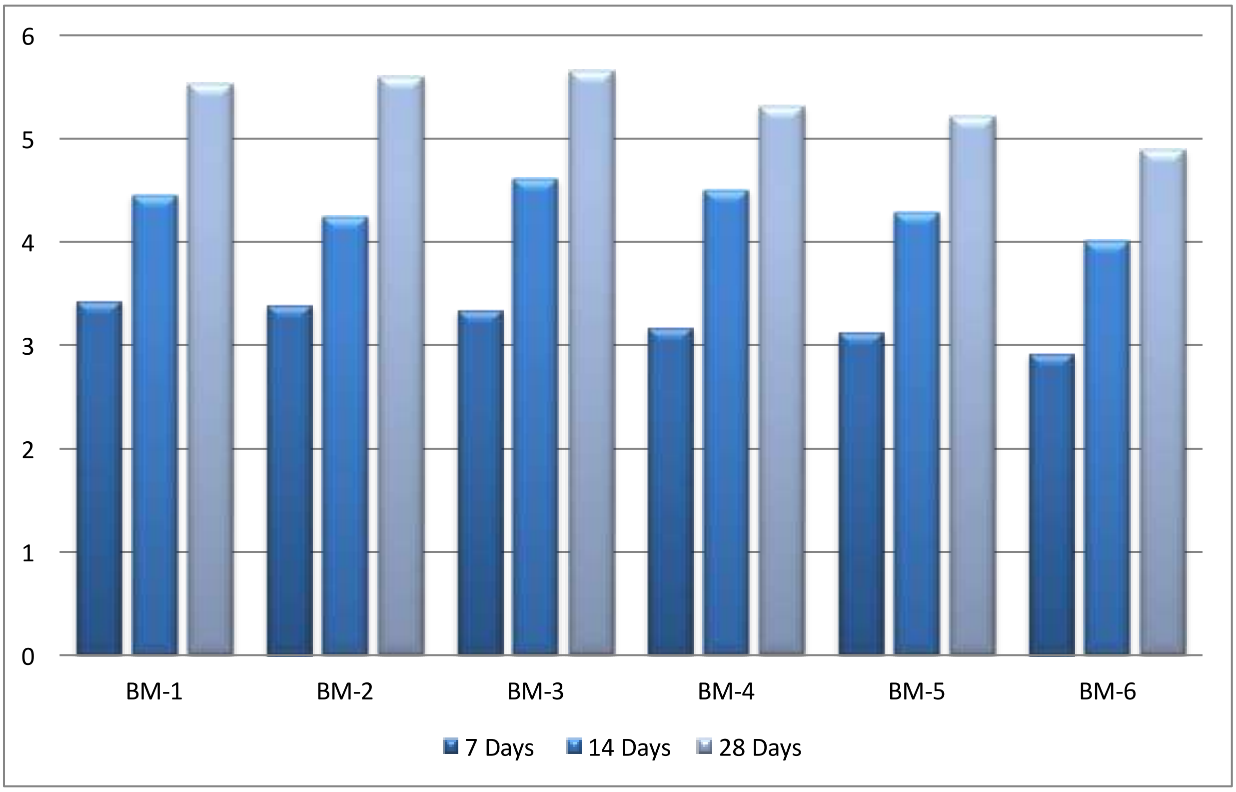


Table 4.13 Results for Split Tensile Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M40*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%MP+0%SF*	***3.43***	***4.45***	***5.53***
BM-2	*90%OPC+5.00%MP+5%SF*	***3.39***	***4.24***	***5.60***
BM-3	*85%OPC+10%MP+5%SF*	***3.34***	***4.61***	***5.65***
BM-4	*80%OPC+15.00%MP+5%SF*	***3.17***	***4.50***	***5.31***
BM-5	*75%OPC+20.00%MP+5%SF*	***3.13***	***4.28***	***5.21***
BM-6	*70%OPC+25.00%MP+5%SF*	***2.92***	***4.01***	***4.89***

Graph:4.10 Split Tensile Strength for all curing days for M40



Flexural Strength Test Results

The results of the flexural strength tests conducted on concrete specimens of different mixes that were cured at different ages are shown and discussed in this section. Flexural strength tests were conducted at 7, 14, and 28-day cure ages. The flexural strength test results for each mix at different curing ages are shown in the table. Additionally, the graph shows how the concrete mixes flexural strengths changed after 7, 14, and 28 days, respectively, in comparison to the control mix (100%OPC+0%SF+0%MP). Additionally shown are the differences in flexural strength between all of the mixes that were cured for 7, 14, and 28 days.

Table 4.14 Results for Flexural Strength (MPa) for each mix at various curing ages

Mix No.	***Description-M30***	***7 days***	***14 days***	***28 days***
BM-1	***100%OPC+0%SF+0%MP***	***2.80***	***3.30***	***4.22***
BM-2	***90%OPC+5.00%SF+5%MP***	***2.77***	***3.29***	***4.17***
BM-3	***85%OPC+10%SF+5%MP***	***2.84***	***3.35***	***4.48***
BM-4	***80%OPC+15.00%SF+5%MP***	***2.94***	***3.42***	***4.68***
BM-5	***75%OPC+20.00%SF+5%MP***	***2.93***	***3.40***	***4.38***
BM-6	***70%OPC+25.00%SF+5%MP***	***2.81***	***3.35***	***4.12***

Graph:4.11 Flexural Strength for all curing days for M30

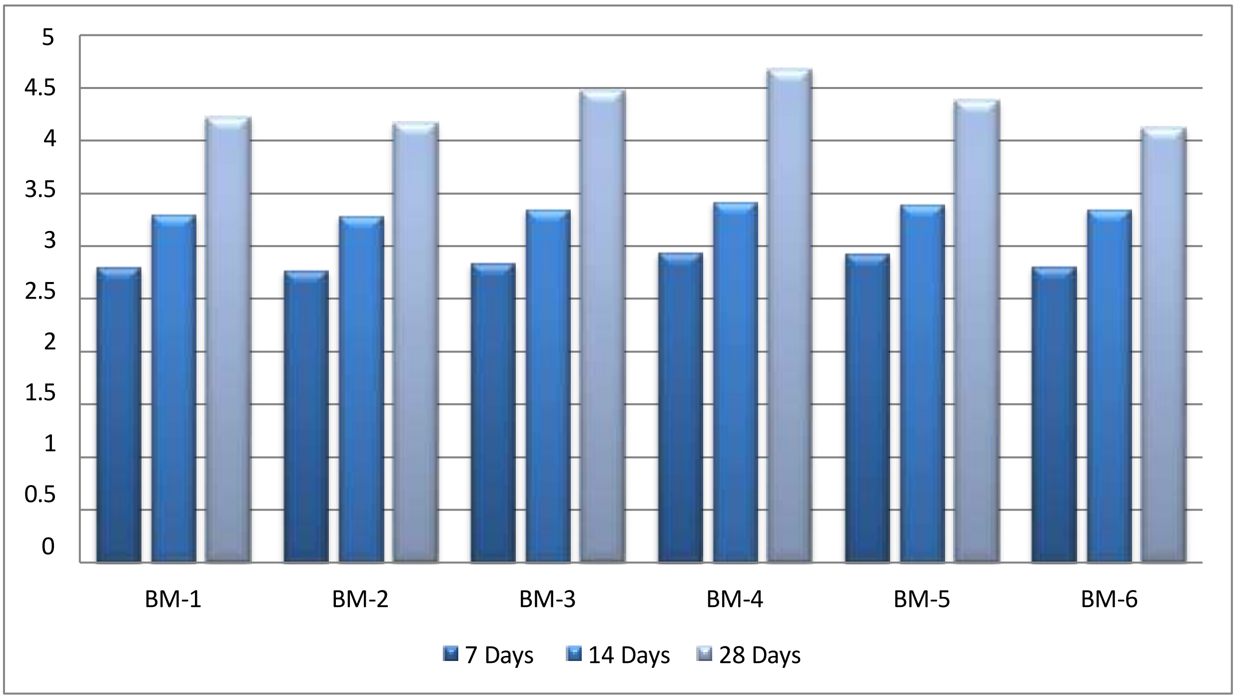


Table 4.15 Results for Flexural Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M30*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%MP+0%SF*	***2.83***	***3.35***	***4.25***
BM-2	*90%OPC+5.00%MP+5%SF*	***3.15***	***3.68***	***4.69***
BM-3	*85%OPC+10%MP+5%SF*	***3.46***	***4.15***	***5.26***
BM-4	*80%OPC+15.00%MP+5%SF*	***2.98***	***3.51***	***4.44***
BM-5	*75%OPC+20.00%MP+5%SF*	***2.50***	***2.97***	***3.77***
BM-6	*70%OPC+25.00%MP+5%SF*	***2.11***	***2.33***	***3.01***

Graph: 4.12 Flexural Strength for all curing days for M30

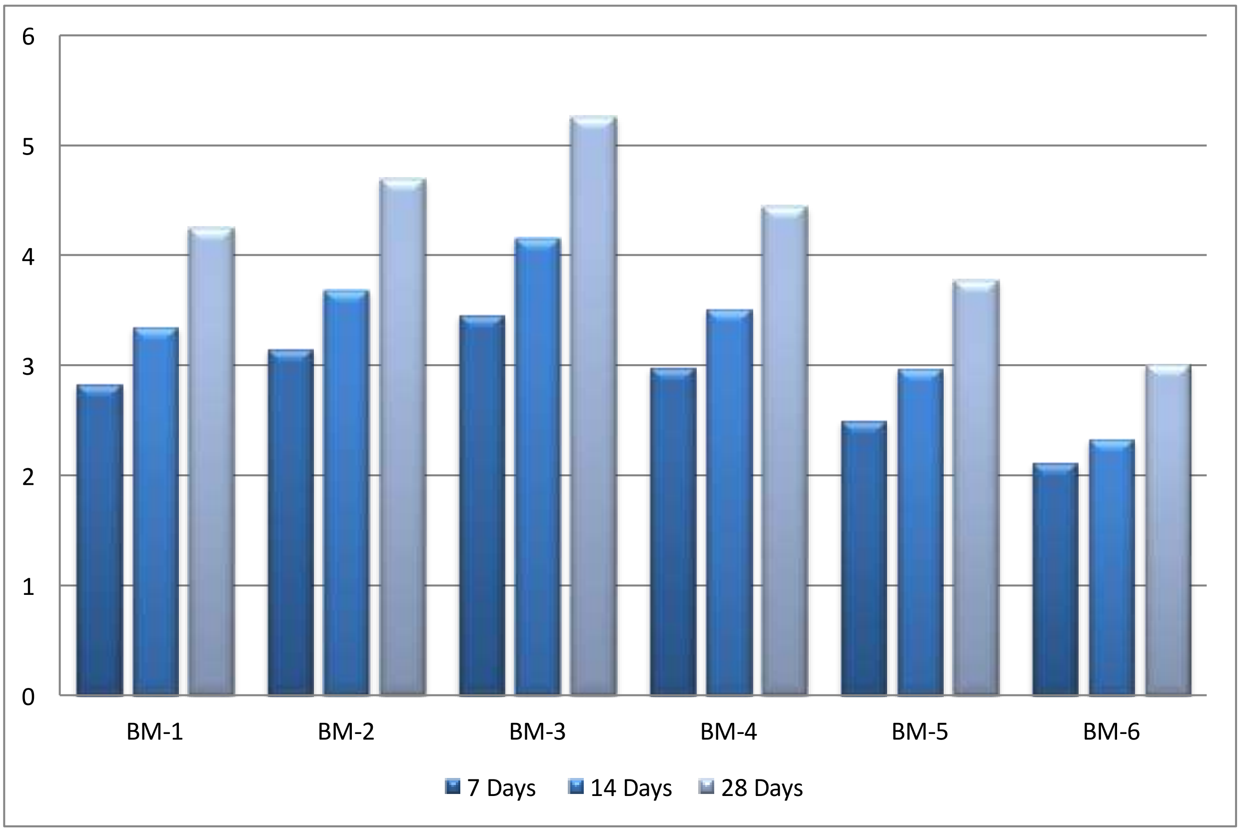


Table 4.16 Results for Flexural Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M40*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%SF+0%MP*	***3.65***	***4.29***	***5.45***
BM-2	*90%OPC+5.00%SF+5%MP*	***3.53***	***4.16***	***5.23***
BM-3	*85%OPC+10%SF+5%MP*	***3.68***	***4.35***	***5.49***
BM-4	*80%OPC+15.00%SF+5%MP*	***4.11***	***4.81***	***6.14***
BM-5	*75%OPC+20.00%SF+5%MP*	***4.14***	***4.83***	***6.10***
BM-6	*70%OPC+25.00%SF+5%MP*	***3.46***	***4.15***	***5.13***

Graph: 4.13 Flexural Strength for all curing days for M40

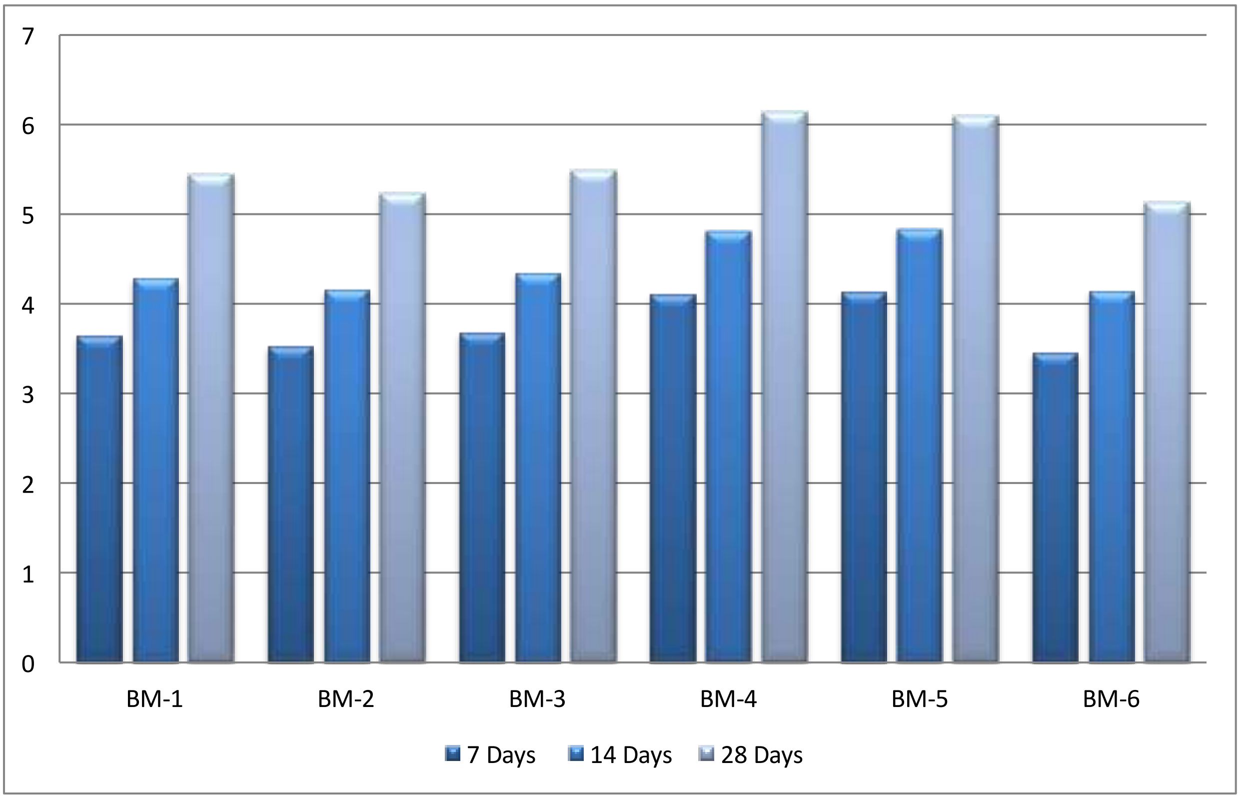
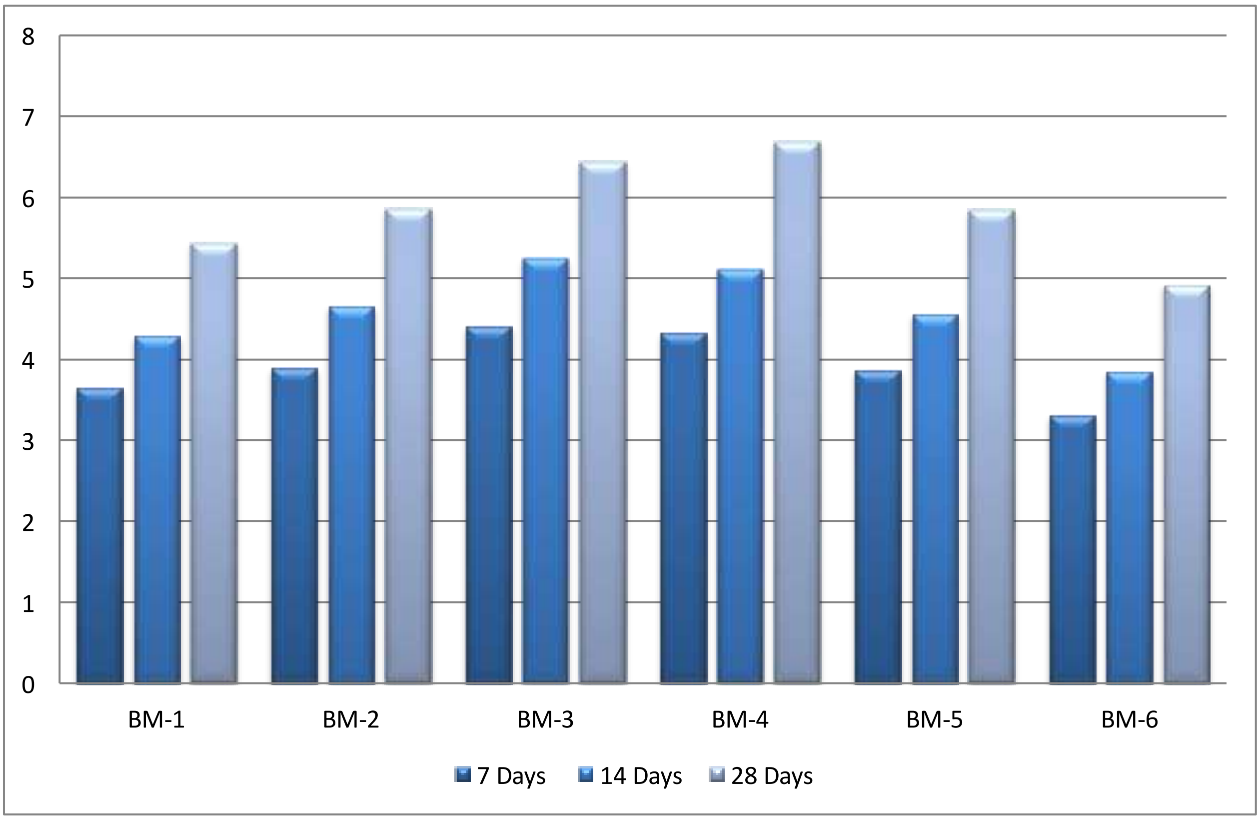


Table 4.17 Results for Flexural Strength (MPa) for each mix at various curing ages

Mix No.	*Description-M40*	*7 days*	*14 days*	*28 days*
BM-1	*100%OPC+0%MP+0%SF*	***3.65***	***4.29***	***5.43***
BM-2	*90%OPC+5.00%MP+5%SF*	***3.90***	***4.66***	***5.86***
BM-3	*85%OPC+10%MP+5%SF*	***4.41***	***5.24***	***6.44***
BM-4	*80%OPC+15.00%MP+5%SF*	***4.33***	***5.11***	***6.68***
BM-5	*75%OPC+20.00%MP+5%SF*	***3.87***	***4.56***	***5.84***
BM-6	*70%OPC+25.00%MP+5%SF*	***3.31***	***3.85***	***4.92***

Graph: 4.14 Flexural Strength for all curing days for M40



5. Conclusion

Considering the results and findings it is concluded that silica fume and marble powder are superior replacement of cement, The rate of strength increase in silica fume concrete is high as compare to marble powder. After performing all the tests and analyzing their results this research draw the following conclusion have been made:

- The maximum compressive strength was achieved when silica fume replacement was approximately 15% (BM-4), with a constant 5% marble powder content for both M-30 and M-40 grade concrete.
- The maximum split tensile strength was attained with 15% silica fume replacement (BM- 4) and 5% marble powder for M-30, and with 10% silica fume replacement (BM-3) and 5% marble powder for M-40 grade concrete.
- The highest flexural strength was observed when silica fume replacement was 15% (BM- 4) and marble powder was maintained at a constant 5% for both M-30 and M-40 grade concrete.
- Finally, based on the result of experiment demonstrate that silica fume exhibits significant potential as a cementitious material in concrete, offering a more effective alternative to marble powder, An increase in the silica fume content results in the reduction of concrete mix workability.
- The results achieved from this study indicate that marble powder can be used in concrete in place of cement, but their effects decrease when the amount of marble powder is increased while the proportion of silica fume remains constant, workability of concrete also decreases at certain percent after we increase a marble powder with constant silica fume percentage, workability of concrete increases.

6. Future Scope

- Microstructural studies (SEM, XRD) for hydration analysis.
- Durability tests (chloride penetration, sulphate attack, carbonation).
- Long-term field studies under real conditions.

- Life-cycle cost analysis for practical application.

References

- Kaur, R., Singh, R., & Kumar, A. (2025). Silica Fumes, Fal-G as Cement Substitutes in Concrete: An Experimental Investigation. In Tools, Techniques, and Advancements in Engineering Materials Science (pp. 37-50). IGI Global Scientific Publishing.
- Rafi, M. R., Omary, S., Faqiri, A., & Ghorbel, E. (2025). Recycling Marble Waste from Afghan Mining Sites as a Replacement for Cement and Sand. Buildings, 15(2), 164.
- Galhate, S. S., Sawant, R. M., Gaikwad, J. R., & Phulpagar, S. R. Experimental Investigation on Metakaolin, Glass Powder and Marble Dust in Concrete as Partial Replacement of Cement.
- Mudassir, P. M., & Fayaz, B. An Experimental Study On Replacement Of Cement With Metakaolin And Marble Waste Powder In Concrete.
- Bheel, N., Nadeem, G., Almaliki, A. H., Al-Sakkaf, Y. K., Dodo, Y. A., & Benjeddou, O. (2024). Effect of low carbon marble dust powder, silica fume, and rice husk ash as tertiary cementitious material on the mechanical properties and embodied carbon of concrete. Sustainable Chemistry and Pharmacy, 41, 101734.
- Rajaee, A., Sadeghzadeh, M., Shekhi, M., Yousefi, M., & Abrishami, S. (2024). Enhancing the mechanical properties of sawdust concrete with silica fume, metakaolin, and marble powder. Journal of Civil Aspects and Structural Engineering.
- Sathe, S., Patil, S., & Bhosale, Y. N. (2024). Investigation of strength, durability, and microstructure properties of concrete with waste marble powder as a partial replacement of cement. World Journal of Engineering.
- Abbas, Y., Djebien, R., Seghir, N. T., & Benaimeche, O. (2023). Enhancing Mechanical Behaviour and Durability of High Performance Concrete with Silica Fume, Ground Blast Furnace Slag, and Marble Powder. Journal of Applied Engineering Sciences, 13(2), 137-146.
- Prakash, B., Saravanan, T. J., Kabeer, K. S. A., & Bisht, K. (2023). Exploring the potential of waste marble powder as a sustainable substitute to cement in cement-based composites: A review. Construction and Building Materials, 401, 132887.
- Kabbo, M., Sobuz, M., & Khan, M. (2023). Combined influence of Waste Marble Powder and Silica Fume on the Mechanical Properties of Structural Cellular Lightweight Concrete. In International Conference on Planning, Architecture & Civil Engineering.