

Properties of concrete M40 using 2 types of cement blended with Processed Fly Ash

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ABSTRACT-In this study concrete mixes of various proportions with w/c ratio 0.36 were prepared in the laboratory to determine compressive strength using two types of cement Vikram and Birla Chetak for M40 grade blended with 30% processed fly ash. Initially mix was produced using two types of cement, Vikram, and Birla Chetak cement blended with 30% processed fly ash and properties were found. On the basis of results maximum 7 days compressive strength was 39.45MPa for concrete using Vikram 1 cement blended with 30%PFA.and maximum 28 days compressive strength was 52.1 MPa for concrete using Birla Chetak 1 cement blended with 30%PFA

Keywords - Processed fly ash, cement, concrete, ordinary Portland cement, compressive strength

I INTRODUCTION

The initial and final setting time of ultra-fine fly ash -cement paste was observed about 9.56 and 11.25 hours respectively at UFFA replacement 20%. However at UFFA replacement 40%, the initial and final setting times of ultra-fine fly ash -cement paste are prolonged to about 11.85 and 13.58 hours, respectively. [Li Yijin et al., 2004]1[S. Lokesh et. al., 2013]2 observed similar pattern in flexural strength of concrete produced as it was found2 in compressive strength. Fly ash Aggregates as replacement for natural aggregate and fly ash for replacement of cement both influences the strength performance significantly. [Shrivastava and Bajaj, 2012]3 tested compressive strength at interval of 7, 28 and 56 days and reported that the strength goes on increasing with the increase in fly ash but after the replacement of 50% the strength goes on decreasing with further increase. Nikhil T. R. [4] observed that replacement of cement by fly ash results in reduction in compressive strength initially. But thereafter there is significant improvement in performance of compressive strength. The maximum compressive strength 66.19 Mpa reported at 55% replacement of Fly ash at 56 days curing with 1.6% super plasticizer and the minimum compressive strength 45.16 Mpa reported at 65% replacement at the age of 56 days. [Soni and Saini, 2014]5 found reduction in compressive strength reduces 11.4 %, 30.1 %, 28.9 % at 30 %, 40 % and 50%. [Alaa M. Rashad et. al., 2014]6 found noticeable decrease in compressive strength when PC was partially replaced with 70 % FA (F70) during 7, 28, 90 and 180 days of hydration. [Rafat Siddiue, 2013]7 use high volume class F fly ash to replace fine aggregate. Replacement % was 35, 45 and 55. Author reported splitting tensile strength continued to increase with the increase in fly ash percentages at all ages. This is due to densification of the paste structure due to pazzolanic action between fly ash and calcium hydroxide librated as a result of hydration of cement. [S. Lokesh et. al., 2013]2 Setting time of concrete is greatly influenced by the amount and properties of fly ash used. For highway construction, changes in time of setting of fly ash concrete from non-fly-ash concrete using similar materials will not usually introduce a need for changes in construction techniques; the delays that occur may be considered advantageous [Sarath et. al., 2011]8.

II OBJECTIVE OF THE STUDY

The research was aimed to investigate compressive strength using processed fly ash with Vikram and Birla Chetak cement for grade M40

III MATERIALS AND THEIR PROPERTIES

Cement

Three types of OPC cement Vikram and Birla Chetak was used for this research program.

Natural Sand

Locally procured natural sand was used as fine aggregate in concrete. Locally available Narmada sand (zone-II) was used

Aggregate

A combination of 20mm nominal size aggregate and 10mm nominal size aggregate is used as coarse aggregate in this experimental program. Both types of coarse aggregate were locally procured.

Water

The water used was ordinary tap water from the Bhopal city.

Processed Fly ash

Fly ash used in this study was collected from Sarni thermal power plant.

IV. EXPERIMENTAL PROGRAM

To conduct experimental program various trials were prepared using Vikram and Birla Chetak blended with 30% processed fly ash for grade.M40

V. RESULTS AND DISCUSSION

Table 1 7 days and 28 days compressive strength of M40 Grade concrete blended with 30% processed fly ash (OPC320+PFA130)

Cement	W/C Ratio	7 days compressive strength	28 days compressive strength
Vikram 1	0.36	39.45	50.74
Vikram 2	0.36	33.9	49.75
Birla Chetak 1	0.36	30.95	52.1
Birla Chetak 2	0.36	32.34	50.22

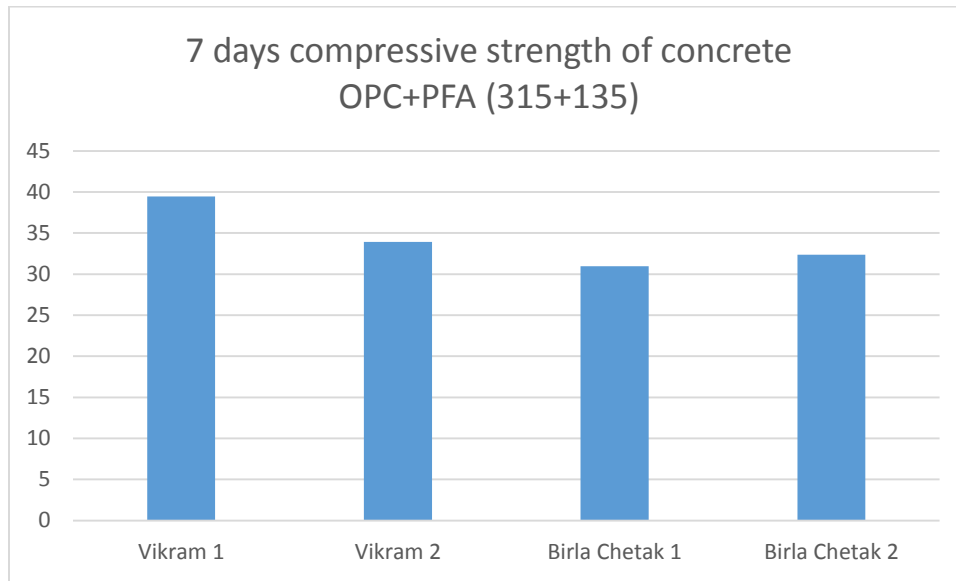


Fig. 1 7 days compressive strength of PFA concrete containing 2 types of cement for grade M40

Above fig shows compressive strength of PFA concrete for M40 grade using two types of cement Vikram, and Birla Chetak. Maximum 7 days compressive strength was 39.45MPa for concrete using Vikram 1 cement blended with 30%PFA.while minimum 7 days compressive strength was 30.95MPa for concrete using Birla Chetak 1 cement blended with 30%PFA

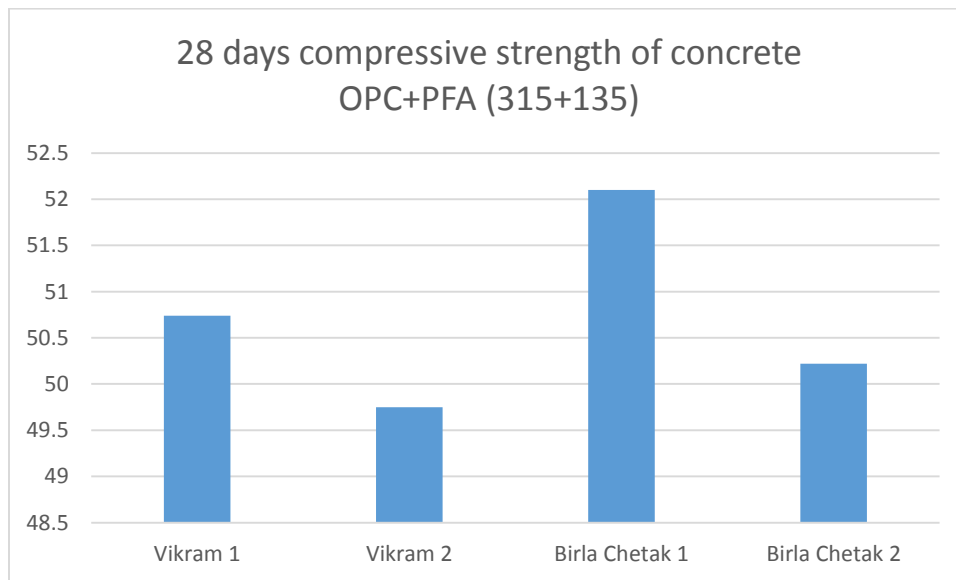


Fig. 2 28 days compressive strength of PFA concrete containing 2 types of cement for grade M40

Above fig shows compressive strength of PFA concrete for M40 grade using two types of cement Vikram, and Birla Chetak. Maximum 28 days compressive strength was 52.1 MPa for concrete using Birla Chetak 1 cement blended with 30%PFA while minimum 28 days compressive strength was 49.75MPa for concrete using Vikram 2 cement blended with 30%PFA

VI CONCLUSION

In this study concrete mixes of various proportions with w/c ratio 0.36 were prepared in the laboratory to determine compressive strength using two types of cement Vikram and Birla Chetak for M40 grade blended with 30% processed fly ash. On the basis of results obtained in the laboratory it can be concluded that M40 concrete blended with 30%PFA gives higher strength at 7days using Vikram cement and higher strength at28days using Birla Chetak

Maximum 7 days compressive strength was 39.45MPa for concrete using Vikram 1 cement blended with 30%PFA.and maximum 28 days compressive strength was 52.1 MPa for concrete using Birla Chetak 1 cement blended with 30%PFA

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