

Properties of High Volume Fly Ash concrete M40 and M50 blended with Processed Fly Ash

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ABSTRACT-In this study concrete mixes of various proportions with w/c ratio 0.349 to 0.36 were prepared in the laboratory to determine compressive strength using Vikram cement trials 1 and 2 for M50 grade and trial 3 and 4 for M40 grade blended with 40% processed fly ash. On the basis of results obtained in the laboratory it can be concluded that M50 concrete blended with 40%PFA gives better results

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

I INTRODUCTION

Nikhil T. R. 2012, [1] conducted research to design HVFAC of grade M-60. Results indicated optimum % for cement replacement by HVFA is 55 %. 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. The maximum flexural strength 5.75 Mpa was observed at 55% replacement of Fly ash at 56 days curing with 1.6% super plasticizer. The minimum flexural strength 4.78 Mpa was observed at 65% replacement at the age of 56 days. [Soni and Saini, 2014]2 found reduction in compressive strength reduces 11.4 %, 30.1 %, 28.9 % at 30 %, 40 % and 50%. 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]3. [Shrivastava and Bajaj, 2012]4 also found that flexural strength goes on decreasing with the increase in fly ash content at 7 days and 28 days. [Rafat Siddique, 2013]5 conducted the experiments to determine the flexural strength of the fly ash concrete. Test results of fly ash concrete shown that the flexural strength of fly ash concretes continued to increase with the age. [Raju and John, 2013]6 reported Fibre addition to the fly ash based mix showed less strength at early age but almost same level of performance at later age was observed with respect to flexural strength. [S. Lokesh et. al., 2013]7 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. It was found that flexural strength reduces when natural aggregates were replaced partially (40 %) with fly ash as compared to control mix. Further reduction in flexural strength continues when cement replaced with fly ash (40 %). Flexural strength increases when silica fume (10 %) is used as mineral admixture in concrete and loss of strengths can be compensated initially [Alaa M. Rashad et. al., 2014]8 found noticeable decrease in compressive strength when PC was partially replaced with 70 % FA (F70) during 7, 28, 90 and 180 days of hydration Author also found higher abrasion resistance of HVFA blended concrete found with SF and combination of SF+GGBS with class F fly ash. Lower abrasion resistance in HVFA concrete found GGBS.

II OBJECTIVE OF THE STUDY

The research was aimed to investigate compressive strength using 40% processed fly ash for grade M40 and M50

III MATERIALS AND THEIR PROPERTIES

Cement

OPC cement Vikram 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 cement blended with 40% processed fly ash for grade.M40 and M50

V. RESULTS AND DISCUSSION

Table 1 7 days and 28 days compressive strength of M40 and M50 grade concrete blended with 40% processed fly ash (OPC270+PFA180)

Cement	W/C Ratio	7 days compressive strength	28 days compressive strength
Vikram 1 M50	0.349	30.63	48.17
Vikram 2 M50	0.349	37.11	52.6
Vikram 3.M40	0.36	23.73	45.82
Vikram 4 M40	0.36	22.97	42.66

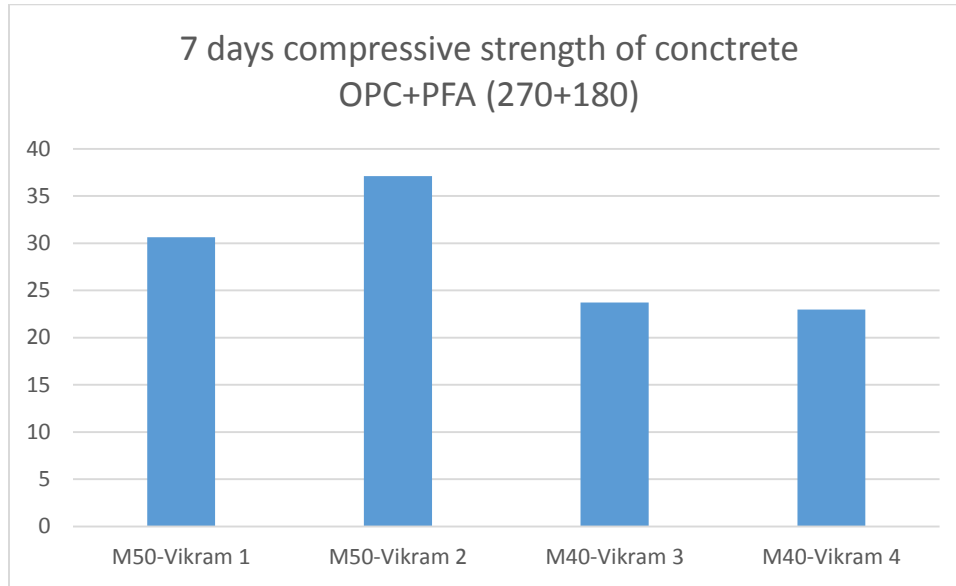


Fig. 1 7 days compressive strength of PFA concrete using Vikram cement (trial 1, 2 for M50 and 3, 4for grade M40)

Above fig shows compressive strength of PFA concrete for M50 grade using trials 1 and 2 of vikram cement and for M40 grade using trial 3 and 4 of vikram cement. Maximum 7 days compressive strength was 37.11MPa for M50 grade concrete using Vikram 2 cement blended with 40%PFA while maximum 7 days compressive strength for M40 grade of concrete was 23.73MPa using Vikram 3 cement blended with 40%PFA

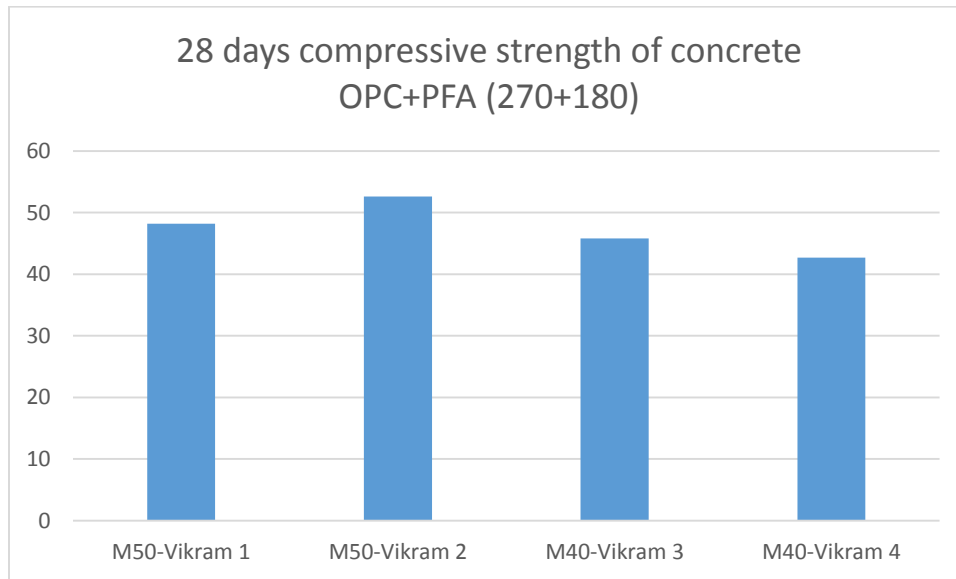


Fig. 2 28 days compressive strength of PFA concrete using Vikram cement (trial 1, 2 for M50 and,3, 4for grade M40)

Above fig shows compressive strength of PFA concrete for M50 grade using trials 1 and 2 of vikram cement and for M40 grade using trial 3 and 4 of vikram cement. Maximum 28 days compressive strength was 52.6 MPa for M50 grade concrete using Vikram 2 cement blended with 40%PFA while maximum 28 days compressive strength for M40 grade of concrete was 42.66MPa using Vikram 3 cement blended with 40%PFA

VI CONCLUSION

In this study concrete mixes of various proportions with w/c ratio 0.349 to 0.36 were prepared in the laboratory to determine compressive strength using Vikram cement trials 1 and 2 for M50 grade and trial 3 and 4 for M40 grade blended with 40% processed fly ash. On the basis of results obtained in the laboratory it can be concluded that M50 concrete blended with 40%PFA gives better results

Maximum 7 days compressive strength was 37.11MPa and maximum 28 days compressive strength was 52.6 MPa for M50 grade concrete using Vikram 2 cement blended with 40%PFA

While maximum 7 days compressive strength and 28 days compressive strength for M40 grade of concrete was 23.73MPa and 42.66MPa respectively using Vikram 3 cement blended with 40%PFA

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