Experimental Study on Self Compacting Concrete using Fly Ash

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Abstract:- - Self-Compacting Concrete (SCC) is a flowing concrete mixture that has the capacity to consolidate under its own weight. The current trend all over the world is to utilize the treated and untreated industrial by-products, domestic waste etc. as a raw material in concrete, which gives an eco-friendly edge to the concrete preparation process. This practice not only helps in reuse of the waste material but also creates a cleaner and greener environment. This study aims to focus on the possibility of using industrial by-products like Fly Ash (FA) in preparation of SCC. This project presents the results of an experimental study aimed at producing SCC mixes by adopting different mix proportions, incorporating mineral admixtures Fly Ash, as supplementary cementing materials and comparison of their performances.

Keywords: Self-compacting concrete, Fly ash

1.0 INTRODUCTION

Self-compacting concrete (SCC) is an pioneering concrete that does not involve shuddering for insertion and compaction.It does not require to be vibrated to achieve full compaction. The composition of SCC mixes includes substantial proportions of fine-grained inorganic materials and this gives possibilities for utilization of mineral admixtures, which are currently waste products with no practical applications.

It is good alternative of conventional concrete especially in congested formwork where compaction is not fissile and in this situation, work with self-compacting concrete is preferred. With the rising demand for productivity and comfort at site as well as performance of the hardened concrete, use of SCC can reduce the labor cost, vibratory machine cost and also faster completion of construction schedule. The use of SCC provides greater flaccidity while placing and compaction than the normal concrete as well as acquiring required resources which results in time and resource saving.

The SCC has gained wide use in many countries for different application and structural Configurations SSC require a high slump that can be achieved by incorporating several chemical admixtures. The super plasticizer influences the rheological behavior; the viscosity and the yield value of the fresh concrete are reduced in certain concrete mix. The super plasticizer ensures high fluidity and reduces water powder ratio. Super plasticizer greatly improves pump-ability and the slump value can be greatly increased. The use of viscosity modifying admixtures increases segregation resistance of concrete and increases the deformability without segregation and then to lead high optimum self-compatibility. The SCC technology is now been adopted in many countries.

2.0 AIM OF THIS PROJECT

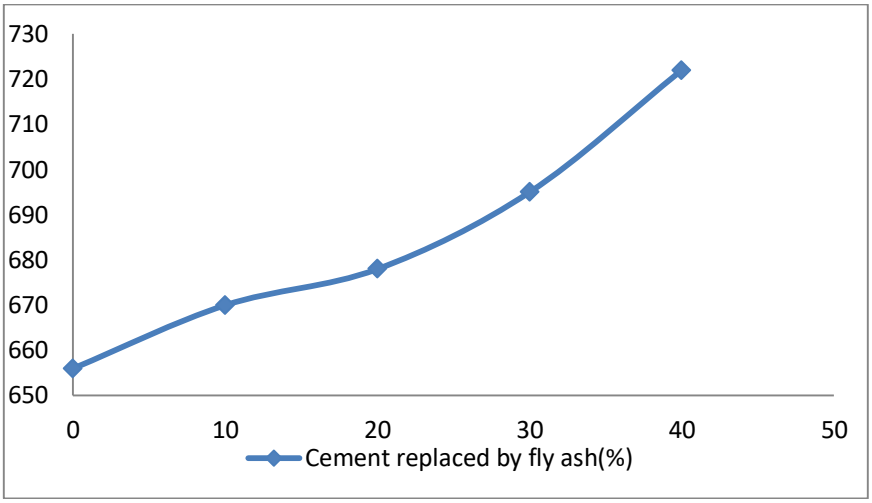
To study of effect of replacement of cement with Fly Ash in concrete.

- To find the optimum percentage of Fly Ash by replacing 0%,10%,20%,30% & 40% of Fly Ash which give maximum strength to concrete.
- To determine and compare the fresh concrete properties of concrete such as Slump-flow test, L box test ,U-box test, V funnel test.
- To determine and compare the hardened properties of concrete such as compressive strength, splitting tensile strength , flexural strength
- To find an alternative material for partial replacement of cement.

3. RESULTS OF FLOW TABLE TEST

Table 3.1 Flow table test

Material	Replacement levels	w/c	Flow Table Test (mm)
Fly Ash	0%	0.38	656
	10%	0.38	670
	20%	0.38	678
	30%	0.38	695
	40%	0.38	722

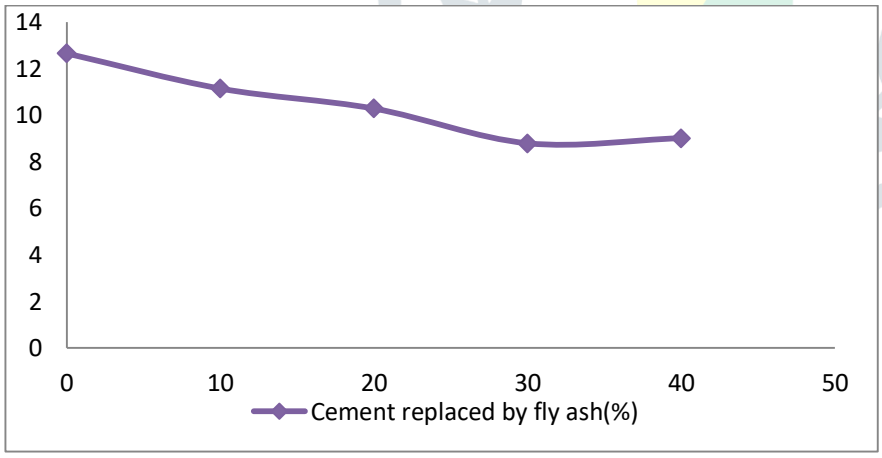


As per above value shown in table , the initial flow is increasing with increase in percentage of fly-ash.

3.2. RESULTS OF V FUNNEL TEST

Table3.2.Resultsof V funnel test

Material	Replacement levels	w/c	V - Funnel (Sec)
Fly Ash	0%	0.38	12.64
	10%	0.38	11.13
	20%	0.38	10.27
	30%	0.38	8.78
	40%	0.38	9

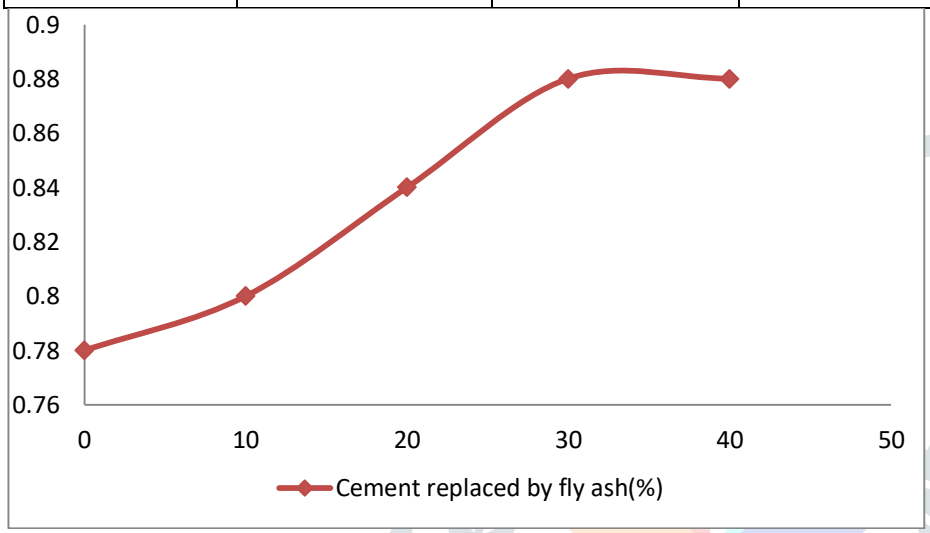


As shown in table, the V funnel value goes on decreasing with addition of fly ash indicates good flowing ability.

3.3. RESULTS OF L BOX TEST Table

3.3.Results of L-Box test

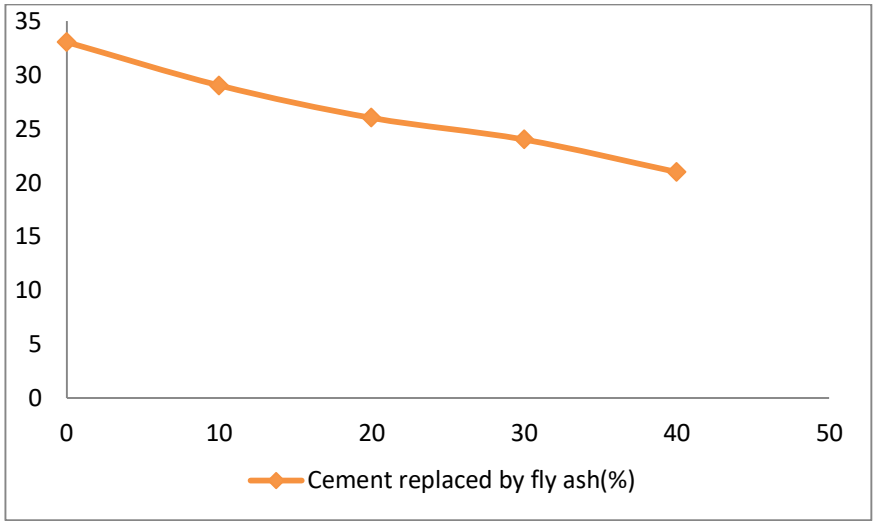
Material	Replacement levels	w/c	L – Box (H_2/H_1)
Fly Ash	0%	0.38	0.78
	10%	0.38	0.80
	20%	0.38	0.84
	30%	0.38	0.88
	40%	0.38	0.88



As shown in table, the L box value is increasing with addition of fly ash percentage which indicates good flowing ability.

3.4. RESULTS OF U BOX TEST Table

Material	Replacement levels	w/c	U – Box (H_2-H_1) cm
Fly Ash	0%	0.38	33
	10%	0.38	29
	20%	0.38	26
	30%	0.38	24

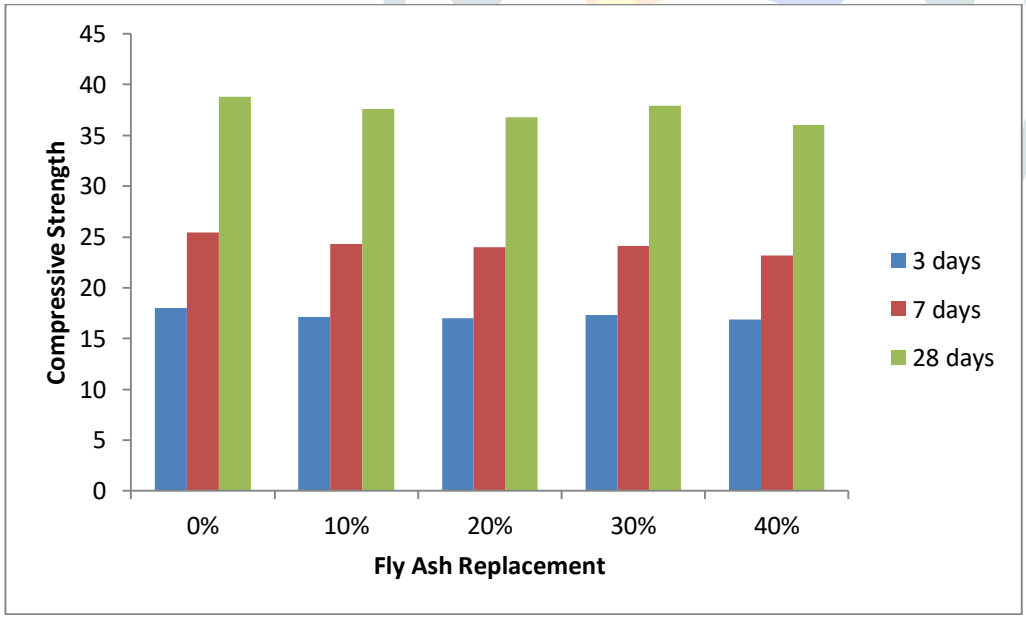


The value goes on decreasing with addition of fly ash which indicates good results.

3.5 Compressive Strength Test

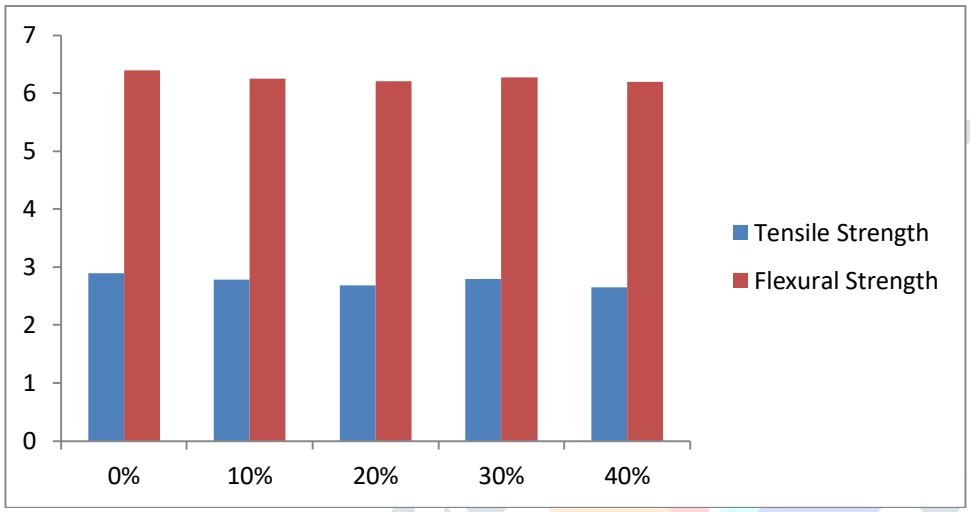
Table 3.5: Compressive Strength Test

Period of curing	0%	10%	20%	30%	40%
3 days	18.00	17.13	17.00	17.34	16.89
7 days	25.45	24.32	24.00	24.13	23.15
28 days	38.78	37.60	36.80	37.90	36.00



3.6 Tensile and Flexural Strength

Replacement cement with fly ash	0%	10%	20%	30%	40%
Tensile Strength	2.89	2.78	2.69	2.80	2.65
Flexural Strength	6.40	6.25	6.21	6.28	6.20



4.CONCLUSION

Flow Test

- The initial flow is high for mixes with maximum replacement of fly ash.

V-funnel Test

- For V-funnel,the mixes with maximum replacement show good flowing ability.
- The value is less than 10 secs for 30% and 40% replacement of cement with fly ash.

L-Box

- The flowing ability is higher with maximum replacement of cement.
- These mixes have shown good segregation characteristics.

U-Box

- The values goes on decreasing indicates good flowing ability.

Compressive Strength

- The compressive strength is maximum for minimum replacement of cement with fly ash.
- The flow is proportional with addition of mineral admixtures.

Tensile and Flexural Strength

- Tensile strength is maximum for minimum replacement of mineral admixtures.
- The flexural Strength is maximum for mixes with minimum replacement of mineral admixtures.

5.REFRENCES

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