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Experimental investigation on self compacting concrete

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AbstractSelf-compacting concrete (SCC) is an innovative concrete that does not require vibration for placing and compaction. It is able to flow under its own weight, completely filling formwork and achieving full compaction, even in the presence of congested reinforcement. The concrete grade M40 was selected and IS method was used for mix design. The properties of materials for cement, fine aggregate, coarse aggregate, admixture(super plasticizer) and M-sand were studied for mix design. The various strength of concrete like compressive, split tensile, flexural were studied for various of using 10%,20%and,30%.The maximum compressive strength of concrete attained at 30% added of admixture at 7, and 28 days. The split tensile strength and the flexural strength were also obtained higher strength at 30% of replacement level at 28 days.

Keywords: M-Sand Self compacting concrete, Mechanical Properties, M40

1.INTRODUCTION

SCC was excellent deformability and segregation resistance .it is capable to flow under its own weight and can completely fill the framework even within congested reinforcement.

There has been an intense development of super plasticizers during the last decades making SCCfeasible

The purpose of this project was to develop and evaluate the properties of SCC made with

1.1 ADMIXTURE

Superplasticizers, also known as high range water reducers, are chemical admixtures used where well-dispersed particle suspension is required. These polymers are used as s to avoid particle segregation (gravel, coarse and fine sands), and to improve the flow characteristics of suspensions such as in concrete applications. Their addition to concrete allows the reduction of the water to cement ratio, not affecting the workability of the mixture, and enables the production of self-consolidating concrete and high performance concrete. This effect drastically improves the performance of the hardening fresh pastes.

2 MATERIAL USED

a)Cement

b)Fine aggregate(M-sand)

c)Coarse aggregate

d)Water

e)Super plasticizer

f)Viscosity modifying agent

a)CEMENT :

Ordinary Portland Cement of 53-grade was used as it satisfied the requirements of IS: 269- 1969 and results

- Ordinary Portland cement(grade53) was used.
- Fineness (retained on 90mmseive)
- Initial Setting Time 30Min.

b) **FINE AGGREGATE:**

Fine aggregate shall conform to requirement of M-sand

- Specific gravity of fine aggregate 2.66
- Finess modulus of fine aggregate 2.32

c) **COARSE AGGREGATE:**

coarse aggregate shall comply with the requirement of IS 383 as for as possible crushed Aggregate shall be used for ensuring adequate durability. The aggregate used for concrete the nominal maxi size of coarse aggregate used in Production of shall be 20 mm

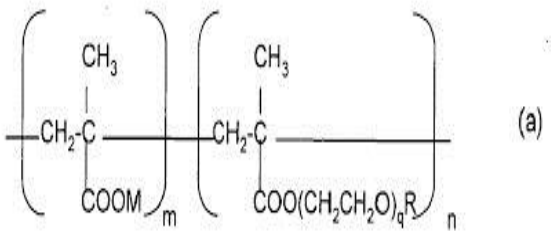
S.No	Material	Sp=10 %	Sp=20 %	Sp=30 %
1	cement	350	350	350
2	Fine aggregate	896	896	896
3	Coarse aggregate	1140	1140	1140
4	Water	139.6	137.2	135.8
5	Chemical admixture	1.4	2.8	4.2

- Specific gravity of coarse aggregate 2.74
- Bulk densiity of coarse aggregate(kg/m3) 1540

d) **WATER:** water is a physical agent mixing all properties and achieve high strength of concrete.and curing agent of 7 & 28 days

e)**SUPER PLASTICIZER**

Polycarboxylicether



Itsalso known as high range water reducers, are chemicals used as admixtures where well-dispersed particle suspension are required. These polymers are used as dispersants to avoid particle aggregation, and to improve the flow characteristics or rheology of suspensions such as in concrete applications

f)**VISCOSITY MODIFYING AGENT**

Most concrete producers readily associate viscosity-modifying admixtures (VMAs) with the manufacture and placement of underwater concrete and self-compacting concrete (SCC), two of the earliest applications for this relatively new type of chemical admixture. VMAs, by virtue of their capability to minimize the movement of water and fines away from the bulk concrete and maintain ahomogeneous composition, is a clear chemical admixture choice for these concrete construction applications

Table 1Mix Proportion

Table 2 Result on Fresh Concrete

Trial Mix	Slump flow (s)	V-funnel (s)	L-box	U-box(mm)
MIX-1	3.89	8.5	0.95	7.9
MIX-2	4	10.15	1	8.3
MIX-3	5.05	11.45	0.88	7.5

Table 3 Result on Compressive Strength

Days	%Replacement	Compressive Strength (N/mm^2)
7days	SP=10%	30
	SP=20%	31.6

Table 4 Result on Split Tensile Strength

Days	%Replacement	Split Tensile Strength (N/mm^2)
7 days	SP=10%	4.1
	SP=20%	4.5
	SP=30%	4.2

Table 5 Result on Flexural Strength

Days	%Replacement	Flexural Strength (N/mm^2)
7days	SP=10%	4.2
	SP=20%	4.36
	SP=30%	4.5

Table 6 Result On Compressive Strength

Days	%Replacement	Compressive Strength (N/mm^2)
28days	SP=10%	37
	SP=20%	39
	SP=30%	37

Table 7

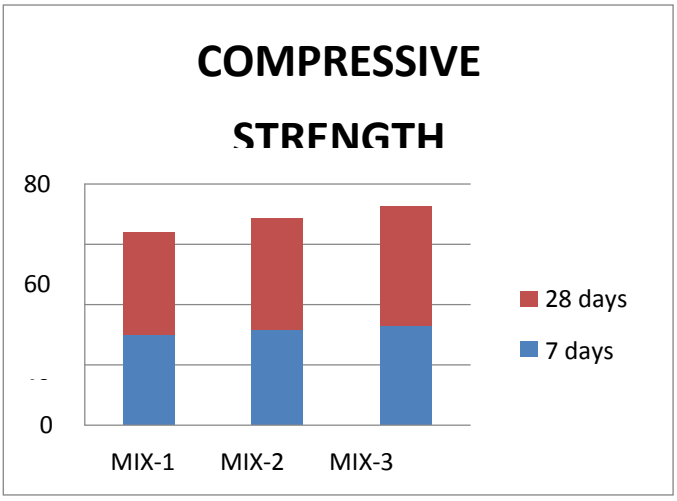
Result on Split Tensile Strength

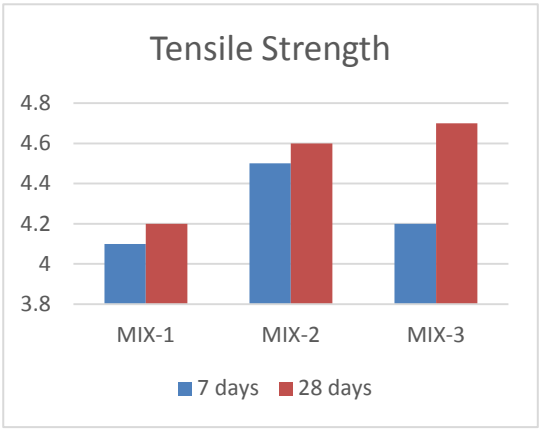
Days	%Replacement	Split Tensile Strength (N/mm^2)
28 days	SP=10%	4.2
	SP=20%	4.6
	SP=30%	4.7

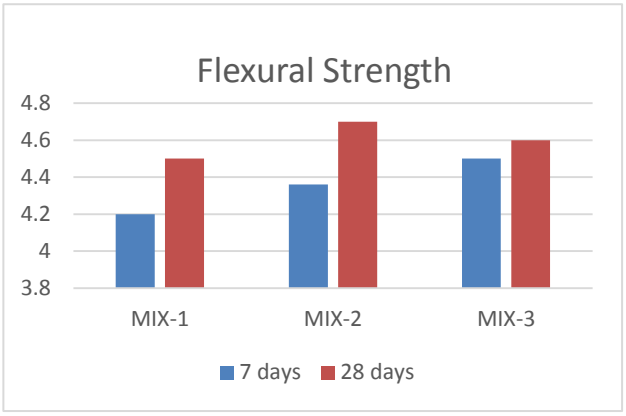
Table 8

RESULT ON FLEXURAL STRENGTH

Days	%Replacement	Flexural Strength (N/mm^2)
28 days	SP=10%	4.5
	SP=20%	4.7
	SP=30%	4.6







4.CONCLUSION

On the basis of the scope of research it can be concluded that:

1º The hardened properties of SCC differ to VC due to the changed mix desigh, even are used similar materials.

2º The high powder content contributes to a filler effect, suppliningthe
small pores between cement particles.

3º The density of SCC is higher than VC due to the better compaction of the mixture in fresh state.

4º The compresive strength of SCC was higher then VC with 15% for
cube speciments and 5% for cylinder speciments at the same cement content.

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