

# Self Compacting Concrete Using GGBS With Addition Of Steel Fibres On M30 Grade Of Concrete

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**Abstract**—Self compacting concrete has developed as an imaginative innovation, equipped for accomplishing the situation with being an extraordinary headway in the field of substantial innovation, causing substantial design without vibration to have been done previously. At present utilization of self compacting concrete is centered around superior execution, better and more solid and uniform quality. In the paper, an undertaking is being made to arrangement self compacting concrete (SCC) with GGBS and blend steel strands the mark of this study is to prepare M30 SCC with GGBS cream steel fibers and difference its fortitude direct and standard concrete. Ordinary cement is done by using IS 10262 2009 and SCC done by utilizing alter Nan Su strategy. For this reason the substantial is supplanted by 0%, 10%, 20%, 30% and 40% of GGBS with expansion of steady steel strands of 0.5% to add up to volume of cement. 3D squares of size 150X150X150mm is utilized for the compressive strength of SCC while cylinder shaped example of 150X300mm are utilized for split tensile strength where as crystal of size 100X100X500mm is ready for deciding flexural strength of SCC.

**Keywords**—SCC(*self compacting concrete*), GGBS(*ground granulated blast furnace slag*), FA(*fine aggregate*), CA(*coarse aggregate*), OPC(*ordinary portland cement*)

## I. INTRODUCTION

### 1.1 General

Concrete is a binding materials made out of fine and coarse total limited along with a liquid concrete that solidifies over the long haul. Concrete is second most involved substance on the planet after water and is the most generally utilized construction material.

### 1.2 SCC (*Self Compacting Concrete*)

Self compacting concrete has developed as a creative innovation, fit for accomplishing the situation with being a remarkable progression in the field of substantial innovation, causing substantial designs without vibration to have been done previously. The utilization of SCC will prompt industrialized creation, decline the specialized expense of in situ cast substantial developments, improve quality, strength,

dependability of substantial designs and dispose of a portion of the potential for individual blunder. It will supplant manual compaction of new cement with an advanced self-loader putting innovation and in that manner further develop wellbeing and security in and around the building site.

## II. OBJECTIVES

The primary goal of this study is to utilize the GGBS (Ground granulated impact heater slag) as a substitution of concrete by fluctuating extent and grasp its consequences for the new properties and compressive strength. The concentrate likewise means to evaluate how much GGBS.

To find out the percentage of GGBS replacement to cement in SCC.

To assess concrete filling ability, passing ability compressive strength with a various proportions of GGBS with steel fibre (0%, 10%, 20%, 30%, and 40%) to the cement, here steel fibre is maintained as 0.5% to total volume concrete.

To check the concrete Split tensile strength & durability characteristics having various proportions of GGBS with constant additional materials Steel Fibre.

## III. MATERIALS AND METHODOLOGY

### A. Materials used

The different materials used:

1) **Cement**: As a general rule, concrete is a glue specialist, everything being equal, in any case, in a smaller setting, a limiting medium utilized in building and structural designing. Concretes of this sort are finely ground powders that are set to a hard mass when joined the concrete ties with water, for building. All alone, Instead, concrete is only sometimes used to tie together. Concrete and total makes stone work mortar or rock concrete. OPC Cement 43 grade is utilized from neighborhood concrete sellers.

Table Number - 01:- Characteristics of Cement

Sl no	Test conducted	results	LIMIT
1	Cement name	Ultra tech	
2	cement grade	43 OPC	
3	cement consistency	32%	UPTO 30%
4	initial setting	46 MIN	>30 min
5	final setting	100	<600 min
6	compressive strength	27.4 MPA	> 22.40 mpa
7	fineness	8.5%	>10%

2) **Coarse aggregate:** Developed totals are a general request of coarse-to medium-grained particulate issue utilized being created, including sand, rock, squashed stone, slag, reused concrete and geosynthetics sums, or basically absolute. Sums are the world's most commonly mined materials. Composite materials, for example, concrete and dull top concrete are all out sections; the entire seals in as a security to add fortitude to the compound material in general.

Table number – 02:-Characteristics of coarse aggregate

Sl No	characteristics	result
1	shape	angular
2	water absorption	0.85%
3	specific gravity	2.71
4	Finess Modulus	Graded

3) **Fine aggregate:** The particles that travel through the 4.75 mm sieve and hold them on the 0.075 mm sieve are fine aggregate. The components stay on a 4.75mm Sieve are coarse totals. 3. About materials. FA in concrete is utilized for instance rock, (surki, stone screenings, consumed muds, soot, fly debris, and so forth). On when they come into contact with mortar or substantial restricting materials. What's more, these inserted salts are hygroscopic. They collect water from the air and set up delays. They make dampness and flowering. The sand type is additionally not liked. They ought to be washed completely before use.

Table number – 03:-Characteristics of fine aggregate

Sl no	characteristics	result
1	shape	angular
2	Specific gravity	2.61
3	Water absorption	1.5%
4	Sieve analysis test	Graded

4) **Manufacturing sand:** Manufactured sand is artificial and delivered from pounding hard stones into little sand measured precise formed particles, washed and finely reviewed to be utilized as development total. It is a better option than waterway sand for development purpose. Manufactured sand is an option for stream sand. Due to quickly developing development industry, the interest for sand has expanded tremendously, causing lack of reasonable stream sand in most piece of the word.

5) **Steel fibre:** Steel fiber is a metal reinforcement. Steel fiber for supporting cement is characterized as short, discrete lengths of steel filaments with an angle proportion from around 20 to 100 with various cross-sections. It is available in goa steel industries.

Table Number -04:-properties of steel fibres

properties	Improvement over Oridinary concrete
Ductility	5 to 10
Impact resistance	100 to 200 %
Cracking & flexural strength	80 to 120%
Shear strength	50 to100%
Bearing strength	50 to100%
Abrasion strength	many time

6) **Superplasticizers:** Superplasticizers is also called high reach water minimizers are added substances utilized in making high strength concrete. Plastisizers are substance intensifies that empower the creation of cement with approx 15% less water content. Superplasticizers permit decrease in water content by 30% or more.

7) **GGBS:** It is a by product from the blast furance used to make an iron. These work at a temperature of around 1500 degrees centigrade and are taken care of with a painstakingly controlled by combination of iron mineral and limestone. The iron metal is decreased to press and the remaining materials from a slag that floats on the highest point of the iron. The strength of the substantial not by the use GGBS.

Table Number 05:- Physical properties of GGBS

Sl No	Physical properties	GGBS
1	Colour	White
2	Fineness	2.70
3	Specific gravity	2.94

#### B. Methodology

##### Test on Cement:

- 1) Normal consistency test
- 2) Initial and final setting time test
- 3) Fineness test
- 4) Specific gravity test

##### Test on fine aggregate:

- 1) Sieve analysis
- 2) Specific gravity
- 3) Water absorption test
- 4) Bulking of sand

##### Test on coarse aggregate:

- 1) Specific gravity
- 2) Water absorption test
- 3) Impact test
- 4) Crushing test
- 5) Fineness test

##### Test on GGBS:

- 1) Specific gravity
- 2) Fineness test

##### Test on fresh concrete:

- 1) V-Funnel test

##### Test on hardened concrete

- 1) Compressive strength test
- 2) Split tensile test
- 3) Flexural test

### C. Results

Results on fresh properties

1) *V Funnel test* : it is conducted on SCC to know the workability criteria. The test quality are tabulated below .

Table Number 06:-V-Funnel Test Result

Mix.No	%, of GGBS mixed with concrete	% of steel fibres	Slump V-Funnel (in sec)
1	0	0	5
2	10		6
3	20		6
4	30		7
5	40		8

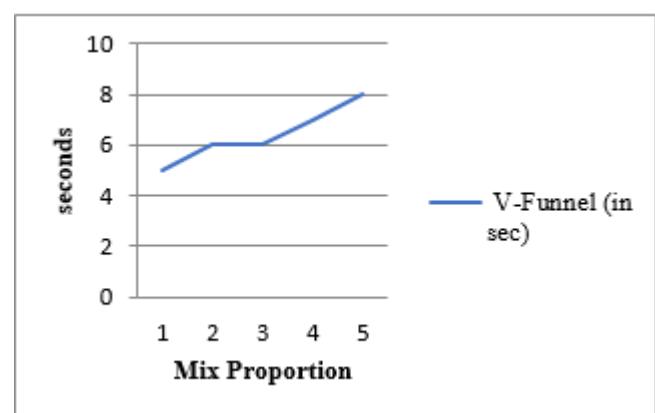


Fig No:-01 slump test

Result on Hardened concrete of SCC

1) *Compressive strength*:

Table Number 07:-Compressive Strength Result

Mix.N o	% of GGBS	% of steel fibre	Compressive Strength (Mpa)	
			7days	28 days
1	0	0	22.71	34.716
2	10		17.5	26.17
3	20		19.72	29.32
4	30		16.5	32.21
5	40		14.25	31.25

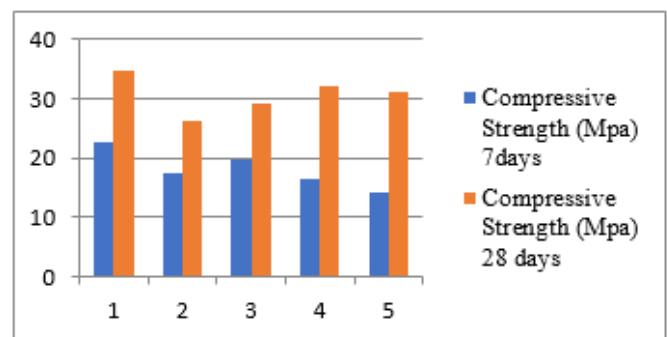


Fig No 02:- Compressive strength test

2) *Flexural test*:

Table No 08:- Flexural Test Result

Mix.N o	% of GGBS	% of steel fibre	Flexural Strength (Mpa)	
			7days	28 days
1	0	0.5	1.9	3.7
2	10		1.34	3.12
3	20		1.51	3.23
4	30		1.72	3.54
5	40		1.65	3.30

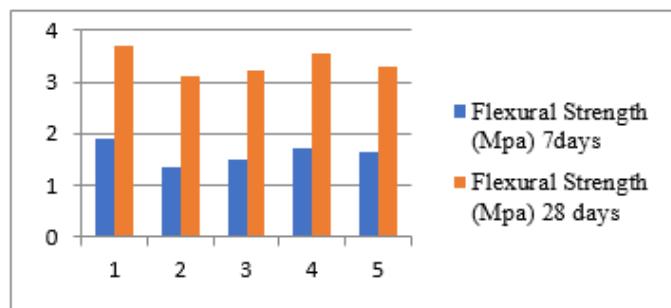
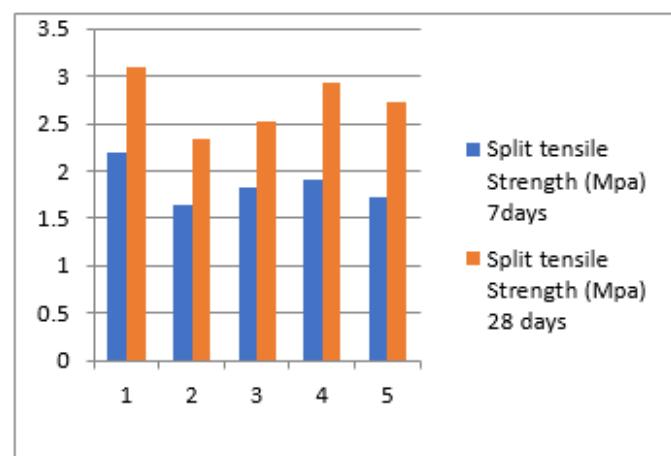


Fig No 03:- flexural test

3) *Split tensile test*:

Table No 09:- Split tensile test result

Mix.N o	% of GGBS	% of steel fibre	Split tensile Strength (Mpa)	
			7days	28 days
1	0	0.5	2.2	3.1
2	10		1.65	2.34
3	20		1.82	2.52
4	30		1.9	2.92
5	40		1.72	2.72



FigNo 04:- Split tensile test

### IV. CONCLUSION

1. By incorporating steel fibres & GGBS into the concrete, are conclude that the compressive strength, cracking strength & Bending strength as increased
2. Steel Fibres mixed with concrete reduces shrinkage, cracking etc in the concrete

3. Compressive strength, tensile strength and Flexural strength with increasing of steel fibers and GGBS to the optimity.

#### V. FUTURE SCOPE OF THE PROJECT WORK

- 1) For future review the GGBS can be supplant up to a 60 to 80% by weight of concrete which might be gives an improved outcomes.
- 2) The GGBS with an alternate rate for the future work can be utilized as substitution materials. In a different rate for geter higher strength results and more durable cement.
- 3) The GGBS with option added steel fiber safeguard use for working on the strength and durable properties of substantial which will be useful for future review.

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