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International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Experimental Study on an Investigation of Self Compacting Concrete by Using Different Material

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ABSTRACT

Concrete technology has revolutionized the construction industry in all the spheres of the world from micro to macro levels and characterized itself to new heights by providing the required strengths in every component of the construction industry. Thus, a race of research is going in every country to enhance the properties of concrete by changing the proportions of different components of concrete (cement, aggregates and water) and also by inducing various foreign agents like admixtures to increase the overall strength and life span of the concrete structure. Self-Compacting Concrete (SCC) is a newly developed concrete in which the different materials of the concrete mix are proportioned in such a way that it can flow under its own weight to completely fill the formwork and passes through the packed reinforced without any segregation and self-consolidation without any type of vibration used.

1. INTRODUCTION

Self-Compacting Concrete (SCC), which flows under its own weight and does not require any external vibration for compaction, has revolutionized the concrete placement to a new world of construction industry. SCC is highly workable concrete that can flow under its own weight through restricted sections without segregation and bleeding and also maintaining overall uniformity of the section. Such concrete should have a relatively low yield value to ensure high flow ability without any interference and without losing its actual strength parameters. A semi-moderate viscosity to resist segregation and bleeding, and must maintain its homogeneity in all the processes viz, transportation, placing and curing to ensure adequate structural performance and long-term durability.

2. LITERATURE REVIEW

M. Yakhlaf et al. (2013) [11] Studied the “Properties of freshly mixed carbon fibre reinforced self-consolidating concrete”. Carbon fibres have much influence on the filling ability, passing ability and segregation resistance of SCC mixtures. HRWR facilitated to achieve the target filling ability and passing ability properties of the SCC mixtures including carbon fibres. The SCC mixtures with 1% carbon fibres (mixtures M5 andM10) required a very high amount of HRWR to improve the filling ability of concrete. The CFRSCC mixtures with carbon fibres content up to 0.75% satisfactorily passed the requirements of SCC. The T50 slump now time was increased with the increase in carbon fibres content because the inclusion of fibres slowed the now of CFRSCC mixture by making it more viscous. The blocking index for all SCC mixtures was below the maximum limit of 50 mm because of their relatively high filling ability and high segregation resistance. All CFRSCC mixtures clearly passed the segregation resistance requirement as their segregation index was significantly below the maximum limit (18%). The visual stability index (VSI) of the freshly mixed CFRSCC mixtures revealed that the concrete mixtures were highly stable (VSI = 0) to stable (VSI = 1), thus indicating excellent and good segregation resistance, as observed from the sieve stability test. The carbon fibres were well distributed in all concrete mixtures, as observed from the scanning electron micrographs. This is because the fibres were well dispersed without any fibre clumping or balling in the presence of SF and HRWR.

S. Saranya et al. (2015) [1] had investigated "Experimental study on hybrid fibre self- compacting concrete. “In this project, glass fibres and polyester fibres were added to SCC and HFRSCC was developed. An attempt has been made to study mechanical properties of self-compacting concrete and glass fibre reinforced self-compacting concrete with addition of mild steel reinforcement in order to increase the required strength. He finds that the addition of the glass fibres improves the compressive strength, tensile strength, load carrying capacity of ordinary reinforced concrete in flexure even with small dosage levels of 0.7%, 0.6% & 0.5%and so on. The results obtained in 0.6% and 0.2% polyester fibres were quite different as compared to the results obtained for 0. 5% glass fibres and 0.3% polyester fibres and 0. 4% glass fibres and 0.4% polyester fibres.

Junaid Ahmad et al. (2015) [2] examined “To study the properties of self-compacting concrete using recycled aggregate and polypropylene fibre”. In this dissertation work emphasis has been laid to reduce the cost of the SCC without reducing the strength of the SCC, hence by-product which are available cheaply and easily like recycled aggregate (demolish concrete and fly ash) has been used to reduce the manufacturing cost without reducing the strength of SCC.

3. RESULT AND DISCUSSION

Sieve analysis of fine aggregates

S. No.	IS Sieve	Wt. Retaine d (gm)	Percentage of Wt. Retained	Cumulative Percentage of Wt. Retained (F)	Percentage of passing (100-F)	Remarks
1	10mm	0	0	0	100	Sand Falls in Zone-II
2	4.75mm	14.5	1.45	1.45	98.55	
3	2.36mm	37	3.70	5.15	94.85	
4	1.18mm	246.5	24.65	29.80	70.20	
5	600µm	205.5	20.55	50.35	49.65	
6	300 µm	287.5	28.75	79.10	20.90	
7	150 µm	177	17.70	96.80	3.20	
8	Pan	32	3.20	100	0	

Fineness modulus =∑F (up to 150µ)/100= 262.65/100 = 2.62, which means it is medium sand Acceptable limit = 2.2 to 3.2

Thus, a fineness modulus of Aggregates has been obtained.

As the Percentage passing 600µ sieve is between 35-59. Thus, it is in zone II of gradation.

Properties of Fine Aggregates

S. No.	Characteristics	Value
01.	Specific Gravity	2.46
02.	Fineness Modulus	2.61
03	Water Absorption (%)	1.1

Compressive Test Results

Compressive strength of the concrete was achieved by testing the cubes of size 150 × 150

×150 mm in the compression testing machine. Four different types of cubes were tested for a compression test. For every sample, 3 cubes were tested and the average values were considered for final results. The standard 150 × 150 × 150 mm size cubes of SCC and FRSCC were tested under a compression testing machine and average values of compressive strength which were calculated are listed in the table below: compressive strength (7days)

S. No.	Percentage of Recron-3S Fibre	Compressive strength (N/mm^2)	Remarks
01.	0.00	21.40	--
02	0.30	22.30	4.20% Increase
03	0.60	24.55	14.71% Increase
04	0.90	26.81	25.28% Increase
05	1.2	23.90	11.60% Increase

4. CONCLUSION

Effect of various percentages of the fibre like 0.30%, 0.60%, 0.90%, 1.2% were thoroughly investigated in the study to understand the best percentage of fibre to achieve the effective compressive strength as well as tensile strength and in the future if new fibres are developed with greater strength and without changing the basic strength of normal concrete then it is possible to make a new concrete which doesn't lose its durability to a maximum life span of the structure.

ACKNOWLEDGEMENT

I wish to express my thanks to all staff members of ICL Group of colleges **who** also helped me in conducting this study.

5. REFERENCES

1. Ali Akbar Shirzadi Javid, Parviz Ghoddousi, mohammad Jaberizadeh and Behnam Bozorgmehr, the comparision and introducing of plate test and Electrical resistance methods of determining the setting time and Thixotropy of self-Consolidating concrete, journal of Testing and Evaluation, 10.1520/JtE20180326, 48, 1, (20180326), (2019)
2. Subhan Ahmad and Arshad Umar, rheolllogical and mechanical properties of self- Compacting Concrete with Glass and Polyvinyl Alcohol Fibres, Journal of Building Materials, 158, (894), (2018)

3. S. Prem Kumar, A.J. Jeyaarthi, experimental investigation of Reinforced concrete using Recron-3s, International Journal of Latest Engineering and Management Research (IJLEMR) ISSN:2455-4847

4. Simple and Rational Methodology for the formulation of self-compacting concrete mixes, journal of Material in civil engineering, Vol 28, No.2

5. S. Saranya, "Experimental study on hybrid fibre self-compacting concrete.", International Journal of Applied Engineering Research (IJAER), Volume 10, Number 19 (2015) Special Issues.

6. Junaid Ahmed, Raj Bhandu Singh, "To study the properties of self-compacting concrete using recycled aggregate and polypropylene fibre", International Journal of Recent Research of civil and Mechanical Engineering [IJRRCME] Vol. 2, Issue 1, pp: (173-177, month-2015-sept-2015).

7. K. Sudalaimani," Experimental Investigation on strength characteristics of hybrid fibre reinforced self-compacting concrete", IJSTE-International Journal of science Technology and Engineering, Volume 3, Issue 05, November 2016.