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STUDY ON SELF COMPACTED CONCRETE

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Abstract

Concrete is one of the versatile construction materials which are used worldwide. In current scenario of construction industries due to demand in the construction of large and complex structures, which often leads to difficult concreting conditions. When large quantity of heavy reinforcement is to be placed in a reinforced concrete (RC) member, we face difficulties to place concrete without void and to remove void we have to use vibrator and it may lead to segregation. that also effect the strength of structure. To avoid this, we have better option that is use of self compacted concrete. The self compacting concrete (SCC) is also known as self-consolidating concrete. It is in the limelight for the last two decades in construction industry. The use of self compacting concrete (SCC) in civil engineering works has become an attractive option which produces confident cohesive concrete. It is highly flowable type of concrete that spreads into the form without the need for mechanical vibration or we can say that it is a non-segregating concrete that is placed by mean of its own weight. This type of concrete mixture does not require any compaction and it saves time, labour and electricity.

KEYWORDS: Self Compacted Concrete, Workability, Flowability, Superplasticizers.

INTRODUCTION

The concept of Self compacted concrete was developed by Prof. Hajime Okamura in Japan at eighteen centuries. Self-compacting concrete (SCC) is a flowing concrete which is mixture of cement, sand, aggregate and superplasticizer that is able to consolidate under its own weight and provide better workability. Vibrating of concrete in congested locations is not possible or may cause some risk to labour and addition to noise stress and noise pollution. There are always doubts about the strength and durability placed in such locations. So, it is worthwhile to eliminate vibration or conventional concrete and adopt self compacted concrete. The important of self compacted concrete is that maintain all concrete durability and characteristics, meeting expected performance requirement it is good segregation resistance (prevent separation of particle in the mix) and has excellent stability characteristics. Self compacted concrete shall be flowable enough to pass through highly reinforced areas it has been placed at heights taller than 5 meters without aggregate segregation and flow virtually uniform level due to gravity force without consolidation, basically we use admixture (superplasticizer) it decreases the water cement ratio and increase workability and durability. In this we focus on to avoid segregation and improve aggregate interlock is our major concern. The susceptibility for interlock depends on the ratio of the size of the opening through which concrete flow and also related to maximum size, shape and volume fraction of aggregates. The distribution of aggregate particles remains homogeneous in both vertical and horizontal direction and ability to pass reinforcement without blocking and ease placement and ensures consistency in quality, independent of worker skills, saving time and manpower and after demoulding work done by self compacted concrete look uniform.

PROBLEM WITH CONVENTIONAL CONCRETE

While using conventional concrete we face different problem like

- Less workability
- Segregation after use of vibrator of concrete
- In under water construction
- During cast in-situ foundation
- Some time we get uneven surface after demoulding
- Required vibrator and skilled worker for completion
- Sometime weight of structure also increases because we use large size of aggregate in it.

MIX COMPARISION BETWEEN NORMAL CONCRETE AND SELF COMPACTED CONCRETE

PCC	SCC
Cement (12%)	Cement (18%)
Water (17%)	Water (20%)
Admixture (1%)	Admixture (5%)
Stone (47%)	Stone (28%)
Sand (23%)	Sand (30%)



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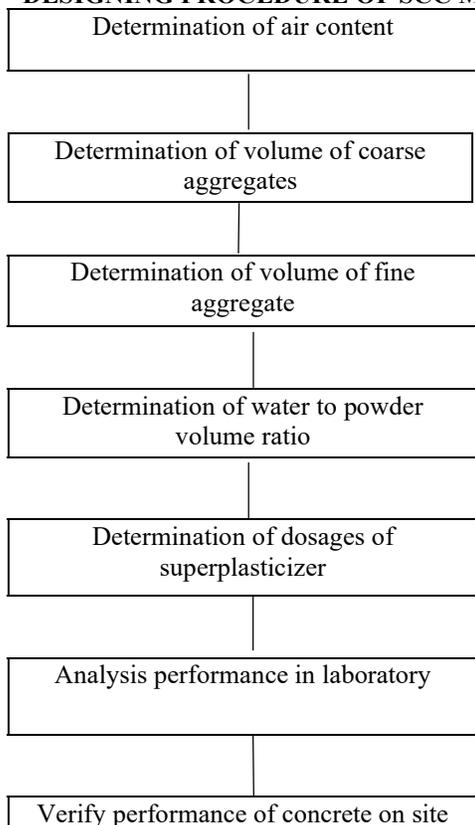
METHODOLOGY

- Paste = Cement + Water
- Mortar = Paste + Fine aggregate
- Concrete = Mortar + Coarse aggregate

Concrete is a suspension of coarse aggregate in mortar and mortar is a suspension of fine aggregate in paste and the paste is a suspension of cement in water. Use water content between 150kg per meter cube to 210kg per meter cube. Use of admixture like (polycarboxylate) is important because it can reduce the water content around 30%. The size of fine aggregate particles should be less than 0.130mm or less than that and quantity of fine aggregate between 400kg per meter cube to 600kg per meter cube. Extending the argument, we can consider mortar as a fluid whose properties are modified by the presence of sand and the extent of modification depends on the properties and volume of fine aggregate. Coarse aggregate in concrete simulated by the larger sand particles and extended to the concrete.

Concrete should be highly flowable and non-segregating. Self compacted concrete fills uniformly and completely every corner of framework by its own weight and encapsulate reinforcement without any vibration. It allows to placed concrete from height of 5 meter without any type of segregation. Because segregation may lead to affect the strength of concrete.

DESIGNING PROCEDURE OF SCC MIX



TEST METHOD	PROPERTY MEASURED	FLOW AROUND
Slump flow test	Filling ability	650mm to 800mm
T-slump flow test	Filling ability	1.5sec to 5sec



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J-ring test	Passing ability	0mm to 12mm
V-funnel test	Filling ability	5sec to 12sec
L-box test	Passing ability	$h1/h2 = 0.70$ to 1
U -box test	Passing ability	$h2-h1 = 33$ mm (max)
Fill box test	Passing ability	90% to 100%
GTM screen stability test	Segregation resistance	0% to 10%

S. NO.	GRADE	CEMENT(KG)	FLYASH(KG)	FREE WATER (KG)	W/C RATIO	C\SAND (KG)	DENSITY	ADMIXTURE (KG)	
1	M30	280	110	154	0.39	710	2364	1.87	
2	M30 (SCC)	330	150	180	0.38	858	2396	2.16	
		Orimet	Filling ability		0% to 5%				

ADVANTAGE OF SELF COMPACTED CONCRETE

- Self compacted concrete is also called as highly flowable concrete and non- segregating concrete.
- It is compacted by its own weight and encapsulated reinforcement without any vibration and uniformly compacted in every corner.
- Efficiency of SSC is more as compared to conventional concrete because SSC required more trial batches at lab as well as at RMC plant.
- It makes the balance in concrete mix between the fluidity to resist the segregation.
- SSC enable greater freedom in design because we can place concrete from the height of 5 meter and compacted with any physical or mechanical efforts.
- Reduce noise and danger of worker at construction site by avoiding use of vibrator.
- It is more precise because the constituent material measurement and monitoring is done more precisely.
- By using the SSC, we can reduce the duration and cost of the construction without compromise in quality.
- Improve quality, reliability, and durability of concrete structure due to better compaction and homogeneity of concrete.
- Use in casting of complex forms giving freedom in design of structures. where it is hard to use vibrator for consolidation of concrete.
- Due to presence of less air void in concrete it decreases the permeability that may lead to increase in strength.

ECONOMICAL ASPECT OF SELF COMPACTED CONCRETE

Talking about the economical aspect of SSC there is a feeling that cost of SSC is much higher than that of compare to normal concrete. The main reason behind it is seen that the material of SSC is about 10% to 15% higher than normal concrete. Because we have to admixture to reduce water contain and or for other purpose and sometime, we have to use plasticizer or superplasticizer to increase the strength of concrete. SSC increase the deformability of the paste that may lead to the increase the cement content in concrete.

It requires precise measurement and monitoring of constituent material while making concrete t. But if we can compare the cost of material, compacting, finishing, etc then they realize that SSC is not a costly concrete for comparable strength.

CONCLUSION

Use of self compacting concrete is the way by which we can protect the environment near construction site because it doesn't require any type of vibration sock for compacting the concrete. because there are many reasons that's why we try to avoid use of vibrator in construction site like noise pollution due to it sometime worker ears get damaged, required electricity to operate, and



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required skilled labour. These all may lead to increase the cost of construction and harm our environment too. There is very less chances of segregation in case of self compacted concrete because in it his concrete there is good balance between fluidity and resistance to segregation.

From this review it is concluded that self compacted concrete has a good influence of workability and in strength also reduce construction time with better compaction at low cost. That's why self compacted concrete is accepted in all over the world.

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