Behaviour Of Self Compacted Concrete Produced With Steel Fiber, Glass fiber and Polypropylene Fiber Additives Subjected To High Temperature

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Abstract. The paper introduces an examination concerning the productivity of temperature-delicate self-compacting concrete. Inspecting on self-compacted solid, steel fiber, glass fiber, Polypropylene fiber to this end, adding strands (steel fiber glassfiber, Polypropylene),using riversand content 1.2% forblend of solidmaterial Whentheshapetest swere 7, 14,28 days old. They have been warmed to high temperatures. Every example were warmed to various temperatures for each solid blend (0°C,100C,200°C) Then, Tests for weight reduction and compressive quality were performed. The Observations of surface breaks were made after presentation to high temperatures Acritical loss of solidity forallcementsafter200°C waswatched. Especially for concrete containing Polypropylene fiber, glass fiber, steel fiber. The strands decreased the danger of dangerous spalling and forestalled it Based on the consequences of the investigation, the yield offine total cement can be induced.

1. Introduction

1.1. GLASSFIBER:-
Glase fibre is used over 30 years as façade boards, sanitation funnelling, ornamental, non-returnable, decorative work and various products in a few construction materials, often non-sectional. Beton is one of the soldest materials in the structure. It offers a rival removal from contrasting fire and wood production and gains quality after a certain period. Cement systems may have a long operating life. The effect of the filaments on this composite increases the quality of the material's stress and effect. Nevertheless, in 1938 Russell Games Slayter of Owens-Corning developed glass fleece, generally referred to as fibreglass, as a material for safety. Fiberglass is an extremely durable and lightweight material. While it has a high mass quality and weight properties, it appears to be efficient in shaping using forming forms in comparison to metals. Glass is the most sea stoned and generally commonplace execution fiber.
1.2. STEELFIBER:-

Fiber steel is a reinforcement for metal. Steel cement fibre is defined as the small, distinct lengths (longitudinal / distance ratio), with different cross-sections of about 20 to 100 steel filaments with the area dispersed in an unhardened solid blend with the traditional blending process, which is not sufficiently haphazard. Subjective variations in the material property of cement can be caused by a particular calculation of the fibre of steel in cement, an enormous defence against breaking, impact, weariness, stress, constancy and other characteristics. Essentially, steel fiber can be sorted into five gatherings, contingent upon the assembling procedure and its shape and additionally segment: cold-drawn wire, cut sheet, dissolve extricated, factory cut, and altered cold-drawn wire. In 2003, Wen and Chung first created concrete glue with self-detecting properties utilizing steel strands with a length of 6 mm and distance across of 8 μm. Hong utilized steel filaments with a length of 32 mm and breadth of 0.64 mm to create self-detecting concrete. Hou and Lynch additionally built up a designed cementitious composite with detecting properties by consolidating steel strands. Teomete and Kocyigit utilized steel fiber with a length of 6 mm to create self-detecting concrete with pliable strain-detecting properties.

1.3. POLYPROPYLENE:-

The polypropylene fiber utilized for this investigation is from Bajaj Group of Nagpur who has been producing textures and polymer mixes with wide scope of use including development industry Tashi India Ltd. Nagpur, a promoting arm of Bajaj bunch presented.

1.4. RIVERSAND:-

Stream sand is a generally utilized development material in Hong Kong, particularly in the generation of cement and concrete sand mortar. The Construction Industry Council has propelled an exploration venture entitled "Research on River Sand Substitutes for Concrete Production and
Cement Sand Mortar Production”. To distinguish elective materials to enhance waterways and, the examination will experience two stages The principal stage (Phase One) of the examination means to recognize reasonable waterway sand substitutes for useful applications in the nearby development industry subsequent stage (Phase Two) will concentrate on defining down to earth answers for utilizing waterway sand substitutes in Hong Kong and the improvement of measures or determinations. This report is on the look into results of Phase One.

2. Literature Review

2.1 P.AkhilKumar, VenuMalagavelli, J.S.RPrasad(2015)
Polypropylene fiber concrete is a sort of solid that polymers are utilized as admixtures and furthermore supplements in. Polymer in concrete has been checked by Committee 548 of the American Concrete Institute since 1971. One sort of the polymers that are utilized regularly in concrete is polypropylene fiber polymer. The focal points of polypropylene strands are: improving blend attachment and pump ability over long separations, improve freeze-defrost obstruction, improve protection from unstable spalling in the even to fan extreme fire, improves way opposition what's more, increment protection from plastic shrinkage during relieving. At that point the compressive qualities of the examples were resolved. The most extreme compressive quality at 23°C was resolved for the gathering of 300g polypropylene strands cement and this expansion was about 5.6% in contrast and the control examples yet the most extreme quality was resolved for the gathering of 600g polypropylene filament concrete at 300°C and its increment was 10.1% in correlation with the control examples. As per the outcomes, the best increment in quality was identified with this gathering The fundamental reason for this examination is to research the impacts of high temperature on the compressive quality of cement. In this way, the tests were completed by blending woolen sort of polypropylene fiber into the solid. Woolen poly propylene fiber influences the usefulness of the crisp cement unfavourably also, it diminishes the droop result practically 31% in correlation with control examples. Similar outcomes have been gotten by different looks into . In the compressive quality test, the most extreme quality has been acquired for the solid by blending 600 g/m3 woolen polypropylene fiber at 300°C. The quality expanding is about 10.1% in contrasting and the control examples and the base quality has been acquired for the solid by blending in 900 g/m3 woolen polypropylene fiber at 750°C. Along these lines polypropylene fiber has less impact on the compressive quality of cement.

2.2 Peng Zhang, Qing-fu Li(8 Jan2012)
The usability and solidity of the solid composite comprising fly debris and silica see the have been tested with multivariate exploratory investigations. Four exceptional portions of fibre thickness have been included. The utility of the crisp solids can be measured by the droop and droop stream parameters. As the spread through the fresh concrete framework in the droop test, the drool stream can be transmitted. The droop will mirror the easiness of the crisp solid composite and the droops of the new solid composite can be robust. The insulation blocking capability of the current solid composite can be examined from the spreading phase in the droop test. Drop and drop stream qualities can be measured using a regular steel sheet, the height, the calculation of the top open mouth and the base measurement of 300 mm, 100 mm and 100 mm, and person No 51208472) No 51208472) , China Postdoctoral Science Foundation, China Postdoctoral Science Special Foundation (award No. 2012T50603) (special foundation of China Postdoctoral science No. 20110491007) and Chinese Ministry of Water Resources (Grant No.201201201) Open Base of the Dike Safety and Fiasco Preventive Engineering Management Research Centre.

2.3 N.Nalanth,1P.VincentVenkatesan,2andM.S.Ravikumar3(16 March2014)
Self-compacting concrete as we as a whole know is a solid which shows great stream properties, great passing capacity, and isolation opposition. No vibration is required to minimal the solid since the SCC has the capacity of compacting under its own load subsequent to being put. Additionally SCC adequately goes through the blocked fortifications and consistently tops off the voids. The SCC along these lines acquired is thick and homogeneous and has prevalent surface completion The concise writing audits of probably the most recent examinations are as per the following. Reference [10]examined the crisp and hard-ended properties of SCC utilizing reused solid totals as both coarse and fine totals states. From the point by point study and investigation of the trial test results got by directing new state tests like droop stream test, L- box test, V-pipetest, J-ring test, etc it is apparent that the drop stream distance across diminished with the increment in the substitution extent of RA yet the droop stream distance across was well in the scope of SCC necessity (650 mm–800 mm). There was a further more decrease indroop stream distance across because of the expansion of steel strands yet the stream steems were very inextend. The J-ring test is spoken to in Figure 4. The J-ring stream spread shows the confined deform ability of SCC due to blocking impact of fortification bars and stream times hows the pace of disfigure ment inside a characterized stream separation. The blocking step measures the impact of blocking. The time needed for the V-channel streame is that of the duration in which the characterised volume of SCC must pass a thin opening and shows the potential of SCC filling, when both the obstruction and the separation do not occur [25,26].

2.4 H. Mazaheripour, S. Ghanbapour, S.H. Mimiradiri, I. Hosseinipour (16 July 2010)

Self-Compacting Concrete (SCC), another sort of High Performance Concrete (HPC) with astounding deformability and segregation obstruction, was first created in Japan in 1986. It is a unique kind solid that can move through and fill the holes of support and corners of molds with no requirement for vibration also, compaction during the setting procedure [1,2]. Light Expanded Clay Aggregates (LECA) has been utilized to help in this examination. Different blended ventures of the light weight material saremade by coarse total sand the regular fine totals to help the cements weight. Through a progression of test blends con ducted during the examination, the nature of the solidatis new condition has been assessed with the below average rating principles of self-compacting concrete distributed by Japan Society of Civil Engineers (JSCE), particularly engaged in its flow ability, isolation resistance capacity and filling capacity. At the point when a percentile volume of normal totals are supplanted with a similar percentile volume of LECA lightweight aggre doors in the blends. As for the properties and evaluating of the subbed LECA totals, the PSD of the LLSCC is be wildered. Along these lines, more limestone and filler is expected to recapture the crisp properties of a SCC. Likewise, so as to make up for the up to referenced blemish, the concrete segment should be expanded so as to improve the compressive quality of the LLSCC.

2.5 ahanaS Shheril P. T. (9 September 2013)

Self-compacting concrete is the solid which can stream under its own weight and fill blocked fortifications and gets compacted with no vibration. Concrete has high compressive quality and solidness however it is fragile and powerless in strain. Expansion of strands in solid aides in capturing the split development and aides in expanding the flexural and malleable quality. Self-Compacting Concrete (SCC) has been utilized since most recent couple of decades, Glass Fiber Fortified Self Compacting Concrete (GFRSCC) is generally new development. Self-compacting concrete is a mild production of the concrete and it has greater quality properties by extending the strands to it. Any exams were carried out on fibre expansion self-compacted concrete. This work attempts a close analysis on new and strengthened extremely valuable asset of the concrete mixtures of self compressing concrete (SCC) and self-compacting glass fibre concrete (GFRSCC) tested by M20 and M30. The squashed coarse total of 20 mm most extreme size adjusted acquired from the neighbourhood pulverizing plant; (Bidadi, Karnataka) is utilized in the present examination. Explicit gravity is 2.60 and fineness modulus 5.4. The Cem–FIL Anti–Crack glass strands were utilized
2.6 Venkatesh Kodur (13 March 2014)

The fire response of individuals with reinforced cement (RC) is influenced by qualities such as mortar, fortifying steel, of the component materials. These include (a) warm, (b) mechanical characteristics, (c) misshapening, and (d) explicit or characteristic content such as concrete spilling. Though the mechanical qualities of the component material determine the degree of solidarity and solidity of the element, it decides the necessary warmth bonds to transfer to the fundamental part. In relation to material properties the missing hapening properties determine the magnitude of mistakes and tensions in the auxiliary component. Warm properties that oversee temperature subordinate properties in solid structures are warm conductivity, explicit warmth, and mass misfortune. These properties are fundamentally affected by the total sort, dampness substance, and organization of solid blend. There have been various test programs for portraying warm properties of cement at raised temperature. A point by point audit on the impact of temperature on warm properties of various solid sorts is given by Khaliq [45], Kodur et al., and Flynn. Warm conductivity of cement at room temperature is in the scope of 1.4 and 3.6 W/m°C and differs with temperature. Figure 1 shows the variety of warm conductivity of NSC as an element of temperature in light of distributed test information and experimental relations. The test information is incorporated by Khaliq from various sources in view of exploratory information.

2.7 Subhan Ahmad 1* and Arshad Umar 2 (2018)

Fiber-strengthened self-compacting concrete (FRSCC) is another structure material that consolidates positive attributes of usefulness of self-compacting concrete (SCC) with improved qualities of solidified cement because of fiber expansion. In writing, metallic and engineered filaments are utilized as the SCC fortification. From the written statement, it can be identified that SCC’s functionality is affected by the use of metallic filaments. Similarly, the compressive strength of SCC automatic self-compacting cement (SCC) is a moderately new structural material that can flow under its own weight and thoroughly fill the moulding, preserving homogeneity even with the existence of blocked fortification and then fuse without compaction. Metallic filaments may be more viable than engineered strands. Development time is shorter and SCC output has no clamour and vibrations. SCC also offers a good surface finish and improved preparation chances. The SCC’s important assets, which are achieved by extending the measure offlines are power, transport capacity and separation opposition.

2.8 J Novák 1 and A Kohoutková 1 (2017)

Various test examinations have been led fully informed regarding the intend to watch the fire reaction of solid composites. Especially, the examinations are centered around the impact of a kind, shape also, substance of strands on the mechanical properties of solid composites, generally compressive and rigidity including flexible modulus. Specifically, it concerns steel strands manufactured filaments and a blend of steel and polypropylene filaments which are generally utilized in the solid business. There likewise a couple examinations which manages carbon filaments and glass strands. As the dissolving purpose of steel is generally high in examination with different materials, the utilization of steel strands is by all accounts helpful for solid composites presented to high temperature. Fusing steel filaments into solid composites stays worth while in any event, when the solid composites are uncovered to high temperature up to 1200°C, especially 1% content has no malicious impact on warmed concrete. Indeed, the incorporation of steel strands in a solid blend prompts an improvement in both mechanical properties and protection from warming impact sin examination with unreinforced concrete.

2.9 B. Sandhya Rani 1, N. Priyanka 2 (2017)
Concrete self-combining (SCC) is also known as cement that is self-combining. Due to its high folio content and fluidity, SCC is a not-isolating cement. Through its weight, it is mounted or balanced in every position, except at the spots where it is offered the thick fortification. In addition, compacting (vibration that uses mechanical vibrators) is not required. On the off chance that the situation of cement is done a ways off of one meter over the territory of position with its flow able nature it very well may be put with no voids honeycombs. It’s a preferred position for receiving the SCC. In this article, the properties of the solid were determined by five fibre expansion blends and one customary blend. In all blends, bonding is finished with a set concrete replacement of 10 percent by fly debris, and bonding by an extension of 0.25 percent in any bond is applied to all bonding. i.e., the fiber substitution rates are 0%, 0.25%, 0.5%, 0.75%, 1.0%, 1.25%. From the outcomes it has been reasoned that expansion of filaments to the solid( SCC) will influence decidedly on both compressive and rigid qualities at various extents.

2.10 Hazrina Ahmad1, a) Mohd Hisbany Mohd Hashim2, Siti Hawa Hamzah3 and Afidah Abu Bakar4 2016

SCC was investigated by Japanese analysts in 1992 so as to discover answer for the basic decline of talented laborers to play out a legitimate compacting process in solid development related to the necessities to create sturdy solid structures. In this manner, SCC was created with the favorable position in therheological properties that enables it to be appropriately poured set up, filling the formwork corners and little voids between fortification bars by methods for its very own weight. Since the level chunk structure is bolstered distinctly on sections, the punching shear limit is additionally seen in the zone around the segment. The commitment of steel filaments in opposing punching shear in level chunks was contemplated. Fortification bars are given in the chunk to prompt punching shear in the structure. Higher fiber content in the blend and higher evaluation of cement demonstrated positive outcomes in opposing the fragile punching shear disappointment. The steel filaments works adequately as shear fortifications to oppose the punching shear disappointment in the level piece component.

2.11 Hajime Okamura and Masahiro Ouchi (15 April 2013)

For quite a while starting in 1983, the issue of the solidness of solid structures was a significant subject of enthusiasm for Japan. The formation of solid cement structures requires sufficient compaction by talented laborers. In any case, the slow decrease in the number of talented specialists in Japan’s development industry has prompted a comparative decrease in the nature of development work. The model of self-compacting concrete was first finished in 1988 utilizing materials as of now available. It isn’t constantly conceivable to foresee the level of compaction into a structure by utilizing the test result on the level of compaction of the solid into another structure, since the most extreme size of coarse total is near the base separating between the fortifying bars of the structure.

2.12 SALAI KARTHIK.R, ELWIN GURU CHANTH.S (2017)

Advantages of polypropylene fiber :-

1. Increases the strength of concrete by 40% which leads to increase the strength of the roads
2. prevents to stops the big or large cracks on the walls
3. it has high ductility
4. reduce pitting of the floor
The auxiliary scale bars were tried under shear stacking through the two-point load setup, with a shear length to profundity proportion equivalent to 2.67. The littler jetty length accommodated the longitudinal support didn’t permit the advancement of curve impact, which caused disappointment by de-bonding of the flexural fortification on account of pillars without ordinary shear fortification.

2.13 Slamet Widodo (2012)

In the new province of SCC, when the nearness of polypropylene fiber expanded it caused lower flow ability (Slump Flow) and passing capacity (J-Ring) of SCC blends. Then again, the consistency and the isolation proportion of the blends expanding in understanding with the volume part of polypropylene filaments content. The solid blends can in any case meet the prerequisite off low ability, thickness and passing capacity of SCC with polypropylene fiber expansion up to 0.10 percent by volume of cement.

2.14 Najilah Farouk*, I. Padmanaban (2017)

point of trial is to contemplate the solidify properties for example compressive quality, split rigidity what’s more, flexural quality of fiber fortified self compacting concrete. Concrete creates miniaturized scale breaks with relieving and these splits engender quickly under applied pressure bringing about low elasticity of cement. Thus expansion of strands improves the quality of cement and these issues can be overwhelmed by utilization of Polypropylene filaments in concrete. Use of poly propylene strands gives solidarity to the solid while the net work ensures the strands.

2.15 Hawra Alradhawi (March 2018)

The droop stature and droop distance across of the five concrete blended tried utilizing Abraham’s droopcone, the droop saw to totally crumpletype. It is watched the necessary flow ability with the little sign of isolation. Contingent upon the trial results and discourses given in this paper the following ends can be drawn. Filaments decline usefulness yet it can be kept up utilizing mineral and synthetic admixtures. Fly debris content in self-compacting solid concrete necessity up to certain degree and improves usefulness Chemical admixture gives flow able concrete and increases segregation and bleeding. Hence, it is recommended to use short length poly propylene fibers.

2.16 K.K. Sideris, P. Manita

Self-compacting Concrete (SCC) is a kind of cement created through the most recent 15 years. It is broadly utilized in various applications going from lodging to huge foundations, for example, spans and burrows. SCC can spread into place under its own weight and fill restricted segments without the need of mechanical solidification, improving along these lines the work place, decreasing the man power requirement for throwing and speeding up development what’s more, the nature of cast structures. SCC is typically considered as an exceptional kind of elite cement created with higher measures of filler materials and lower water/fastener proportions as contrasted and different cements. Along these lines porosity of SCC is for the most part

2.17 A. Mohammed a,b, N. T. K. Al-Saadi a,b, R. Al-Mahaidia

The Near-Surface Mounted (NSM) fiber strengthened polymer (FRP) reinforcing and fix method has been generally utilized to re-establish or expand the quality of strengthened cement (RC) structures. In this strategy, The exhibition of NSM CFRP reinforcing utilizing direct draw out tests (single-laps hear
tests) with IHSSC-CA in normal and high temperature was researched in this examination. In view of the tests results, the accompanying ends are being drawn.

2.18 PietroLuraa,bGiovanniPietroTerrasia

In this examination, a constructive outcome of SAP on the spalling obstruction of HPSCC was illustrated. Out of 4 examples with SAP, none indicated firespalling, while both reference tests without SAP did. It is assumed that the systems by which the SAP demonstration in HPSCC presented to high temperatures is connecting the PP strands further more, permitting their permeation as of now at a low volume content, when the PP strands are not permeated either with one another or with the ITZ encompassing the totals. Consolidating the SAP with a low measure of PP strands is useful for the new properties of the HPSCC, since at the high PP fiber stacking required for permeation, the HPSCC loses its self-compacting properties.

2.19 FarhadAslania,b,,JackKelina

In this experimental research, three hundred cylinder exhibits of temperature-exposed specimens were needed for reinforcing steel and polypropylene fibres with lightweight rubberized auto-compacting beta. The results on fresh properties, compression resistance, tensile strength and elasticity module have been tested on cylinder specimens. The experimental technique The success of life cycle thinking onto the construction network was based on a pattern for greener material, which moreover is more and more rational in relation to existing expectations, using fewer concrete and waste materials. The following conclusions can be reached from experimental procedures.

2.20 FarhadAslani,M.ASCE1;JunboSun2;andGuanqi Huang3

Self-compacting concrete (SCC) is a cemented composite used without mechanical vibration for complicated formworks. Thanks to its prevalent showing, SCC has been commonly used in solid structures today, including fantastic deformations and high blockages. Self-compacting is another type of SCC rubber treated cement (SCRC), is created when morsel elastic totals from squander tires are mixed with various divisions in SCC to supplant some portion of customary totals; this created SCRC accomplishes a superior monetary advantage and reusing of squandered tires. Then, polypropylene and steel filaments are likewise utilized in SCRC to improve the mechanical properties, particularly at raised temperatures. In this examination, eight polypropylene and steel-fiber-fortified SCRC blend structures were delivered. Droop stream and J-ring tests were performed to explore the properties of crisp SCRC (flowability, streamspeed, filling capacity, and passing capacity).

3. Conclusion and Future works

Self-compacting cements tried in the present investigation had an dangerous spalling inclination practically like the one of regularly vibrating cements of a similar quality class. The lingering mechanical properties tried in this examination (lingering compressive quality and parting rigidity) in self-compacting concretes and regularly vibrating cements having a place in the equivalent quality
class were influenced by a similar way. Impact of raised temperatures saw as increasingly unfavorable to parting malleable quality of all blends tried in this examination.

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