International Journal of Engineering Research and Modern Education
Impact Factor 6.525, Special Issue, April - 2017
6th National Conference on Innovative Practices in Construction and Waste Management
On 25th April 2017 Organized By
Department of Civil Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu

EXPERIMENTAL INVESTIGATION ON STRENGTHENING INTERLOCKING HOLLOW BLOCK WITH POLYESTER STRAP WASTE

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Cite This Article: C. V. Saranya & Shilpa Tajy, "Experimental Investigation on Strengthening Interlocking Hollow Block With Polyester Strap Waste", International Journal of Engineering Research and Modern Education, Special Issue, April, Page Number 51-54, 2017.

Abstract:

Production of blocks used for wall construction have different techniques adopted which could be in form of hollow or solid blocks produced in varying shapes laid with mortar. An improved form of mortar-less blocks which is an innovative structural component for masonry building construction called interlocking block .This brings about economical production, reduced cost of labour and appreciation of available local materials for construction of structures for both rural and urban development in the world today, thereby eliminating the use of mortar in laying of blocks. The blocks are neatly fixed through the aid of grooves and protrusion on the blocks to restrain movement when assembling the interlocking block from top and or bottom of one to another forming safe, stable, economical and aesthetic bonding for walls. It can be widely used for both temporary and permanent structures. The assembling does not require much skill, and more so, faster, neater with improved efficiency. The dismantling in the case of temporary wall is also, easier, faster and economical which do not involve destroying any part of the wall. Now days, hollow concrete blocks and bricks are becoming very popular. These blocks are being widely used in construction of residential buildings, factories and multi-storied buildings. These hollow blocks are commonly used in compound walls due to its low cost. The blocks and bricks are made out of mixture of cement, crusher powder and stone chips. By adding polyester strap waste of 0.1to 0.12% we can increase the strength of hollow concrete block Hollow blocks construction provides facilities for concealing electrical conduit, water and soil pipes. It saves cement in masonry work, bringing down cost of construction considerably.

1. Introduction:

Hollow concrete blocks are substitutes for conventional bricks and stones in building construction. It is sometimes called a concrete masonry unit (CMU). A concrete block is one of several precast concrete products used in construction. They are easy to place and it saves cement in masonry work, bringing down cost of construction considerably. These blocks are being widely used in construction of residential buildings, factories and multi-storied buildings. The blocks are used for both load bearing and non load bearing walls. The hilly states of India have high humidity, dampness and rainfall, so the blocks are much useful for the N.E. Region, Himachal Pradesh, J&K, and U.P. etc. The blocks are made out of these blocks in masonry there is stone the blocks and bricks are made out of mixture of cement, sand and stone chips. Interlocking blocks are like 2 adjoining pieces of a jigsaw puzzle. Each block has a projection at one end and a depression at the other. The projection of one block fits in to the depression of the next so that they always align perfectly. The blocks have vertical holes in them which have a double purpose. Firstly, the holes reduce the amount of material required to make the block without compromising on it strength. Secondly, steel rods can be inserted or mortar poured into them to increase the building's strength and stability.

2. Experimental Program:

2.1 Material: Hollow concrete block is produced by using crusher powder and polyester strap waste ,0.1%,0.12% of volume of mould, in addition to conventional concrete materials .Stone powder produced from stone crushing zones appears as a problem for effective disposal. Substitution of normal sand by stone powder will serve both solid waste minimization and waste recovery. concrete made of stone powder and stone chip gained about 15% higher strength than that of the concrete made of normal sand and brick chips. The PFC exhibited improved flexural and compressive strength, abrasion resistance, and reduced drying shrinkage over that of plain cement concrete (PCC). polyester fibers are alkali resistant. Due to their non-biodegradability, the use of polyester fibers in cement concrete hollow blocks can also help in conservation of environment.

Figure 1: Polyester Strap Waste

2.2 Experimental Procedure: Hollow blocks of size as shown in the figure 3 was designed as per IS code .There are 9 hollow blocks are made to perform both fresh concrete and hardened concrete tests. The study focuses to determine the relative performance of concrete by using powder sand. From laboratory experiments, it was revealed that concrete made of stone powder

and stone chip gained about 15% higher strength than that of the concrete made of normal sand and brick chip. Concrete of stone powder and brick chip gained about 10% higher strength than that of the concrete normal sand and stone chip concrete. The highest compressive strength of mortar found from stone powder which is 33.02 Mpa, shows that better mortar can be prepared by the stone powder. The compressive strength of concrete from stone powder shows 14.76% higher value than that of the concrete made of normal sand. On the other hand, concrete from brick chip and stone powder produce higher compressive value from that of brick chip and normal sand concrete.

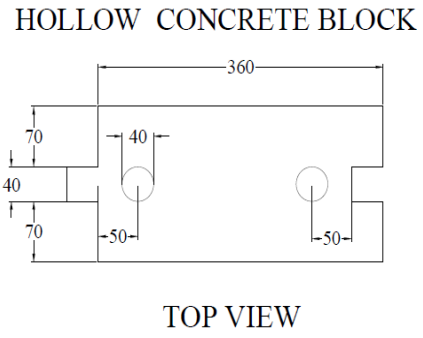


Figure 2: Casting Mould

Size of block	=	360x180x180mm
Volume	=	11.664 x 10-3m^3
Unit weight of concrete	=	2400kg/m^3
Volume/sum of ratio	=	2400/7
	=	342.9m^3

Block

0.1%	-	30.8gm
0.12%	-	36.94gm

Table 1: Mix Proportion for M15 Grade concrete

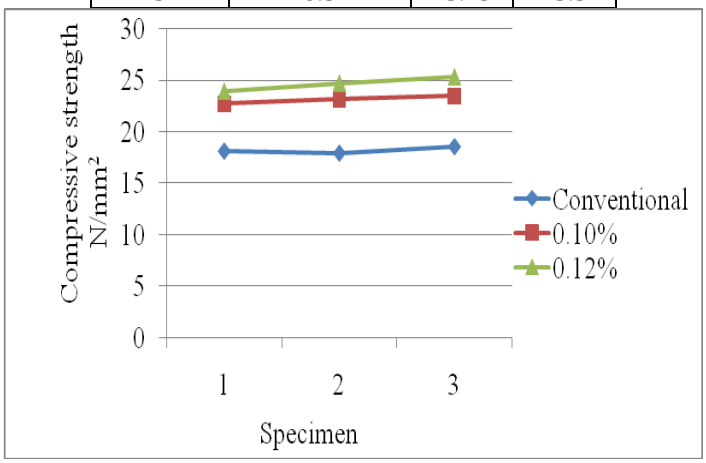
Water(liter)	Cement (kg)	Crusher powder (kg)	Coarse aggregate(12mm) (kg)
191.6	383	572.13	1161.6

M_{15} grade: 1:2: 4

3. Result and Discussion:

Table 2: Compressive strength of concrete (M15) After 28 days curing

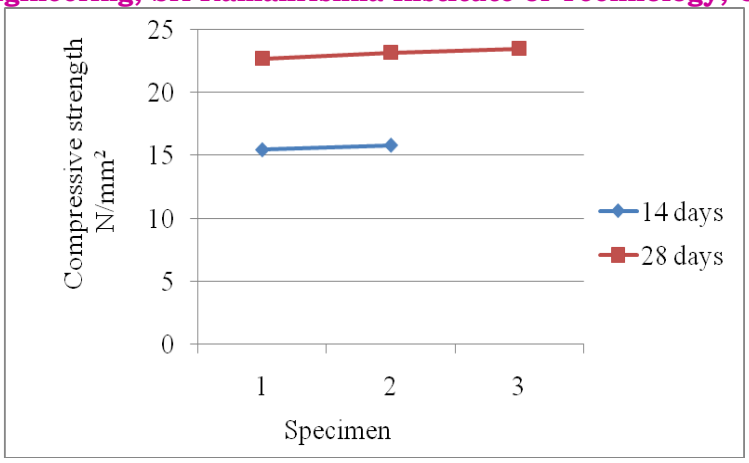
Specimen	Conventional	0.10%	0.12%
1	18.1	22.68	23.91
2	17.9	23.14	24.69
3	18.51	23.45	25.3



0.1% of polyester fiber

Table 3

Specimen	14 days	28 days
1	15.43	22.68
2	15.8	23.14
3		23.45



0.12% of polyester fiber

Table 4

Specimen	14 days	28 days
1	16.97	23.91
2	17.9	24.69
3		25.3

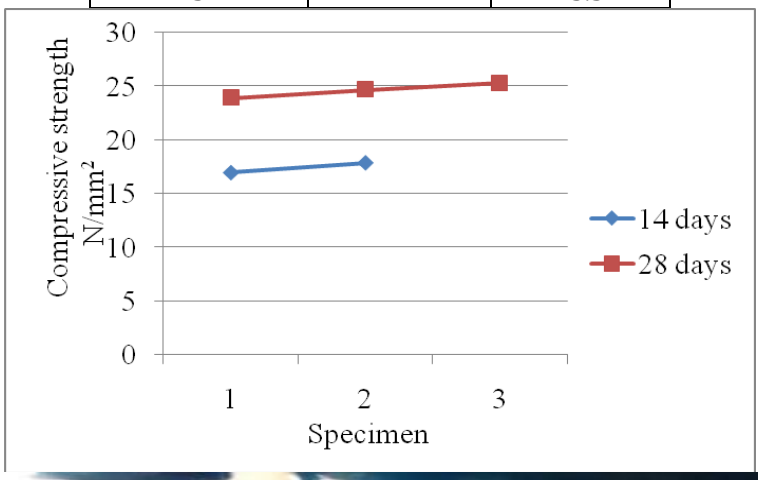


Figure 3: Compression test on hollow block

4. Conclusion:

Based on the experimental study the fiber added hollow block has more compressive strength than the conventional hollow block. Based on the experimental study the hollow concrete block with polyester strap waste is Ecofriendly and the strap waste can be disposed easily. When polyester strap waste of 0.10%&0.12% is added to conventional block, it provides incremental increase in compressive strength. In 14-days curing, compressive strength is increasing 20% by adding the polyester strap waste. In 28-days curing, compressive strength is increasing 24% by adding the polyester strap waste. These types of hollow blocks are more economical, when compared to normal concrete blocks. Fiber added hollow block comes under grade A type hollow block according to IS code.

5. References:

1. IS 2572.2005 “construction of hollow and solid concrete block masonry”

2. IS 2386-PT(IV) “Impact test on aggregate”
3. IS 2386-PT(III) “Specific gravity test”
4. IS 4031-PT(IV) “Consistency test of cement”
5. IS 4031-PT(IV) “Initial and final setting time of cement”
6. “Techno Economic Feasibility Report on Concrete Hollow and Solid Block.”
7. Akeem Ayinda Raheem, Ayodiji Kayode Momoh, Aliu Adebayo Soyingbe (2012) “Comparitive Analysiso Sandcrete Hollow Blocks And Laterite Inter Locking Blocks As Walling Elements.”
8. Ehukwudi Onyeakpa, Lateef Onundi (march-April) 2014 “Improvement on the Design and Construction of Inter locking Blocks and It’s molding machine”