Investigation of Concrete Block with different Aggregate and Mixed Aggregate size to withstand under Local Compression

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Abstract

In present study experimental analysis was performed on concrete blocks of different aggregate size and also prepared with different mixed aggregate size, the constant loading rate of 1.0e-5/sec was induced in concrete block with different loading area i.e. 100mm×100mm, 60mm×60mm, 20mm×20mm and 15mm×15mm. the compressive test is performed using compression testing machine. The local compression effect is induced by steel block in upper part of concrete block the M30 grade is used for concrete block, it is observed that 10 mm of aggregate size gives better stability as compared to other aggregate size i.e. 6mm, 16mm, 20mm. further the two different size aggregates were mixed together i.e. 6mm+10mm and 10mm+20mm, the compression test is performed with these aggregate sizes and it is observed that mixed aggregate size of 10mm+20mm represents good agreement in compressive strength in all loading areas with constant loading rate in local compression.

Key Words – Concrete Block, Concrete, Compressive Strength, Local Compression, Aggregate Size, Mixed Aggregate.

1.1 Introduction

Concrete is a composite material composed on nice then coarse aggregate bonded together along liquid cement. Concrete is the second-most-used material in construction with embargo with water content afterward water,[2] concrete have greater role in strength of structures of various uses i.e. buildings, bridges etc. [3] Its utilization worldwide, with higher demand is double that on steel, wood, plastics, and aluminum combined.[4] in past years greater demand of concrete is increased due to excess construction work in society [5]. This extensive usage effects into a variety about environmental impacts. Most notably, the production procedure because cement produces enormous volumes on greenhouse fuel emissions, administration after internet

8% concerning world emissions.[6][7] Other environmental worries encompass large illegal sand mining, impacts on the enclosure environment certain so increased floor runoff, yet potential community fitness implications from toxic ingredients. Significant research then development is being instituted in accordance with strive to reduce the emissions or edit concrete a supply about carbon sequestration, or expand recycled then small raw substances content material among the composition after obtain a round economy. Concrete is expected after remain a effective material for buildings resilient according to local effect of disasters,[8] as well as a solution to carbon – di – oxide effect in the air pollution on environment have need to be controlled.

1.2 METHODOLOGY

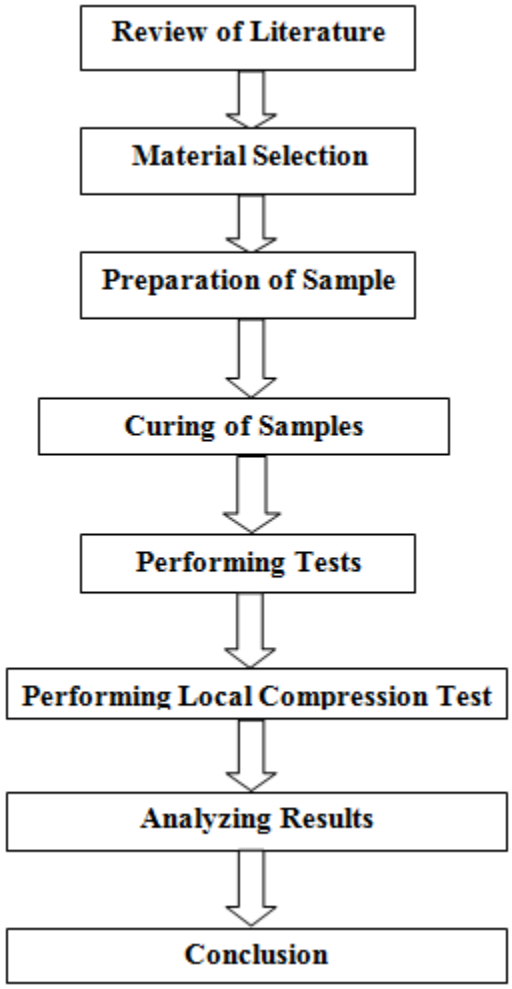




Figure 1: Compressive Strength test of concrete block samples in UTM of different configuration.



Figure 2: Compressive strength test of concrete block.

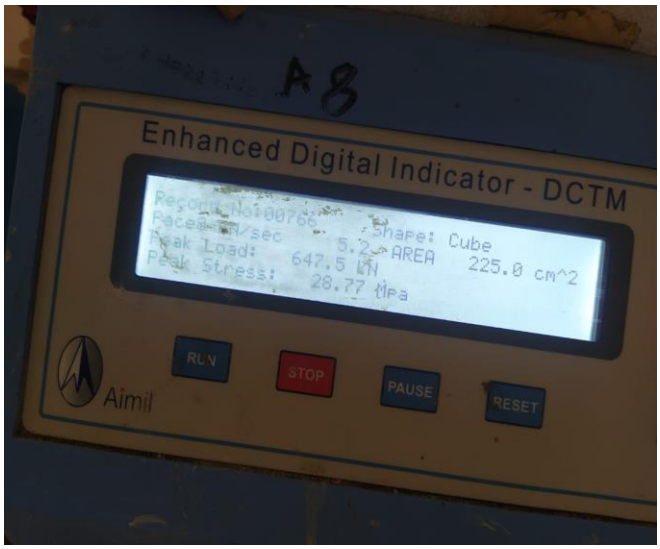


Figure 3: Compressive strength test of concrete block.



Figure 4: Compressive strength test of concrete block.

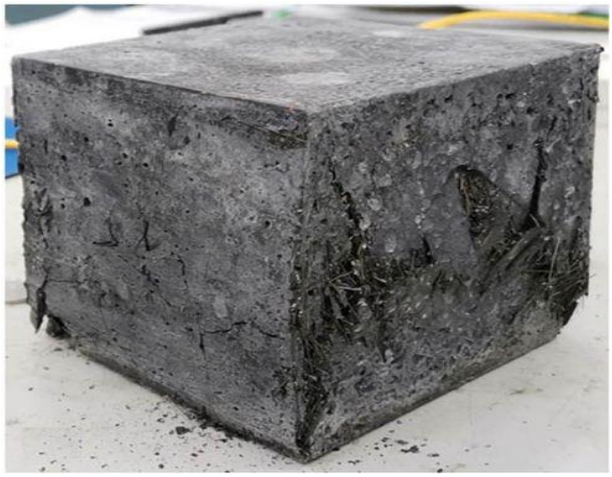


Figure 5: Compressive strength test of concrete block with shear crack.

1.3 RESULT

- **Local compression strength test result**

Validation		
Loading rate (1.0e-5/sec)		
Loading area	**Aggregate size (mm)**	**Stress (MPa) Validation**
100×100 mm	6	22.69
	10	30.58
	16	24.47
	20	27.65

1.4 Compressive strength result for local compression of compressive area of 60mm×60mm

Loading rate (1.0e-5/sec)		
Loading area	**Aggregate size (mm)**	**Stress (Mpa) (LA= 60×60 mm), (LR= 1.0e-5/sec)**
60×60 mm	6	21.88
	10	28.96
	16	23.22
	20	25.52

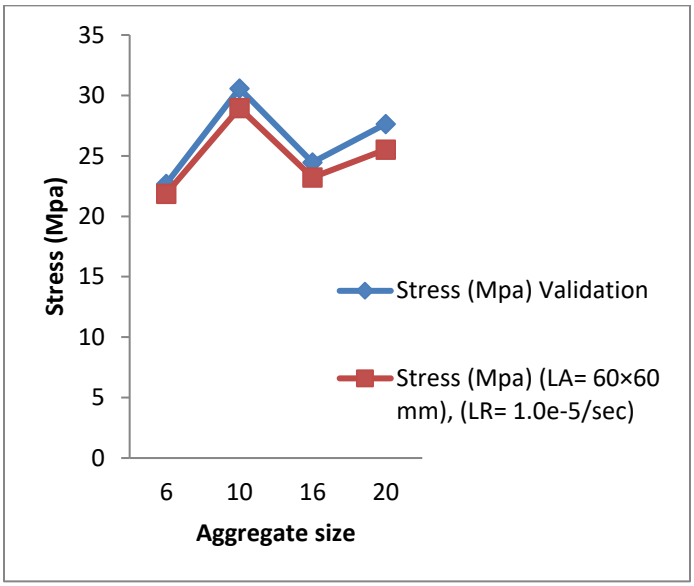


Figure 6: Graph shows results of compressive strength test

1.5 Compressive strength result for local compression of compressive area of 20mm×20mm

Loading rate (1.0e-5/sec)		
Loading area	**Aggregate size (mm)**	**Stress (Mpa) (LA= 20×20 mm), (LR= 1.0e-5/sec)**
20×20 mm	6	69.85
	10	108.33
	16	98.65
	20	93.85

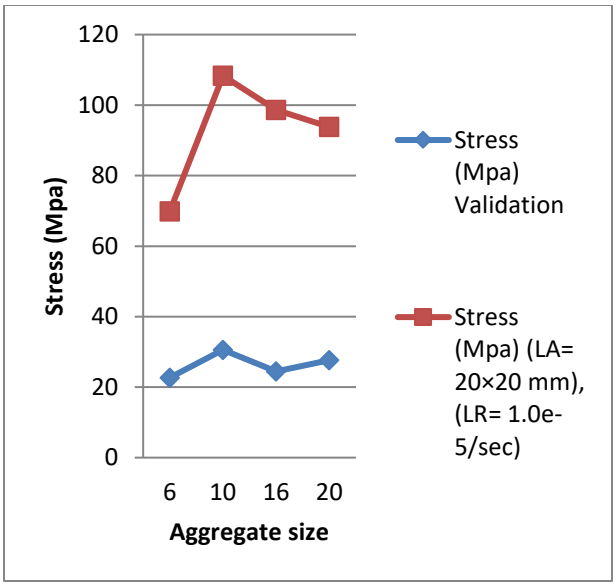


Figure 7: Graph shows results of flexural strength test.

1.6 Compressive strength result for local compression of compressive area of 15mm×15mm

Loading rate (1.0e-5/sec)		
Loading area	**Aggregate size (mm)**	**Stress (Mpa) (LA= 15×15 mm), (LR= 1.0e-5/sec)**
15×15 mm	6	98.74
	10	125.43
	16	111.58
	20	103.69

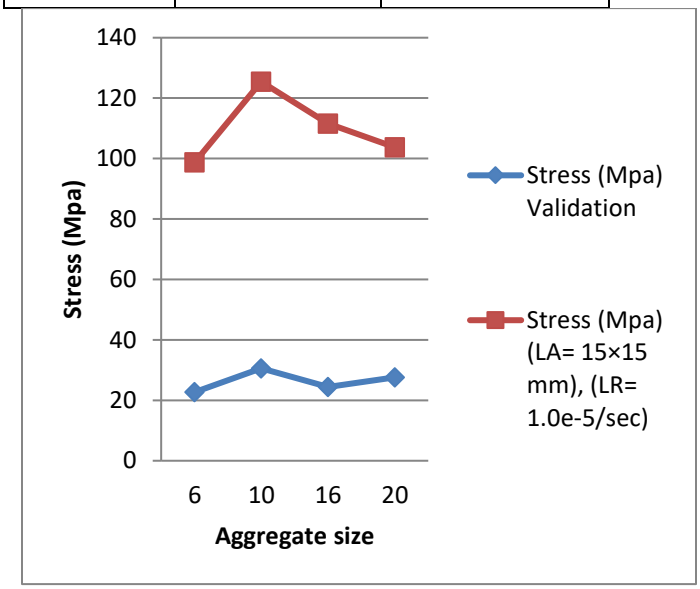


Figure 8: Graph shows results of flexural strength test.

1.9 Overall comparison of dynamic result:

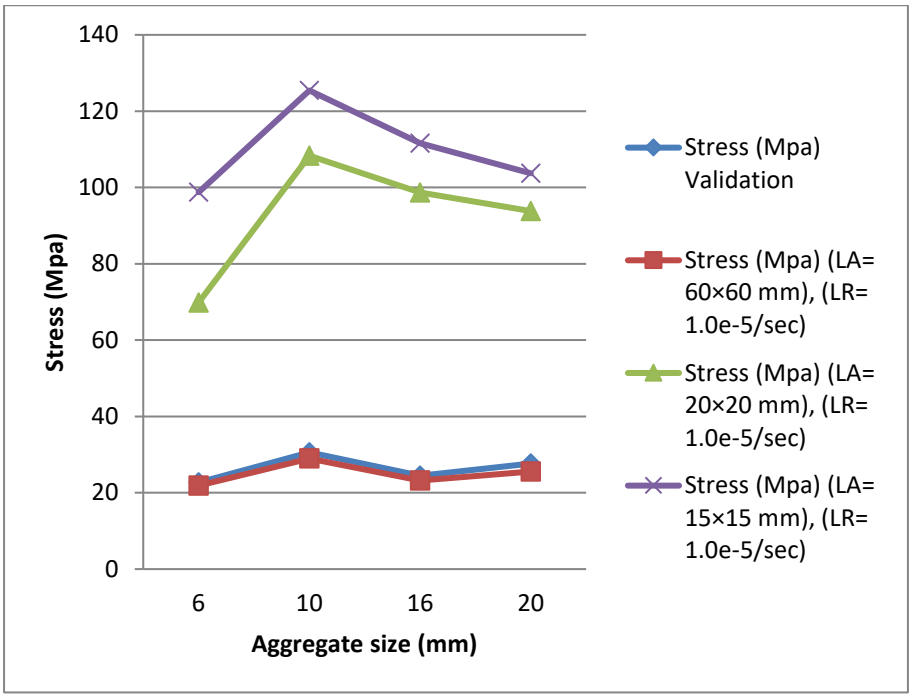


Figure 11: Overall comparison of result for compressive strength of different size aggregate and constant loading rate.

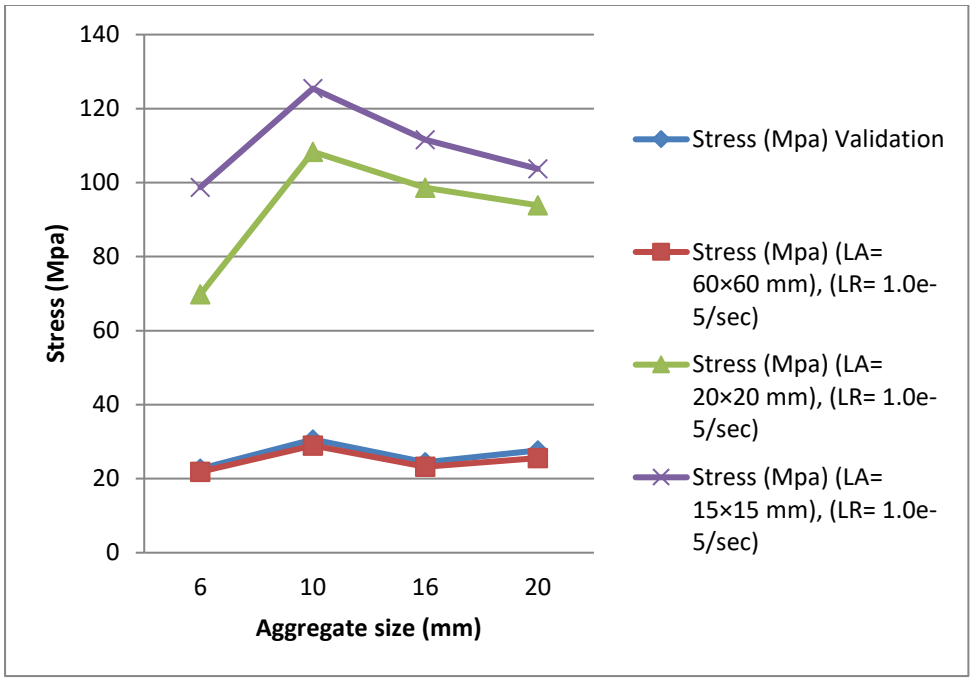


Figure 12: Overall comparison of result for compressive strength of different size aggregate and constant loading rate.

Conclusion

1. The test result of this study concludes that there is great potential for the utilization of concrete block of different configurationbased on present study, the following conclusions can be made.

2. Concrete block with 10mm aggregate size exhibits higher strength i.e. with increase in stability and ability to resist high loads.

3. The compressive strength of the concrete block increasesin different local compressive loads due to effect of loading area.

4. The mixed aggregate of size 10mm+20mm represents higher stability as compared to other aggregate size and mixed aggregate.

5. It is observed that the mixed aggregate provides higher stability in local compression under constant loading rate with different loading area.

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