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UTILIZATION OF DEMOLISHED CONCRETE WASTE AS A COARSE AGGREGATE IN CONCRETE

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ABSTRACT
In current days concrete waste is caused whenever any demolition activities happen. Use of Recycled aggregate reduce the environmental impact. Once the useful life of the structure is all over it will be demolished and all the demolished wastes just get their path to landfills. Finding large space for landfills is becoming very tough . In This study is focused on reuse of Demolished Concrete waste and reduces the usage of natural resource, and collecting Demolished Concrete from the demolition of structures at location, Crushing Concrete waste and separating unlike sizes using sieve analysis, by collecting several sizes of Aggregate are preserved with heating and chemical process. In this study the usability of demolished waste as coarse aggregates in new concrete is tried. In my research paper an investigational study is carried out to study the feasibility and reprocessing of demolished concrete waste for new project construction

Keywords: Natural concrete aggregate, Recycled aggregate concrete, Super plasticizer Conplast SP 430

1. INTRODUCTION

Concrete was discovered by the Minoan civilization over 2000 BC [1]. In the previous phases of the Roman Empire about 300 BC, the Romans found that mixing a sandy volcanic ash with lime mortar produced a hard water resistance material which we know as concrete [2-5]. Construction and demolition wastes are one of the most important components of wastes caused world-wide [6-10]. Extremely large number of aggregates are used in concrete making and in construction. When the beneficial life of the building is over it will be demolished, and all the demolished wastes just get their path to landfills [11-13].

Finding large space for landfills is extremely problematic. On the other hand, constant mining and quarrying of natural aggregates for construction is causing reduction in natural resources [14-17]. The reprocessing of demolished structure waste in to aggregates to be used in new engineering function provides a capable solution to both the problems. In this work the usability of demolished waste as coarse aggregates in new concrete is tried [18-20].

It has been reported that abrasion resistance of recycled aggregates aresimilar to that of normal aggregates, ratios of splitting tensile strength to that ofcompressive strength were found to be in good agreement with conventional values derived for concretes from natural aggregates [21-23]. Although the resistance of recycled aggregate to mechanical actions is lower than fresh crushed granite aggregate,the values are generally within acceptable limits, for achieving a design compressive strength, recycled aggregate concrete requires lower water—cement ratio and higher cement content to be maintained as compared to concrete with fresh granite aggregate, the water absorption of recycled aggregateincreases with an increase in strength of parent concrete from which the recycled aggregate is derived, while it decreases with an increase in maximum size of aggregate [24-27]. Compressive strength decreased with increasing recycled aggregate content. In addition, the concrete mix with 406 recycled aggregates exhibited the best tompressive strength. The workability of concrete, expressed in terms of slump. varied within the range from 60 to 92 mm, which is acceptable for new concrete [28-30]. This investigational study involves evaluating the properties of the constituents of concrete including the demolished concrete wastes which shall be used as coarse aggregates in new concrete with the aim of making high strength concrete, In our research paper an experimental learning is carried out to investigate the feasibility and reusing of demolished waste concrete for new construction.

2. METHODOLOGY

The methodology will be adopted for the project work.

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- Literature Survey
- Material Collection
- Mix Proportions
- Casting of Specimens
- Testing of Results
- Conclusion

3. MATERIALS AND METHODS

The raw material utilized in concrete are subjected to several experiments to determine their properties and to decide their usability in concrete. Concrete is a synthetic material, which is made up of cement, coarse aggregates, fine aggregate andwater. In this experiment additionally I have added an artificial admixture (super plasticizer) to enhance some of the properties of concrete. The material utilized are cement, M-sand, recycled aggregate, coarseaggregate and artificial admixture.

In order to check the use of demolished waste as coarse aggregates in concrete in recentlyconstructed project, the mechanical properties for the recycle aggregate were determined,with specific gravity, water absorption, abrasion resistance, Aggregate Impact Value and Aggregate Crushing Value.

- Cement
- Fine aggregate
- Coarse aggregate
- Recycled aggregate
- Admixture – Super plasticizer Conplast SP 430
- Water

In this analysis, control mix was designed as per IS10262:1986 to reach a target compressive strength of 30 MPa. The casted cubes are test for7, 14, 28 days Compressive strength, Split tensile strength and 14, 21, 28 days Flexural strength test. The wet mixture was filled into themould in 3 layers with the help of solve the mix is compacted with twenty-five blows of 4.5 kg rammer on level and rigid platform. The numberand size of samples are determined by the specific of the tests.

The excess mixture was scraped off and also the mould levelled using a straight edge. The mould and its content were left for twenty four hours before the removal of the mould. Identification marks wereinscribed on the specimen for simple referencing.

4 .MIX DESIGN

The design mix for concrete grade M30 is used and several replacement ratios of recycledaggregate by natural aggregate is considered. The water cement ratio is remained stable. The super plasticizer considered was Conplast SP 430.

Table 1 Mix Design for Natural Concrete

Materials	**Cement**	**FA**	**CA**	**Water**
	(kg/m^3)	**(kg/m^3)**	**(kg/m^3)**	**(lit/m^3)**
ConventionalConcrete	436	840	1050	195
	1	1.93	2.45	0.45

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Table2 Mix Design for Reprocess Aggregate Concrete

	Cement (kg/m^3)	FA (kg/m^3)	CA (kg/m^3)	RCA (kg/m^3)	Water (lit/m^3)
RCA 10%	435	840	970.9	107.1	195
RCA 20%	435	840	860.8	215.2	195
RCA 30%	435	840	750.7	323.3	195

5.TESTS ON CONCRETE

The taken demolished concrete was crushed physically using rammers to the needed aggregate size.

Workability of the concrete

The equivalent slump is determined by calculating the workability of the concrete using the compaction factor test. Because it is high strength concrete, the slump test will yield no results

Compressive strength test

The mould specimens of size150mm*150mm*150mm cubes were analyzed to determine the compressive strength at the period of 7, 14 and 28 days.

Fig 1 Compressive strength

Tensile strength test

The Mould specimens of size 150mm*300mmcylinders were analyzed to determine the tensilestrength at the time of 7, 14 and 28 days.

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Fig 2 Split tensile strength

Flexural strength test

The mould specimens of size 1m*0.15m*0.15m beams were analyzed to determine the flexural strength at the time of 28 days.

Fig 3Flexural strength

RESULTS AND DISCUSSION

The several results obtained from the compressive strength tests, tensile strength tests and flexural strength tests were examined and arranged. The table 3, 4, 5 and the figure 5, 6, 7 show that results of the compressive strength, split tensile strength and flexural strength respectively.

Study on recycling and reuse of structural and demolition wastes is very important because with the growth in development and urbanization there is an increased requirement of natural resources while on the other hand the present demolished wastes have no correct means of disposal.

Therefore to use these wastes in new concrete construction is not only a capable solution to both the problems, but also that these demolished wastes are simple to obtain and are available at lower prices than the virgin aggregates.

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Table 3 Compressive Strength Test Results

% of replacement	Compressive Strength (N/mm^2)		
	7 Days	14 Days	28 Days
0%	16.33	25.56	32.25
10%	14.42	23.14	31.14
20%	15.66	25.65	31.66
30%	17.04	26.72	33.67

Table 4 Split Tensile Strength Test Results

% of replacement	Split Tensile Strength (N/mm^2)		
	7 Days	14 Days	28 Days
0%	2.63	3	3.6
10%	2.4	3.05	3.42
20%	2.27	2.9	3.3
30%	2.55	3	3.59

Table 5 Flexural Strength Test Results

% of replacement	Flexural Strength (N/mm^2)		
	7 Days	14 Days	28 Days
0%	2.2	2.65	3
10%	1.8	2.3	2.65
20%	2.05	2.36	2.7
30%	2.16	2.7	2.95

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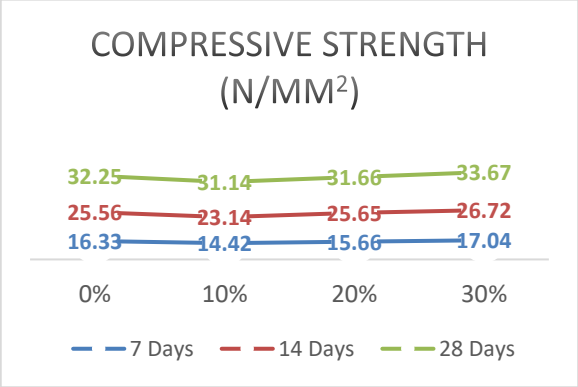

Fig 4 Compressive Strength Test Result

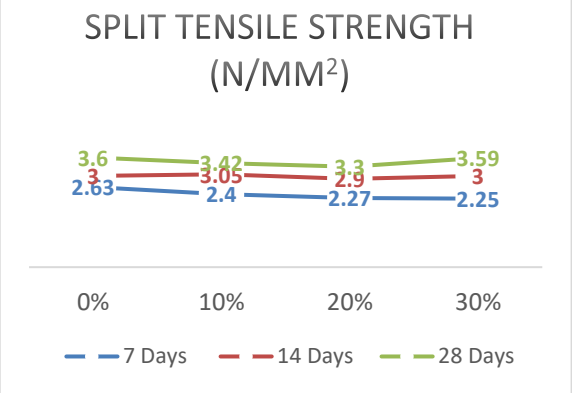

Fig 5 Split Tensile Strength Test Results

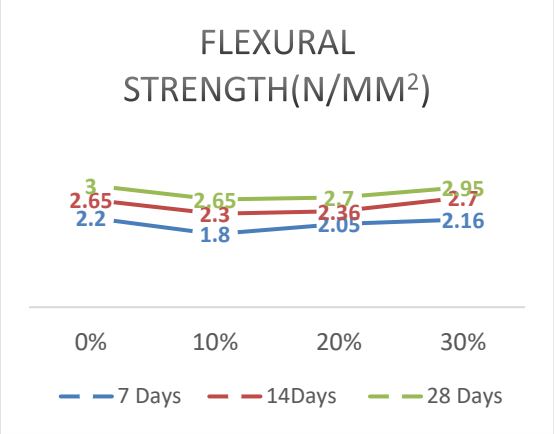

Fig 6 Flexural Strength Test Results

CONCLUSION

The following resulting conclusions can be taken from the above experimental studies:

- The bulk density and specific gravity of recycled aggregates is less than that of natural aggregates. This is because of the attached mortar exist on the aggregate surface.
- the compressive strength results of recycled aggregate concrete it can be concluded that the recycled aggregate concrete though ha slower strength development than the natural aggregate concrete, it can still be

used in construction by choosing the best possible replacement ratio.

- Additional it can also be concluded that the split tensile strength similarly follows the same tendency of reduction in strength with increased replacement. But they still lie within the range needed to be used in structural concrete and hence are acceptable.
- Similar trends are observed in case of flexure results. And the results are found to be satisfactory. From the above investigations it can be hence concluded that the optimum replacement for this particular mix for high strength concrete is 30%.Up to this replacement good compressive strength can be achieved using recycled aggregates. Beyond this replacement the strength acquired reduces gradually and does not cross the target strength and in order to overcome this problem, suitable adjustment in mix design is required.

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