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UTILIZATION OF DEMOLISHED CONCRETE WASTE FOR NEW CONSTRUCTION AND EVALUATION OF ITS STRENGTH

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Abstract *– In present day Demolished Concrete waste handling and management is challenging one in all over the countries in the world. Recycle the Demolished Concrete has reduces the environmental pollution and protect the natural resources. This research is focused on utilising the Demolished Concrete waste and reduces the generation of construction waste. This research included a collecting a Demolished Concrete from the demolition of building at site, Crushing Demolished Concrete waste and is separated with different sizes using sieve analysis. Various sizes of Aggregate is treated with heating and chemical process. Finally the Demolished Concrete Aggregate (DCA) is replaced by various percentages of !0 %, 20 % , 30 % adding with fibre and test can be conduct and compared with nominal Concrete.*

Key Words: **Demolished Concrete Aggregate (DCA), Super plasticizer agent (SP430), Recron 3s Fiber, Demolished Concrete (DC), Ordinary Portland Cement (OPC).**

1. INTRODUCTION

Concrete is widely used material for construction of building by the mixing of Cement, Aggregates and water. Aggregate is produce from natural resources. The resource of Course Aggregate is minimized day by day. So some other material must be introduced for balancing the demand. This project is utilizing the Demolition Concrete Aggregate (DCA) and determination of properties of DCA, then it is treated with heating and chemical process and making the Concrete with various percentage of DCA with replacement of Course Aggregate added with fiber. The results are compared and giving more strength then the nominal Concrete.

2. MATERIAL USED AND PROPERTIES

2.1 Cement.

Ordinary Portland Cement (OPC) 53 grade "Ultra Tech Cement" was used to cast the concrete moulds.

Table 1. Properties of Cement.

S. No.	Property	Cement
1.	Initial setting time	44 minutes
2.	Final setting time	620 minutes
3.	Consistency	33 %
4.	Specific Gravity	3.15

2.2 Fine Aggregate.

Natural river sand (Zone II) is used as a Fine Aggregate. It is passes through the 4.75 mm IS sieve and then used for making of Concrete.

Table 2. Properties of Fine Aggregate.

S. No.	Property	Fine Aggregate
1.	Fineness modulus	2.52
2.	Specific gravity	2.70

2.3 Course Aggregate.

The Course Aggregate is properly sieved and 12.5 mm , 20 mm aggregates were used for Concrete.

Table 3. Properties of Coarse Aggregate.

S. No.	Property	Coarse Aggregate
1.	Fineness modulus	2.52
2.	Specific gravity	2.7

2.4 Demolished Concrete Aggregate.

Crushing a Demolished Concrete waste and is separated with different sizes using sieve analysis. Various sizes of DCA was treated with heating and chemical process.

Fig. 1. Demolished Concrete Aggregate

Table 1. Properties of Coarse Aggregate.

S. No.	Property	DCA
1.	Specific gravity	2.66
2.	Water absorption	1.6 %

2.5 Water

Water cement ratio of 0.50 was used in the recycled concrete and for this purpose potable water was used for mixing and curing purpose.

2.6 Fiber

For this project Recron 3s Fiber has been used which belongs to synthetic fiber category

Recron 3s prevents the micro shrinkage cracks developed during hydration, making the structure/plaster/component inherently stronger.

Fig. 2. Recron 3s fibers

Table 4. Specifications of Recron 3s fiber

S. No.	Property	Value
1.	Cut length	6 mm or 12 mm
2.	Shape of fiber	special for improved holding of cement aggregates
3.	Melting point	> 250°c
4.	Tensile strength	4000-6000 kg/cm^2
5.	Dosage rate	Concrete Use CT 2024 (12mm) at 909 g/m^3 Plaster Use CT 2012 (6 mm) at 125 g/ cement bag 1:4 cement/sand ratio Optimise as per application

2.7 Superplasticizer

Super plasticizer agent (SP430) Specific gravity 1.20 to 1.21 at 30º C. All concrete mixes was used to achieve good workability.

3. RESULTS AND DISCUSSIONS

Concrete was casting with cubes (150 mm x 150 mm x 150 mm) , cylinders (150 mm dia. And 300 mm Height) and beams (100 x 100 mm x 500 mm) the different percentage of replacing of DCA of 10 %, 20 % , 30 %. The Concrete specimens were introduced to curing process and testing the specimens of 7 days, 14 days and 28 days strength.

3.1 Compressive strength test on Concrete cubes.

Compressive strength of concrete is find according to IS: 516-1959. Concrete cubes were loaded uni-axially by using standard compression testing machine with 100 tonnes capacity until the specimen fails.

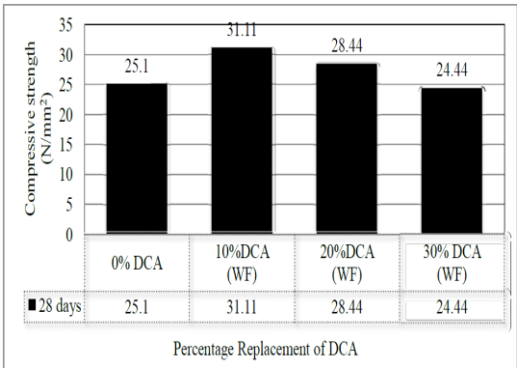

CHART 1. Compresive strength test at 28 days

As shown in CHART 1 the Compressive strength of the Concrete cubes decreased at the 30 % replacement of DCA Concrete added with fiber.

10 % and 20 % of DCA Concrete has more strength then the nominal Concrete.

3.2 Tensile strength test on Concrete cylinders.

The tensile strength was carried out 150 mm diameter and 300 mm height of cylindrical specimen and the load is laterally applied by using standard Compression testing machine with 100 tonnes capacity until the specimen fails

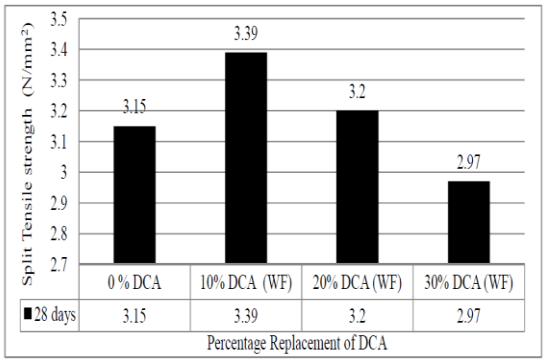

CHART 2. Flexural strength test at 28 days

As shown in CHART 2. it is clear that the addition of fiber content increases the split tensile strength of concrete.

In this case the optimum split tensile strength is increased 7.07 % than the control concrete.

3.3 Flexural strength test on Concrete beams.

The Concrete beam has a size of 150 mm x 150 mm x 500 mm. It can be casting , curing ,testing and the result is shown below.

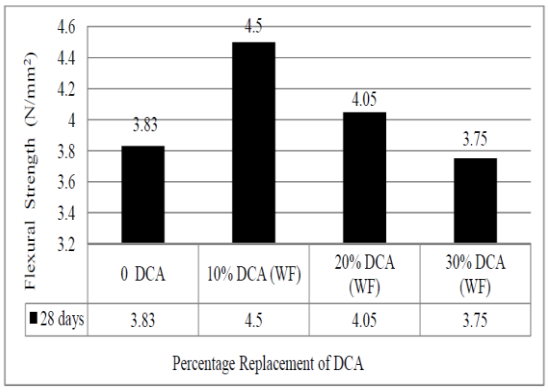

CHART 3. Flexural strength test at 28 days

The CHART 3 shows the flexural strength of DCA Concrete is lower than the nominal Concrete mix.

3.4. Conclusion.

Based on the experimental investigations carried out, the following conclusions are drawn

On Comparing Compressive strength of Nominal Concrete and Demolished Concrete Aggregate, the percentage of DCA replacement upto 20%, the strength increased as 2.5%.

On Comparing Split Tensile Strength of Nominal Concrete and Demolished Concrete Aggregate, the percentage of DCA replacement upto 20%, the strength increased as 7.07%.

On Comparing Flexural strength of nominal Concrete and Demolished Concrete Aggregate, the percentage of DCA replacement Reducing the strength

From the study the Replacement of DCA Concrete allowed to use up to 20 % with adding fiber. For more replacement of DCA Concrete has decreasing in strength.

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