International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 06 | Jun 2023 www.irjet.net p-ISSN: 2395-0072

Effect Of Polyster Fiber And Ceramic Waste As A Replacement Ingredients In Concrete

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Abstract - In Recent Times, The Entire World Witnessed The Building Of Extremely Difficult Civil Engineering Structures. The Best Building Material For All Types Of Structures Has Proven To Be Concrete. Because Of The Rapid Rate Of Population Growth, It Can Be Difficult To Get Coarse Aggregate For Construction. How Popular Is As The Population Expands, The Amount Of Consumer And Industrial Goods Rises. It Has Been Demonstrated That India Generates A Lot Of Waste When Ceramic Tiles Are Used As Finishing Materials For Building Construction. Because Of This, Ceramic Tiles Must Be Used In This Study To Address The Problem Of Waste Disposal, And Polyester Fibre , Which Comes From Petroleum Products, Must Be Used To Enhance The Quality And Strength Of Concrete. The Objective Of This Study Is To Examine The Workability And Durability Of Concrete With Polyester Fibre At Replacement Values Of 0.5%, 1.0%, 30%, And 40% By Percentage Of Cement And Ceramic Waste Aggregate At Replacement Values Of 10%, 20%, 30%, And 40% In Order To Examine Using Waste Ceramic Tile Aggregate As Coarse Aggregate In M-25 Grade Concrete Mix's Durability And Qualities.

***Key Words*: Ceramic, Waste, And Concrete, Polyester Fibers, Workability, Compressive Strength, Flexural Strength.**

1.INTRODUCTION

Historically, cement concrete has been the most effective material for creating all kinds of constructions. Few construction supplies are now available in the nation, and every construction project results in increased productivity waste. Concrete is still one of the most traditional, long-lasting, and adaptable building materials available. The infrastructure for tiny residences, low-rise buildings, big structures, and domestic constructions are all covered by it. It is employed in all kinds of construction projects. Concrete is becoming more and more popular as a result of innovation and advancement in this industry.

The primary components of concrete, a material made by humans, are cement, aggregates, water, and additives. These are mostly aggregates, which are inert granular materials like sand, crushed stone, or gravel. Lack of building supplies is a problem brought on by the unreasonable population growth rate. In the past, aggregates could be used for any purpose, were inexpensively available, and met all the requirements. Natural resource depletion occurs frequently in developing countries like India because of the development of infrastructure and other facilities as a result of rising urbanization and industrialization.

The appropriateness of our continued exploitation and excessive use of natural resource aggregates, however, has come under question in recent years on a global scale. In concrete mixtures, aggregates are frequently regarded as harmless filler materials. However, a closer examination reveals that aggregate has a significant impact on the characteristics of both fresh concrete and hardened concrete. But ongoing aggregate extraction has led to their depletion, which might lead to an imbalance in the environment. Alternative Aggregate Sources Can Be Used In Construction As A result. In a few years, a significant natural resource issue affecting the next generation will arise. The fact that hundreds of tonnes of trash are disposed of in landfills each year, occupying and degrading valuable land, is another factor speeding up this environmental catastrophe.

2. MATERIAL

An Overview of Ceramic Waste :

As suggested by the name, double charge tiles are produced by combining two layers. Furthermore, tiles are loaded twice. Its 8 mm thickness gives it strength and durability.

Double Charged Tiles Are The Best Alternative For Any Business Locations With Heavy Foot Traffic Because They Are Thicker Than Regular Tiles And Were Built Using Cutting-Edge Technology. with exceptional craftsmanship and tenacity.

They are quickly overtaking other options for floor tiles. Therefore, in this project, double charged tiles must be used as coarse aggregate.

An Overview of polyster fiber :

Polyester fibres are becoming more and more well-liked because of their remarkable qualities and adaptability.

Polyester Fibres Are Known For Their Excellent Strength And Durability. They Can Withstand Stretching Quite Well. Due to their low moisture absorption capacity, polyester fibres do not readily absorb water.

Polyester fibre is frequently used in the construction of home furniture. It is used to make curtains, bed sheets, blankets, and pillows in addition to upholstery fabrics.

Polyester is a fantastic option for these applications due to its durability, resistance to stretching and shrinking, and capacity to withstand fading and stains. Numerous technical and commercial fabrics use polyester fibres.

Conveyor belts, geotextiles, and automotive textiles are made using them. As well as filter fabrics (for liquid and air filtration), (such as seat belts and airbags).These Are Just a Few of the Many Applications of Polyester Fibre. Due to its adaptability and performance characteristics, it is a frequently used material in many industries.

Polyester fiber with a cut length of 12 mm has been used in this investigation.

Cement: Portland pozzolana cement, under IS: 1489 part-1, is used in construction.

Fine aggregate: Fine aggregate is used to create concrete that complies with the IS: 383-2016 specification for coarse and fine aggregate from natural sources, with fractions ranging from 4.75 mm to 150.

Coarse aggregate: Coarse aggregate is used to create concrete according to the IS: 3832016 specification for coarse and fine aggregate from natural sources, with a proportion ranging from 20 mm to 4.75 mm.

Water: Concrete needs water as a key component. In general, water that is suitable for drinking can also be used to make concrete. Another criterion used is that water is considered appropriate if the PH ranges from "(6 to 8)".

Mix design: As per IS code 10262-2019 suggest concrete mix design here we are doing mix design with using various material property.

Table 1 ADD PROPORTION TOGETHER TO GET 1 m3

ADD PROPORTION TOGETHER TO GET 1 m3	
Materials	Quantity
W/C - ratio	0.45
Cement	427 kg/m^3
Coarse aggregate (20mm)	1153 kg/m^3
Fine aggregate	652 kg/m^3
water	206 kg/m^3

3. Results

Addition of [P.F._ polyster, C.W.A._ ceramic waste]

In compression test , flexural test

1. [P.F.] (0) + [C.W.A.] (0) + [N.C.A.] (100),
2. [P.F.] (0.5) + [C.W.A.](10) + [N.C.A.] (90)
3. [P.F.] (1.0) + [C.W.A.](20) + [N.C.A.] (80)
4. [P.F.] (1.5) + [C.W.A.](30) + [N.C.A.] (70)
5. [P.F.] (2.0) + [C.W.A.](40) + [N.C.A.] (60)

Table 2 7,28-DAY OBSERVATION PERIOD FOR COMPRESSIVE TEST

Mixing the percentages of [P.F.] [C.W.A.] and [N.C.A.]	COMPRESSIVE STRENGTH (N/mm^2)		PERCENTAGE
	AVG. OF 7 DAYS	AVG. OF 28 DAYS	%
1	19.83	30.52	0
2	21.14	33.58	-9.57
3	23.52	36.78	20.59
4	21.98	33.64	13.57
5	22.55	34.17	15.31

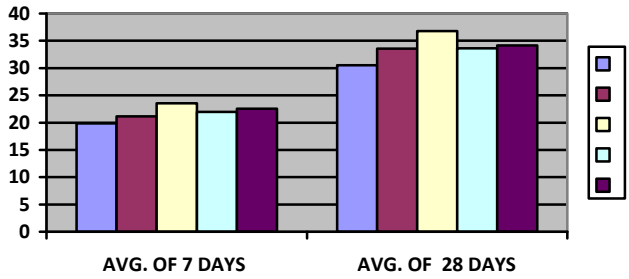

Figure 1 Avg. of 7,28 days for compressive strength

AN ANALYSIS OF COMPRESSIVE STRENGTH:

For this study's control and polyster fibre with cement replacements of 0.5%, 1.0%, 1.5%, and 2.0% ceramic waste replacements of 10%, 20%, 30%, and 40%, there are a total of 90 cubes and 45 beams. To evaluate the compressive strength of the 150x150x150mm cubes, the cubes were squashed for seven and twenty-eight days.

For each age group, three specimens were most likely tested. Before being removed, cured, and put through a strength

test, all freshly cast specimens were kept in their moulds for 24 hours.

The ability to withstand deformation brought on by external forces, as determined by the IS Compressive Strength for Materials Guideline. Cubes For Casting That Measure 150x150x150mm.

Cubes are made and cured for 7 and 28 days for compressive strength. Samples tested on a compression machine.

For all ratios, a total of 45 cubes were evaluated. Nine cubes were cast for standard proportions. For the following seven and twenty-eight days, three cubes for each percentage were cast. After being removed from the water tank and dried for two hours, each cube was properly cured for the appropriate number of days.

Table 3 7,28-DAY OBSERVATION PERIOD FOR flexural test

Mixing the percentages of [P.F.] [C.W.A.] and [N.C.A.]	FLEXURAL STRENGTH (N/mm^2)		PERCENTAGE
	AVG. OF 7 DAYS	AVG. OF 28 DAYS	%
1	33.66	51.50	0
2	34.33	52.66	2.25
3	43.16	66.33	28.79
4	37.66	57.66	11.96
5	38.83	60.00	16.50

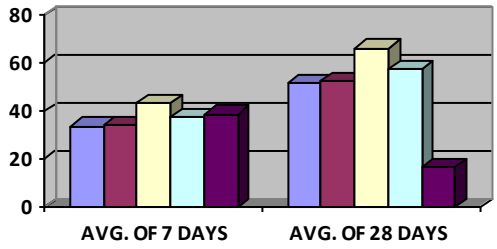

Figure 2 Avg. of 7,28 days for FLEXURAL strength

AN ANALYSIS OF FLEXURAL STRENGTH:

90 Polyster Fibre Beams and Cubes in Total, with Cement Replacements of 0.5%, 1.0%, 1.5%, and 2.0% Ceramic Waste Replacements of 10%, 20%, 30%, and 40% by Aggregate, were Used in This Study for Polyster Fibre.

The 150x150x700mm Beams Mould Were Prepared for Flexural Strength For Each Age In A Mix Design Proportion, Probably 3 Specimens Were Tested (The Beams Were Squelched For 7 Days And 28 Days).

All freshly cast specimens were created in moulds for 24 hours before being removed, cured, and tested for strength in water.

4. CONCLUSION

Testing On Various Concrete Mixtures, Including Those That Substituted Polyester Fibre And Ceramic Waste For The M-25 Grade Of Concrete, Was Done For This Study.

The Conclusion That Was Reached After Considering The Data, Analysis, And Discussion Is Described Below.

When Nca Is Substituted With 20% Ceramic Waste And 1.0% Polyester Fibre With Cement, The Slump Value Increases To 6.66%. Additionally, The Percentage Increase Results In A Decrease In The Slump Value.

The Compressive Strength Increases By 20.59% When Nca Is Substituted By Cement, 20% Ceramic Waste, And 1% Polyester Fibre. Additionally, The Compressive Strength Has Been Improved By Replacing Cement And 15.31% At Nca With 40% And 2.0% Of Ceramic Waste And Polyester Fibre, Respectively.

Cement, 20% Ceramic Waste, And 1% Polyester Are Used To Replace Nca.

Fibre, The Increase In Flexural Strength Is 33.33%. Moreover, The Addition Of Pf (2.0%) And Cwa (40%) Results In A 20.00% Increase In Flexural Strength.

The Cost Is Reduced By 3.71% When Ceramic Waste And Cement Are Substituted For Nca In The Cost Analysis.

The Study's Conclusion, Which Takes Into Account All Of These Data Analyses, Is That Increasing The Coarse Aggregate Content Of Concrete By 20% And Replacing 1.0% Of The Polyester Fibre With Cement Both Improve Its Strength And Properties.

The Global Urbanisation And The Construction Industry Are Both Beneficial To The Environment In Every Way.

It Significantly Reduces The Use Of Sand And Cement Resources At A Time Of Rapidly Increasing Material Consumption.

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