MORTAR COMPRESSIVE STRENGTH VARIATIONS OF CURING FOR BOTH WASHED AND UNWASHED (RECYCLED FINE AGGREGATE) RFA STATES

Rajdeep Singh and Shashi Bhushan Suman
Department of Civil
Nirwan University, Jaipur

ABSTRACT: - The modern world sees a significant accumulation of construction and demolition waste. Recycled coarse aggregates sourced from this waste can serve as substitutes for virgin aggregates in producing new concretes. However, research on the impact of utilizing the fine fraction of this waste on concrete properties has not definitively determined outcomes. In this study, Ordinary Portland Cement (OPC) of 43 grades, denoted as OPC-43, was employed as the primary binding material for the mortar mix. The selection adhered to the specifications outlined by the Bureau of Indian Standards, specifically IS 269-2015.Compressive strength ideal temperature at which this test is to be performed is 270 + 20C. Weigh the materials needed for every cube individually. RFA's recycled aggregate mortar gained over the course of the 7-day curing periods at various replacement percentages of Natural Sand (NS). This comprehensive analysis sheds important light on the mortar's performance in terms of compressive strength. This study assesses the properties of recycled fine aggregates obtained from two recycling plants by examining variations in mortar compressive strength after 7 days of curing for both washed and unwashed recycled fine aggregates (RFA).

Key Words: Compressive strength, recycled fine aggregates, unwashed and washed

1. INTRODUCTION

The use of coarse recycled aggregate as a replacement for natural aggregate has been studied extensively in past years [1-3]. Construction and demolition waste (C&DW) gathers in significant amounts in numerous nations, necessitating specific focus. As an illustration, the European Commission has established a goal of achieving a 70% recycling rate by 2020 [4]. A study commissioned by the European Commission approximates that mineral waste constitutes 40-80% of the overall C&DW volume. Similarly, Katz [5] found that granular material comprises *50% of construction waste accumulated during the construction of structural frames of residential buildings, a figure that decreases to *20% during finishing works. Its use in concrete as a replacement for natural aggregates is more challenging due to some detrimental effects on the properties of the new concrete. Some studies have demonstrated that water absorption in recycled fine aggregates (RFAs) greater than those of natural aggregate and this property limits the application of recycled concrete. Evan-gelista and Brito [6], used RFA with 13.1% absorption to replace natural sands in the manufacture of concrete, and when there

placement reached at 30%, the compressive strength of the RAC had a greater variation than that of NC, possibly resulting from the instability-inducing porosity of recycled aggregates. In India, despite availability of huge amount of demolition waste, very few efforts have been done on the utilization of this waste to wealth. Therefore, a systematic study has been undertaken to utilize recycled coarse aggregate as a partial replacement for natural coarse aggregates for developmentM30 grade concrete. The recycled coarse aggregates have been utilized as such (unwashed) as well as in washed form for comparison purpose with control concrete using natural aggregates. Mortar compressive strength variations of curing for both washed and unwashed (Recycled Fine Aggregate) RFA states are discussed.

2. MATERIAL AND METHODOLOGY

In this study, Ordinary Portland Cement (OPC) of 43 grades, denoted as OPC-43, was employed as the primary binding material for the mortar mix. The selection adhered to the specifications outlined by the Bureau of Indian Standards, specifically IS 269-2015. Compressive strength- The temperature at which this test is to be performed is 270 + 20C. Weigh the materials needed for every cube individually.

According to IS: 650-1991, the following amounts of cement, standard sand, and water are needed for each cube:

Cement = 200 gm

2 mm to 1 mm - 200 gm

Standard Sand = 600 gm

1 mm to 500mic - 200 gm

Water = (P/ 4+ 3) Percentage of total mass of sand and cement, ranging from 500mic to 90mic. Cement consistency, according to IS: 4031 (Part 4) 1988, is P Stand a mixture of regular sand and cement on a nonporous plate.

Compressive strength=load/area, N/mm2

3. RESULT

Mortar and concrete structures are made to be stable under compressive loads, compressive strength becomes a crucial mortar attribute. Compressive strength plays a crucial role in these structures because it is closely related to other properties of the mortar. For mortar, the Bureau of Indian Standards IS: 4031-1988 (part 6) provides guidelines for determining compressive strength. A 500 KN loading compression testing machine was used to systematically test the compressive strength of mortar samples after 7 day of curing. All three types of Recycled Fine Aggregate (RFA) were covered, both in washed and unwashed conditions, with replacement ratios of fifty percent and one hundred percent. The RFA types' strength variations at 7 day of curing, for both washed and unwashed RFA states, are meticulously displayed in Figures 1, which follow, give a thorough depiction of the strength that RFA's recycled aggregate mortar gained over the course of the 7-day curing periods at various replacement percentages of Natural Sand (NS). This comprehensive analysis sheds important light on the mortar's performance in terms of compressive strength.

Table. 1 Compressive strength in various replacement percentage in wash and unwashed under 7 days

Mix Type		
	Unwashed	**Wash**
NS	35	35
50%RFA-1	24.58	22
50%RFA-2	33.54	36
50%RFA-3	43	45
100%RFA-1	18.98	19.7
100%RFA-2	29.83	30.84
100%RFA-3	33.8	37

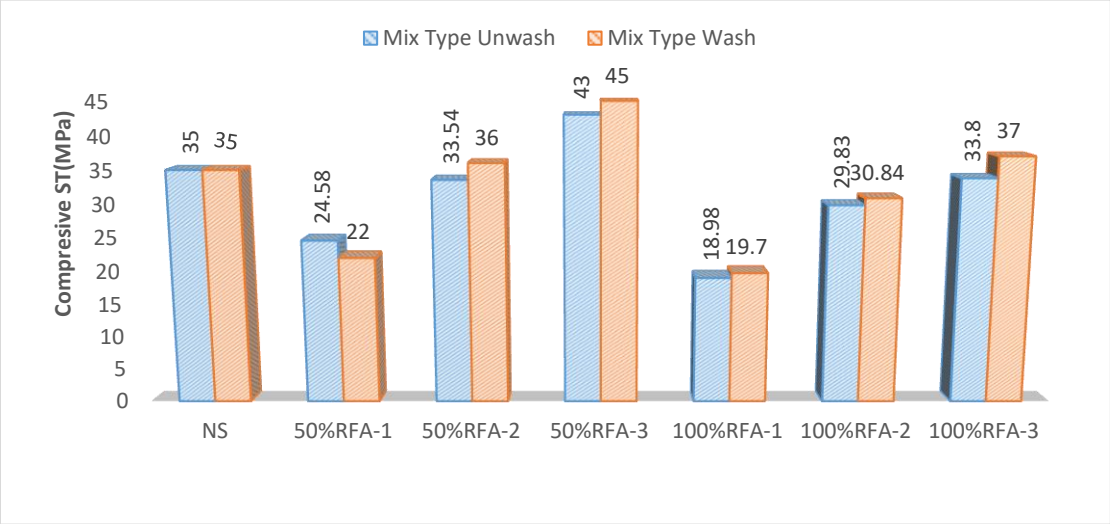

Figure1 Compressive strength of different type of recycled aggregate mortar at 7days curing

4. CONCLUSION

The Maximum strength that RFA's recycled aggregate mortar gained over the course of the 7-day curing periods at 50%RFA replacement of Natural Sand (NS). The comprehensive analysis sheds important light on the mortar's performance in terms of compressive strength.

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