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# Partial Replacement of Aluminium Fabrication Waste in Cement Concrete

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***Abstract:*** ***Aluminium fabric wastes are available in the aluminium fabrication industries all over the world. In this project the waste material from Salem aluminium fabrication industry is taken into account. Aluminium fabric wastes are to be used as a replacement for fine aggregate in ordinary concrete. fine,coarse,cement intial test check. Experiments for its properties hardened state will be also carried out.1:1.23:2.19 mix will be provided for partial and full replacement of fine aggregate with aluminium fabric wastes. Optimum Percentage of aluminium waste will be foundout by 0% to 100% removal of sand with aluminium waste.Cubes and cylinders are manufacture and will be cured to conduct compressive strength and split tensile test on 7 days and 28 days test.Compare 20,40,60,80,100 percentage reduction in fine aggregate to add aluminium fabric waste get good result in 40 percentage.Both compressive and tensile test good result in 40 percentage reduction.***

***Keywords:*** ***Aluminiumfabricwaste(AFW),industry,hardened,spilt tensile***

## I. INTRODUCTION

Aluminium fabrication waste materials produced during the fabrication of aluminium. This material is mainly produced from the anode replacement. Here the carbon rich waste material will be produced. This material cannot be used for other processes. Thus by using this material in concrete we can enrich the carbon content and the strength can be increased. Aluminium Fabric Waste from Madras Aluminium factory, Salem, Tamil Nadu, India.

**MATERIALS REQUIRED**

- Cement
- Aluminium Fabric Waste
- Coarse aggregate
- Fine aggregate
- Water

**BENEFITS**

- Utilization of waste material
- Increase in strength and durability properties
- Protection to reinforcement towards corrosion

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**Fig .1 Aluminium fabric waste(AFW)**

## II. LITERATURE REVIEW

Roz-Ud-Din Nassar And Parviz Soroushian, Field Investigation Of Concrete Incorporating Milled Waste Glass In their paper Normally waste materials added to cement to increase the strength up to 20 to 40 percentage only.normally reduced fine aggregate to other waste materials got good result.Aluminium fabric waste added to increase workability of concrete. normally reduced fine aggregate to other waste materials got good result.Waste materials added to concrete cost effective and eco friendly

Nitish Puri, Brijesh Kumar, Himanshu Tyagi**,** Utilization Of Recycled Wastes As Ingredients in their paper In Concrete MixReduced the conventional concrete and increase waste material land should be cleaned.Waste added to concrete cost is effective. Removal of fine aggregate to aluminium waste to decrese fineness.fineness decreses to increase workability and decrese crack.workability means easy to do work.workaility is very less means time saving.water content and finess value affect the fresh property of concrete.cube test find the compressive strength of concrete.spilt tensile test find the equipment is cylinder

P. Turgut, E. S. Yahlizade, Research Into Concrete Blocks With Waste Glass in their paperWaste material added to concrete to find the fresh and hardened properties of concrete. Aluminium waste added to concrete good binding property. Aluminium waste added to concrete increase workability

## III. METHODOLOGY

**i)Literature Review**

**ii)Material Collection**

Fine aggregate

Coarse aggregate

Cement

Aluminium fabric waste

**iii)Material Testing**

Water absorption test
Sieve analysis
Bulk density test
Specific gravity test

**iv)Casting of specimen**
**v)Testing of specimen**
Compressive strength test
Split tensile test
**vi)Results and Discussion**
**vii)conclusion**

Collect all the journals related to aluminum fabric waste replace to fine aggregate.Next step to collect all the materials.The basic available materials is fine aggrete,coarse aggrete,cement,aluminium fabric waste and water. Basic test of fine aggregate,coarse aggrete,cement should be conduct.Based on mix design cube and cylinder tested.Again find the compressive and spilt test conducted.Finally tested on the above specimen compare the result to normal concrete.

## IV. TESTS FOR MATERIALS

### A.Fineness test for cement

**Table 1 Finess of cement**

| cement sample (w1)g | cement residue (w2)g | percentage of residue (w2/w1)x100 |
|---|---|---|
| 100 | 6 | 6 |
| 100 | 5 | 5 |

**Analysis of results**

From above result 5.5 percent.According to IS code should not exceed 10 percentage.

### B.Consistency test

Consistency test for cement based on the water content of cement.This test conducted by normal room.standard Consistency value as per IS code 33 to 35mm.In this project got 34mm.Hence the cement paste should be required consistency.

### C.Intial Setting Time Test

**Table 2 Initial setting time for cement**

| S. No | Wt of cement in gms | % of water added | Volume of water added in ml | Initial setting time in min | Depth of penetration |
|---|---|---|---|---|---|
| 1 | 300 | 0.7 | 79 | 5 | 40 |
| 2 | 300 | 0.7 | 79 | 10 | 40 |
| 3 | 300 | 0.7 | 79 | 15 | 40 |
| 4 | 300 | 0.7 | 79 | 20 | 40 |
| 5 | 300 | 0.7 | 79 | 25 | 39 |
| 6 | 300 | 0.7 | 79 | 30 | 39 |
| 7 | 300 | 0.7 | 79 | 35 | 38 |
| 8 | 300 | 0.7 | 79 | 40 | 38 |
| 9 | 300 | 0.7 | 79 | 45 | 37 |
| 10 | 300 | 0.7 | 79 | 50 | 35 |

Average initial setting time = 30 minutes

### D. Test For Final Setting Time Of Cement

Vicats apparatus used to find the final setting time360 minutes.standard value of intial setting time and final setting time is 30minutes and 10hours.

### E.Specific Gravity Test For cement

Specific gravity value changed based on moisture content. Specific gravity affect the mix design.Two instrument to find specific gravity.That is Lechaterlier flask and Pycnometer.In this project use Pycnometer.Value of specific gravity is 3.15.

### F.Bulk density of fine aggregate

Density is one of the index property. Bulk density of sand is 1120 to 1680kg/m3 acceptable limit.Normally density is mass per unit volume.Bulk density differ from specific gravity.bulk density partially compacted value.specific gravity fully compacted value. In this project got 1200kg/m3 .This value is under the limit.

### G.specific gravity of fine aggregate

**Table 3 specific gravity of fine aggregate**

| Description | Sample |
|---|---|
| Wt of empty pycnometer (gm) | 673 |
| Wt of pycnometer + coarse aggregate (gm) | 1537 |
| Wt of pycnometer +water +coarse aggregate (gm) | 2085 |
| Wt of pycnometer +water | 1550 |
| Specific gravity | 2.74 |

### H.TestForWaterAbsorption Of Fine Aggregate

Water absorption maximam acceptable value is0.8%.Water content absorbed high means weak aggregate.aggregate absorb more water commonly affected the total structure. In this project after 24 hours immersion got 0.6percentage

### I. Specific Gravity Test For Coarse Aggregate

Coarse aggregate value normally 4.75 mm to 20mmm size.using Pycnometer calculate the specificgravity.Normal range of specific gravity value is 2.6 to 3.In this project specific gravity value is 2.68.This result is under the limiting value.

**Fig 2 Specific Gravity Test For Coarse Aggregate**

### J.Bulk density for coarse aggregate:

Wt of empty cylinder w1 (kg) is10.024.Wt of cylinder + coarse aggregate w2(kg) is 18.296.Net wt of the aggregate8.276.

$$\text{Bulk Density } V = \frac{w2-w1}{\text{Capacity of cylinder}}$$

Capacity of cylinder = 5 litres

So, Bulk density V = 1.655 kg/litre

### K.Test For Water Absorption Of Coarse Aggreate (C.A)

Take 1000 g of C.A ($W_1$g). The sample is filled with water and kept for 24 hours. After 24 hours immersion, the sample is taken out and dried in air for getting the saturated surface dry condition (SSD).

Then, it is weighed ($W_2$g).Wt of sample taken ($W_1$) is 3000g.Wt of sample in SSD state ($W_2$) is 3005 g.Wt of oven-dried sample ($W_3$) is 2993 g.Water absorption of coarse aggregate is{($W_2$-$W_3$/$W_3$)} x100.Water absorption of coarse aggregate is 0.4%Water absorption of coarse aggregate shall not be more than 0.6percentage.This project got the result in 0.4 percentage.Hence the result should be under the limit.

**Fig3 Test For Water Absorption Of C.A**

### L.Physical and Chemical properties of aluminium fabric waste

Colour - Black
Size -600 microns to 4.75 mm
Carbon content - 94%
Silica -4.2%
Others - 1.8%

## V. RESULTS

### A) compression test results for specimens with percentage of AFW

Compressive strength of concrete cube test deep idea about all the characteristics of concrete .The compressive strength of concrete is determined in batching plant laboratories. To maintain the desired quality of concrete during casting. The strength of concrete is required to calculate the strength of the structure. Concrete specimens are a cast and tested under the action of compressive loads to determine the strength of concrete. compressive strength is calculated by dividing the failure load with the area of application of load, usually after 28 days of curing..The compressive strength of concre***te*** is given in terms of the compressive strength *of 150* mm size cubes tested at 28 days .

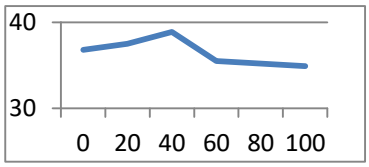


**Fig 4 Compressive Test results**

### B) Spilt Tensile Test results

splitting tensile strength test on concrete cylinder is a method to determine the tensile *strength* of *concrete.* A diametral compressive load will be applied along the length of the sample at a continuous rate untill failure occurs. This loading induces tensile stresses on the plane containing the applied load, causing tensile failure of the sample. The cylindrical mould shall be of 150 mm diameter and 300 mm height .Samples of aggregates for each batch of concrete shall be of the desired grading and shall be in an air-dried condition.

**Fig 5 Spilt Tensile Test**

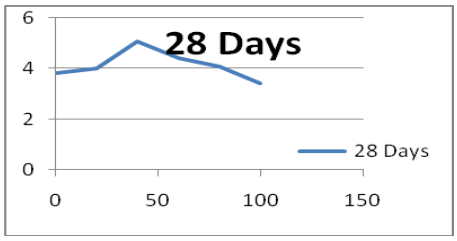


**Fig 6 Spilt Tensile Test results for specimens with percentage of AFW**

## VI. CONCLUSION

.Aluminum waste added to concrete to maintain good binding strength in concrete..Maintain same workability in aluminium added to conventional concrete.. Based on the above test result compression test best result in 40 percentage replacement of aluminium waste. Calculated the optimum use of aluminium waste in concrete .40 percentagefineaggrete reduction got higher strength in compressive and spilt tensile test. Aluminum waste added to concrete reduced fine aggregate economical and ecofriendly waste management

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