Retraction

Retraction: An Experimental Study on Partial Replacement of Fine Aggregate by Crusher Dust and Coarse Aggregate by Tile Waste in Concrete (IOP Conf. Ser.: Mater. Sci. Eng. 1145 012004)

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IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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An Experimental Study on Partial Replacement of Fine Aggregate by Crusher Dust and Coarse Aggregate by Tile Waste in Concrete

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Abstract. There is a need to conserve the natural resources and prevention of environment for the future generation. The major problem arising in now a day is disposal of wastes from industries. In our project we have made an attempt to use the wastes generated in the construction field. By use of waste materials, the cost of construction could be reduced to a reasonable manner. We have made use of tiles as replacement material for coarse aggregate and crusher dust is used as alternative for sand. In this study we have partially replaced the fine aggregate by crusher dust at the percentage of 6%, 12%, 18%, 24% and have founded the optimum percentage of replacement and we have proceeded it by having a constant percentage alternative of sand with partial alternative of gravel by waste tiles at the percentage of 5%, 10%, 15% and 20% for M20 concrete. A total number of 96 specimens were cast compression, tensile and flexural strength were founded. There by we conclude that the waste tiles and crusher dust could be used as alternative materials for sand and gravel in concrete. And we have found that the partial replacement of sand and gravel by 24% and 15% by crusher dust and waste tiles is optimum.

1. Introduction
Concrete material is the second most expended material next to water in the universe [1]. The increase in use of concrete material will also lead to increase in depletion of the materials used for it [2]. This increase use of materials leads to demand for it, so obviously the cost of the materials rises due to unavailability of materials. So, there is a need to find the locally available materials which could at least partially replace the conventionally materials. If some of the waste materials are found to be used in concrete, the cost of concrete could also be reduced [3]. This work not only shrinking cost of industry. Also, secure demolition of waste material can be attained. The use of low-cost products
without fall of achievement is very essential to the improvement of expansion of countries. This study also experimental investigation done to study the effect of partial alternative of sand by crusher dust at the percentage of 6%, 12% 18%, 24% and waste tiles by 5%, 10%, 15% and 20%. The tests were carried out on the concrete after curing it for 7 and 28 days [4]. The compression, tensile and flexural strength of concrete specimens were found in the experimental study. Tables 1-5 illustrates the materials used.

2. Materials Used

- Cement
- Fine Aggregate
- Coarse Aggregate
- Waste tiles as coarse aggregate
- Crusher dust as fine aggregate
- Water

| S. No | Properties                  | Value    |
|-------|-----------------------------|----------|
| 1     | Specific gravity            | 3.2      |
| 2     | Consistency                 | 30%      |
| 3     | Initial setting time        | 34 minutes|

Table 1. Properties of cement (OPC)

| S. No | Properties                  | Value |
|-------|-----------------------------|-------|
| 1     | Specific gravity            | 2.76  |
| 2     | Free moisture content       | 2.1%  |

Table 2. Properties of Sand

| S. No | Properties                  | Value |
|-------|-----------------------------|-------|
| 1     | Specific gravity            | 2.69  |
| 2     | Free moisture content       | 0%    |
| 3     | Water absorption            | 2%    |
| 4     | Abrasion test               | 24.6% |
| 5     | Impact value                | 14.193%|

Table 3. Properties of Gravel

| S. No | Properties                  | Value |
|-------|-----------------------------|-------|
| 1     | Specific gravity            | 2.77  |
| 2     | Free moisture content       | 1%    |

Table 4. Properties of Crusher Dust

| S. No | Properties                  | Value |
|-------|-----------------------------|-------|
| 1     | Specific gravity            | 2.62  |
| 2     | Free moisture content       | 0%    |
| 3     | Water absorption            | 3%    |

Table 5. Properties of Tiles Waste
3. Experimental Program
The mix design is composed for greatest size of gravel is 20mm traditional aggregate and crumbled ceramic aggregate [5]. The modification of strength of impious concrete using solid wastes as partial replacement of traditional gravel is studied by casting cubes, until 50%. The concrete was groomed in the laboratory using mixer [6]. The cement, sand and gravel and solid decay tiles and crusher dust are combined in dry state and then the aim water quantity is added and the overall concrete is blended for 5 minutes, the concrete is sluiced in the mould which is screwed tightly [7]. The concrete is spew into the mould in three layers by nudge with cramming rod for cubes of 150X150X150 mm size were tested for compression [8]. The cast models are eliminated after 24 hours and these are buried in a water tank. After a curing period of 7, 14, 28 days the samples are taken out and these are tested for compressive strength and the outputs are corelated with traditional concrete [9].

4. Results and Discussion
4.1 General
To assess mechanical properties of concrete using waste tiles aggregates and crusher dust as sand partial replacement, suitable size specimens were cast and tested [10]. Care was taken to maintain accuracy of weight of the concrete ingredients and well calibrated measuring devices used to find the loads. This chapter presents the test discussions.

4.2 Compressive Strength
Compressive strength has been found out at the ages 7 and 28 days after soggy curing the samples endlessly [11]. Strength of concrete mainly trust on three aspects viz. Strength of Gravel, Strength of mortar design mix, Bond strength between cement mortar and gravel. Tables 6 -11 and Figures 1- 5, shows the compressive strength.

| Description | No of Days | % Replacement of crusher Dust |
|-------------|------------|------------------------------|
|             |            | 0%  | 6%  | 12% | 18% | 24% |
| Compressive Strength (N/mm²) | 7          | 13.45 | 14.92 | 13.62 | 16.34 | 17.20 |

Figure 1. Compressive Strength for F.A Replacement
Table 7. Compressive Strength of C.A Replacement along with F.A Replacement

| Description                  | No of day | % Replacement of C.A by tiles with constant F.A Replacement |
|------------------------------|-----------|-------------------------------------------------------------|
|                              |           | 0%  | 5%  | 10% | 15% | 20% |
| Compressive Strength (N/mm²) | 7         | 13.45| 12.14|13.02|13.40|12.00|
|                              | 28        | 25.30|26.45|27.2 |29.32|21.85|

Figure 2. Compressive Strength of C.A Replacement along with F.A Replacement

4.3 Split Tensile Strength

Table 8. Split Tensile Strength for F.A Replacement

| Description                  | No of Days | % Replacement of Crusher Dust |
|------------------------------|------------|--------------------------------|
|                              |            | 0%  | 6%  | 12% | 18% | 24% |
| Split Tensile Strength (N/ mm²) | 7          | 1.42 | 1.48 |1.42 |1.63 |1.79 |

Figure 3. Split Tensile Strength for F.A Replacement

Table 9. Split Tensile Strength Of C.A Replacement Along with F.A Replacement

| Description                  | No of Day | % Replacement of C.A by tiles with constant F. A |
|------------------------------|-----------|--------------------------------------------------|
|                              |           | 0%  | 5%  | 10% | 15% | 20% |
| Split Tensile strength (N/mm²) | 7         | 1.422|1.431|1.426|1.475|1.462|
4.4 Flexural Strength

Table 10. Flexural strength for F.A replacement

| Description                  | No of Days | % Replacement of Crusher Dust |
|------------------------------|------------|-------------------------------|
| Flexural Strength (N/ mm²)   | 7          | 0%   | 6%   | 12%  | 18%  | 24%  |
|                              |            | 3.86 | 4.208 | 3.998 | 3.917 | 4.29 |

Figure 4. Flexural strength for F.A replacement

Table 11. Split tensile strength of C.A replacement along with F.A replacement

| Description                  | No of Days | % Replacement of C.A by tiles with constant F.A replacement |
|------------------------------|------------|----------------------------------------------------------|
| Split Tensile Strength (N/ mm²) |            | 0%   | 5%   | 10%  | 15%  | 20%  |
|                              | 7          | 3.86 | 4.083 | 3.625 | 3.875 | 4.082 |
|                              | 28         | 4.167| 4.25  | 3.875 | 4.332 | 4.250 |

Figure 5. Split tensile strength of C.A replacement along with F.A replacement
5. Conclusion
The paper concludes the following things by the experimental studies
• The waste tiles and crusher dust could be used as alternative materials for sand and gravel.
• The strength of the concrete is optimum when the sand is replaced at 24% and coarse aggregate is replaced at 15%.
• The weight of concrete reduces as higher in the percentage restoration of gravel by tile waste.

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