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Determination of hardened properties of high-strength concrete with partially replacement of fine aggregate using lathe scraps

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Abstract

Concrete is the common extensively utilized man-made material in the world. Concrete plays an important role in our Infrastructure development that shows our status worldwide among the other nations. One of the difficulties that have arisen since the introduction of concrete structures in the building business is how to increase concrete strength while still being efficient and cost-effective. The use of novel materials in concrete will boost the strength of the concrete in a more significant way; one such development is High Strength Concrete.

Introduction

Concrete is important material and the most widely used buildings material in the world, owing to its versatility and relatively low cost. Nowadays, as an industry by-products and demand for concrete ingredients increase, construction materials are being replaced by industrial by products or waste materials obtained from diverse sectors. Because aggregate makes up more than 70% of

the concrete matrix, it is an important ingredient to employ while making concrete. Many countries lack natural aggregate suited for construction, although aggregate use in other countries has expanded in recent years as a result of strong construction boom. As a result, artificially generated types of aggregate and industrial waste materials might be introduced as alternatives to prevent natural aggregate depletion. (See Table 1.)

Section snippets

Cement

In this project, Portland Pozzolana Cement was used. PPC is confirming to the code of IS 1489:1991. This table shows that properties of cement.…

Fine aggregate

The benefit of fine aggregate is that it improves the mix's workability and homogeneity. The fine aggregate also aids in the suspension of coarse aggregate particles in the cement paste. Natural river sand is employed as a fine aggregate, conforming to IS 383:1970 Zone II grading. This table 2 shows that properties of fine aggregate.…

Coarse aggregate

The coarse aggregate, …

Mix combination of the high strength concrete

The mix combination of high strength is mentioned in table 5. The cementitious material fly ash (85 kg/m^3), silica fume (40 kg/m^3) and high range water reducers are used in this study.…

Compressive strength test

The universal testing machine is used for compressive strength test. The size of the cube is cast for 150 mm × 150 mm for testing. The concrete cubes were placed in the UTM, uniaxial load is applied to concrete cubes. The maximum or ultimate load that was applied to the concrete cube sample until it failed. Table 6 shows the 7th day compressive strength test results of various mix combinations.

The concrete's compressive strength is improved up to 10 percentage of the lath scrap replacement and…

Conclusion

- The industrial by products like lath scraps, fly ash and silica fume are used in this study.…

- The lath scarps replaced by the fine aggregate in partial manner.…
- The physical properties are determined and compared with natural fine aggregate.…
- The compressive strength is varied from 61.20N/mm^2 to 63.14N/mm^2. The compressive strength of the concrete is reached 63.14N/mm^2 for the mix 2 after 28days of curing.…
- The tensile strength of the HSC varies between 4.88MPa and 7.23MPa.…
- Upto 20 % replacement…

…

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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Improvement in Bending Performance of Reinforced Concrete Beams Produced with Waste Lathe Scraps ↗
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