

GREEN CONCRETE

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ABSTRACT

Green concrete is a revolutionary topic in the history of concrete industry. This was first invented in Denmark in the year 1998. Green concrete has nothing to do with colour. It is a concept of thinking environment into concrete considering every aspect from raw materials manufacture over mixture design to structural design, construction, and service life.

I. INTRODUCTION

GREEN concrete has nothing to do with color. It is a concept of using eco-friendly materials in concrete, to make the system more sustainable. Green concrete is very often and also cheap to produce, because for example, waste products are used as a partial substitute for cement, charges. The size of construction industry all over the world is growing at faster rate. The huge construction growth boosts demand for construction materials. Aggregates are the main constituent of concrete. Due to continuously mining the availability of aggregates has emerged problems in recent times. To overcome this problem, there is need to find replacement to some extent. Nowadays, there is a solution to some extent and the solution is known as "Green Concrete". It is a concept of thinking environment into concrete considering every aspect from raw materials manufacture over mix design to structural design, construction, and service life.



II. WHAT IS GREEN CONCRETE & WHERE IT IS USED?

Today the word green is not just limited to color, it represents the environment, which is surrounding us.

Concrete which is made from concrete wastes that are eco-friendly are called as “**Green concrete**”.

The other name for green concrete is resource saving structures with reduced environmental impact for e.g. Energy saving , co2 emissions, waste water.

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Concrete wastes like slag, power plant wastes, recycled concrete, mining and quarrying wastes, waste glass, incinerator residue, red mud, burnt clay, sawdust, combustor ash and foundry sand.

Green Concrete is a term given to a concrete that has had extra steps taken in the mix design and placement to insure a sustainable structure and a long life cycle with a low maintenance surface. e.g. Energy saving, CO2 emissions, waste water.

The goal of the Centre for Green Concrete is to reduce the environmental impact of concrete. To enable this, new technology is developed. The technology considers all phases of a concrete construction’s life cycle, i.e. structural design, specification, manufacturing and maintenance, and it includes all aspects of performance, i.e.

- 1) Mechanical properties (strength, shrinkage, creep, static behaviour etc.)
- 2) Fire resistance (spalling, heat transfer etc.)
- 3) Workmanship (workability, strength development, curing etc.)
- 4) Durability (corrosion protection, frost, new deterioration mechanisms etc.)
- 5) Thermodynamic properties (input to the other properties)

III. THE PROPERTIES OF GREEN CONCRETE ARE :-

- 1.) **Workability**, which is basically the ease with which concrete can be compacted fully without segregating or bleeding.
- 2.) **Segregation**, which is basically separation of coarse particles from the green concrete.
- 3.) **Bleeding**, which is the appearance of water along with cement particles on the surface of freshly laid concrete.
- 4.) **Harshness**, which is the resistance offered by the concrete to its surface finish.

IV. MATERIAL FOR GREEN CONCRETE



V. APPLICATION OF GREEN CONCRETE



Fig: Green concrete dam



Fig: Green Concrete Bridge



Fig: Green Concrete Columns

VI. ENVIRONMENTAL BENEFITS TO USING GREEN CONCRETE

Lasts Longer: Green concrete gains strength faster and has a lower rate of shrinkage than concrete made only from Portland Cement. Structures built using green concrete have a better chance of surviving a fire, as it can withstand temperatures of up to 2400°F . It also has a greater resistance to corrosion, which is important with the effect pollution has had on the environment. Acid rain greatly reduces the longevity of traditional building materials.

All of those factors add up to a building that will last much longer than one made with ordinary concrete. Similar concrete mixtures have been found in ancient Roman structures. This material was also used in the Ukraine in the 1950s and 1960s. Over 40 years later, those Ukrainian buildings are still standing. If buildings aren't constantly having to be rebuilt, fewer construction materials are needed. The impact on the environment is reduced.

Reduces Energy Consumption: If you use less Portland cement and more fly ash when mixing concrete, then you will use less energy. The materials that are used in Portland cement require huge amounts of coal or natural gas to heat. Fly ash already exists as a byproduct of another industrial process, so you are not expending much more energy to use it to create green concrete. Another way that green concrete reduces energy consumption is that a building constructed from it is more resistant to temperature changes, thus saving heating and cooling costs.

Reduces Carbon Dioxide Emissions: Among the main ingredients in ordinary cement are pulverized limestone, clay, and sand which are heated to a high temperature. This process is responsible for between 5 and 8% of all Carbon Dioxide emissions worldwide. The manufacturing of green concrete releases up to 80% fewer Carbon Dioxide emissions. As a part of a global effort to reduce emissions, switching completely to green concrete for construction will help considerably.

VII. ADVANTAGES OF GREEN CONCRETE^a

- Much change is not required for the preparation of green concrete compared to conventional concrete.
- Reduces environmental pollution.
- Have good thermal and acid resistance.
- Compressive and split tensile strength is better with some materials compared to conventional concrete.
- Reduces the consumption of cement overall.
- Green concrete is economical compared to conventional concrete.
- Green concrete having better workability than conventional concrete.

VIII. DISADVANTAGES OF GREEN CONCRETE

- Structures constructed with green concrete have comparatively less
- Life than structures with conventional concrete.
- Compressive strength and other characteristics are less compared to conventional concrete.
- Water absorption is high.

- Shrinkage and creep are high compared to conventional concrete.
- Flexural strength is less in green concrete

IX. LIMITATION

- By using stainless steel, cost of reinforcement increases.
- Structures constructed with green concrete have comparatively less life than structures with conventional concrete.
- Split tension of green concrete is less than that of conventional concrete

X. SCOPE IN INDIA

Green concrete is a revolutionary topic in the history of concrete industry. As green concrete is made with concrete wastes it does take more time to come in India because of industries having problem to dispose wastes and also, having reduced Environmental impact with reduction in CO₂ emission.

XI. CONCLUSIONS

- There is significant potential in waste materials to produce green concrete.
- The replacement of traditional ingredients of concrete by waste materials and by products gives an opportunity to manufacture economical and environment friendly concrete.
- Partial replacement of ingredients by using waste materials and admixtures shows better compressive and tensile strength, improved sulphate resistance, decreased permeability and improved workability.
- The cost per unit volume of concrete with waste materials like quarry dust is lower than the corresponding control concrete mixes.
- A detail life cycle analysis of green concrete by considering various parameters is very much necessary to understand the resultant concrete properties