

# Properties of Sisal Fibre Reinforced Concrete with Partial Replacement of Cement by Marble Dust and Ricehusk Ash

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## Introduction

Concrete is the mostly extensively used and adaptable building material which is generally used to resist compressive forces. Since the use of cement and production of cement creates much more environmental issues and also it is costlier process. Concrete is the homogeneous mixture of cement, fine aggregate, coarse aggregate and water. It is the world second largest using material for building construction. Concrete provide higher compressive strength, relatively with lesser split tensile and flexural strength. Concrete is an important mankind to create the built environment, the requirements for which are both economy and also durability and sustainability. Concrete is versatile material which has the possibility of moulding into any geometric shapes which can be manufactured easily. Utilizing the resilient nature of the material, expeditious progress has been made in the field of construction in the recent years. When the matrix of the concrete is modified use of natural and synthetic fibers, optimization of grain size distribution has emanated striking improvements in its many properties such as strength and durability. The main aim of using fibers as reinforcement in concrete is that they are capable of enhancing the mechanical properties such as compression, split tensile and flexural strength.

The combination of excellent compressive strength, durability and serviceability has made concrete a highly demand construction material and the backbone of our society's infrastructure. It is known that Egyptians were using early forms of the concrete in around 3000 BC to build pyramids. The ancient Romans made many

developments in concrete technology. Concrete increase its strength according to its age.

Concrete is the most widely used construction material today. The constituents of concrete are coarse aggregate, fine aggregate binding material and water. Rapid increase in construction activities lead to acute shortage of conventional construction material has led to environmental concerns. The cost of concrete can be reduced by reducing the cost of any one material in the concrete matrix. The cost reduction may also be achieved by using locally available materials. Mainly the world wide consumption of cement in the production of concrete is very high and several countries have encountered meeting this need and have opted for alternative material.

Concrete is a brittle material with high strength in compression but weak in tension for which reinforcement is provided. Physical properties, mechanical performance and microstructures were evaluated with different curing regimes. Their test results concluded that these fibers showed great refinement in enhancing the strength of the composites and when mixed at optimum volume fraction, improved the overall strength of concrete significantly.

In the modern scenario, no construction activity has been imagined without using concrete. Concrete is widely used building material in the construction industry. The main reason is its high strength and durability. The possible applications of industry by-products in concrete are as partial replacement of cement with Marble Dust Powder and Rice Husk Ash. The use of such materials in concrete reduces the environmental pollution.

These investigations try to satisfy the social needs for safe and economic construction with waste materials, which needs enhanced and cost-effective materials. A huge amount of the cement used in the construction work, the continuous increase in the price of Portland cement is attributed to the inadequate production rate of raw materials when compared with demand rate. The Ordinary Portland Cement (OPC) concrete is a brittle material. Micro cracks present in the concrete leads to brittle fraction of concrete. In plain concrete structural cracks can be developed before loading due to drying shrinkage and other causes. When load is applied the internal cracks propagate and additional cracks are formed. The development of this cracks cause of inelastic deformation in concrete. The addition of fibers in concrete can act as a crack arrester and improves its static and dynamic properties and also increases structural performance.

The recent development of secondary reinforcement in concrete in various fields has provided a strong technical base for improving the quality of the material. The selection of the type of fibers is guided by the properties of the fibers such as diameter, specific gravity, Young's modulus, Tensile strength etc and the extent these fibers affect the properties of the cement matrix.

We all known concrete is a brittle material. A normal concrete and brittle materials, structural cracks develop in structural element before applying load drying shrink aging and other so many problems. The useful due to its cost as comparatively natural and synthetic fibers is economical, its environmental compatibility and bio durability.

Concrete is obtained by mixing cement, fine aggregate (M-sand), coarse aggregate and water is required proportions with or without a suitable admixture. It is that pourable mix of cement, water, fine aggregates that hardens into a super-strong building material. It is an essential building material that is widely used in the construction of infrastructure such as buildings, bridges, highways, dams and many other facilities. Civil engineering is a professional engineering discipline that deals with the design,

construction and maintenance of the physical and naturally built environment, including works like roads, dams, parks and recreation, bridges etc. It is broken into several sub disciplines including environmental engineering, geotechnical engineering, infrastructure and construction techniques and many more. Development of city is governed by its infrastructure. This project deals with the advanced construction technique by concrete technology replaced by different waste materials. It is a composite mass, which makes ingredient of concrete. Ingredients of concrete are coarse aggregate, fine aggregate water and admixture other etc. In this experimental investigation, We Design M:20 for infrastructures according to Indian Standards codes. Concrete durability, unlike its structural design properties, is difficult to estimate by indirect means such as compressive strength or permeation properties. The construction industry is in the need of huge raw material and hence the cost of construction has been increasing dramatically. The major difference between conventional concrete and fiber reinforced concrete is essentially the use of admixtures. The economy, efficiency, durability and rigidity of reinforced concrete make it an attractive material for a wide range of structural applications. Concrete is the most popular building material in the world. The use of the replacement materials offers cost reduction, energy savings, arguably superior products, and fewer hazards in the environment. The industry's disposal of the marble dust powder material consisting of very fine powder is today constitutions one of the environmental problems around the world. Utilization of marble dust powder in various industrial sectors especially the construction, agriculture, glass and paper industries would help to protect the environment.