

# Study on Behaviour of Concrete by Replacement of Aggregate and Sand with Rubber Tyre Chips and Foundry Sand

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**Abstract** - Concrete is the most important civil engineering material in construction buildings and industries because increase the strength properties. Rubber and foundry sand are produced excessively worldwide every year. In such a case the reuse of rubber and foundry sand would be a better choice. In order to reuse rubber wastes, rubber tyre chips was added to concrete as coarse aggregate and In order to reuse foundry sand, foundry sand was added to concrete as fine aggregate and its different properties like compressive strength. As a result it was found that rubberized and foundry sand concrete is durable, less ductile, has greater crack resistance but has a low compressive strength when compared with ordinary concrete. Due to rapid growth in automobile industry use of tyre increase day to day and there is no reuse of the same to decrease the environmental pollution .in this paper we will study about physical and mechanical properties of concrete containing recycled tyre or rubber material aggregate. This study present the information about the civil engineering application of foundry sand, which is technically sound and is environmental safe. Foundry sand can be used as a partial replacement of fine aggregate and rubber tyre chip partial replacement coarse aggregate .foundry sand can be used in concrete to improve its strength and other durability factor. Foundry sand is high silica sand that is a by – product from the production of both ferrous and non-ferrous metal casting. The fresh & hardened properties of concrete such as workability, compressive strength, are the identified.

**Key Words:** Rubber Tyre Chips, Foundry Sand, Workability, Compressive Strength of Concrete.

## 1. INTRODUCTION

A large variety of materials are considered feasible and valuable additive for concrete. Waste of rubber tyre is a harmful to the environment. The management of waste tyre rubber is challenger to municipalities. A rubber obtained from scrapped tyre is considered as the recent waste materials are vital use in the construction field. This creates a major problem for the earth & their living. The investigation show that the rubber tyre material are the do not decompose. Concrete is the most commonly used

construction material in civil engineering and cement, sand, aggregate is economical and easily available in market. The disposal of waste tyre landfill is legally banned in all the countries due to environmental impact.

The environmental condition is the various problems. India has been recycling & reusing waste tyres for 4 decades. Although it is estimated that 60% are disposed of through dumping. Scrap tyre is not only waste but also costly. The production of rubber increases every year. The rubber tyre chips are used to replace by gravel.

Concrete is normally use in frame structure; utilization of waste solid materials is one of the most challenging problem growth of the world of population. The industrial sand, waste tyre rubber chips. Waste rubber tyre is a huge task to the industries and public sectors, decomposing of waste rubber tyre which contains composed of materials and it cause serious contamination for environmental condition

**Foundry Sand:** - Foundry sand is high quality silica sand that is a byproduct from the production of both ferrous & non-ferrous metal casting. It can be reused several times in foundries but, after a certain period cannot be used further & becomes waste material. It can be used in many of ways as a natural or manufactures sand.

**Rubber Tyre Chips:** - A large variety of waste materials are considered feasible and even much valuable additives for concrete. Some of these materials include cellulose, fly ash and wood particles. Rubber obtained from scrapped tyres is considered as the most recent waste materials that have been examined because of its vital use in the construction field.

The physical & chemical characteristics of foundry sand and rubber tyre will depend in great patron the type of casting process & the industry sector from which is originates. The cement of high strength concrete is generally high which often leads to higher shrinkage and greater evaluation of heat of hydration besides increase in cost.

## 2. LITERATURE REVIEW

**2.1 Mr.S.S.jadhav, Dr.S.N.Tande, Mr.A.C.Dubal (2017)** <sup>(1)</sup> the utilization of used of foundry sand in concrete. The normal concrete mix was proportional to achieve a 28 days of compressive strength 38mpa.nad the other concrete mixes the 25% & 35% by weight regular concrete sand with clean /new foundry sand & used foundry sand. At the 28 days concrete containing used of foundry sand .The test result is 0-0% lower value than normal concrete but concrete contain 25% & 35% new/clean foundry sand gave almost same compressive strength as that of the control mix.

**2.2 Jk Lakshmiapat, et.al, (2017)** <sup>(2)</sup> to investigate the properties of concrete mixture in which the fine aggregate are the partially replace with used of foundry sand with the percentage of 10%, 20%, 30% and 40% by weight. The properties of fresh concrete are performance by the test.

**2.3 K K Wagh, et.al, (2014)** <sup>(3)</sup> to investigate the performance of the fresh concrete hard concrete .the fine aggregate replace by foundry sand. The result of this investigation showed that mix Upto 40% replace by foundry sand and showed about 10% higher compressive strength at 28 days.

**2.4 Venkatesh P, S.A.Vengadesh Subramaniam (2015)** <sup>(4)</sup> to study the waste tyre as partial replacement of fine aggregate to crumb rubber. The different partially replacement crumb rubber is a 0%, 10%, 20%, 30% and 40% by volume .the casted of cylindrical cube and beam and test of flexural strength and split tensile strength . The increases the percentage crumb rubber in concrete to decreases the strength of concrete. The result is show that there decreases in all type of strength for crumb rubber are used in concrete.

**2.5 PranitaBhandari, Dr.K.M. Tajne (2016)** <sup>(5)</sup> the foundry sand normally of a higher quality than the typical bank run for natural sands used in full construction sites.the sand from the outer shape of the mould cavity. It is compost of naturally occurring material which are blended together; high quality silica sand (85-95%), bentonite clay (4-10%) as a binder. It is black in colour due to carbon content.

**2.6 Senthil V. Thiyagarajan, THENMRZHI R (2012)** <sup>(6)</sup> the usage of waste tyres in civil engineering is currently very low. Ali and Ali (1996) found the elevation of properties and failures characteristics of Portland cement concrete field with different content of find rubber chips. He found that the concrete was more slip resistance, highly elastic, lighter in weight and could be used for fire proofing, water proofing and insulation.

## 3. CONCLUSIONS

The 7 days & 28 days compressive strength of the specimens silica fume increased by addition foundry sand & crumb rubber. The silica fume fine partials as well as good adhesion

between rubber & the cement paste. the addition of 5% crumb rubber give more strength as compilation conventional concrete &10% crumb rubber give low strength as compared to conventional concrete . The use of 0.5% and 1% of crumb rubber as a fine aggregate in concrete for M20 grade doesn't show any changes. Addition of 10%, 20%, 30% and 40% of rubber tyre chips and foundry sand further decreases the strength.

The experimental study conducted on the partially replacement of coarse aggregate with rubber tyre chips and fine aggregate with foundry sand as percentage of 10%, 20%, 30% and 40%. As a result it was found that rubberized and foundry sand concrete is durable, less ductile, has greater crack resistance but has a low compressive strength when compared with ordinary concrete.

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