



# A Study on Crumb Rubber: Opportunities for Development of Sustainable Concrete in the New Millennium

## KEYWORDS

crumb rubber, utilization, compressive strength, low cost, sustainable

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**ABSTRACT** Crumb rubber is a term usually applied to recycled rubber from automotive and truck scrap tyres. During the recycling process steel and fluff is removed leaving Tyre rubber with a granular consistency. Continued processing with a granulator and/or cracker mill, possibly with the aid of cryogenics or mechanical means, reduces the size of the particles further. It is not possible to discharge the rubbers in the environment because they decompose very slowly and cause lots of pollution. So, it is necessary to have a relevant use of these wastages. These waste materials can be used to improve some mechanical properties of concrete. Addition of rubber to concrete results in the improvements of some mechanical and dynamical properties. Such as more energy absorption, better ductility and better crack resistance. By using the waste tyre (crumb rubber) one can reduce the harmful effect on environment and provide sustainable concrete.

## INTRODUCTION

Utilization of industrial waste products in concrete has attracted attention all around the world due to the rise of environmental consciousness. Accumulations of stockpiles of Tyres are dangerous because they pose a potential environmental concern, fire hazards and provide breeding grounds for mosquitoes that may carry disease. Tyre pile fires have been an even greater environmental problem.

Tyre pile fires can burn for months, sending up an acrid black plume that can be seen for dozens of miles. That plume contains toxic chemicals and air pollutants, just as toxic chemicals are released into surrounding water supplies by oily runoff from Tyre fires. In order to prevent the environmental problem from growing, recycling Tyre is an innovative idea or way in this case. Recycling Tyre is the processes of recycling vehicles Tyres that are no longer suitable for use on vehicles due to wear or irreparable damage (such as punctures).

Tarun have reported that the compressive strength of rubberized concrete can be improve when fine aggregate was fully replaced by fine crumb rubber. He also indicated that if the rubber particles have rougher surface or given a pre-treatment, the better and improved bonding may develop with the surrounding matrix, and that may result in higher compressive strength.

Piti el outlined that crumb rubber responses were found to denote greater flexibility and Toughness with larger deflection at peak load, longer post-peak load responses and higher fracture energy. Waste Tyres are a tremendous problem throughout the world. It is hardly surprising that in many countries it has been deduced that the best option is to simply burn them in cement kilns. At least in this way, the reasoning goes, some of the energy invested in the Tyre is reclaimed.



Figure 1: crumb rubber in cracker mill

Sources: [www.googleimages.com/crumb\\_rubber](http://www.googleimages.com/crumb_rubber)

## INDIAN TYRES INDUSTRY:

TABLE – 1  
GENERAL DETAILS

Consumption world ranking	4 <sup>th</sup>
Total number of Tyre Companies	36
Total number of Tyre Factories	51
Tyre Production 2012-13 (Estimated)	110 Million
Industry Turnover (Estimated)	Rs. 31000 crores
Capacity Utilization (Estimated)	84%
Growth in Truck & Bus tyre production	15%

Source: Indian rubber industry statistics

## APPLICATIONS OF WASTE TYRES IN CIVIL CONSTRUCTION

### • Tyre rubber in concrete and mortars

Research on cement-based products modified with Tyre rubber – such as concrete and mortar – has been carried out for many years in order to examine the potential utilization of waste Tyres in concrete production. Waste Tyres have been used to partially replace the aggregates in mortars and concrete. Tyre rubber can be used to produce workable concrete for specific applications, provided that adequate selection processes are undertaken – including the amount, gradation and shape of Tyre particles. This section deals with the properties of either mortar or concrete modified with waste Tyre rubber.

## CASE STUDY

In the present study, effect of crumb rubber as fine aggregate replacement on the compressive strength of concrete having mix proportions of 1:1.31:1.14 was investigated. The percentages of replacements were 0%, 10 %, 20% and 30% by weight of fine aggregate. Tests were performed for compressive strength or all replacement levels of crumb rubber at different curing periods (7-days & 28-days).

## CONCLUSIONS

We can say that for 1m<sup>3</sup> M20 grade of concrete consumption of fine aggregate is 775.96 kg. Here in specimen M-3

we replace fine aggregate by 24.62 kg of crumb rubber for 1m<sup>3</sup>M20 grades of concrete. So, we can say that up to 15% foundry sand utilized for economical and sustainable development of concrete. Uses of crumb rubber in concrete can reduce the harmfulness to the environment and produce a 'greener' concrete for construction. An innovative supplementary Construction Material is formed through this study.

**REFERENCE**

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