



# A DETAIL DISCUSSION ON UTILIZATION OF INDUSTRIAL WASTE FOR THE APPLICATION OF TRANSPORTATION SECTOR

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**Abstract** - Several studies have been conducted over the last few decades to investigate the effect of adding Industrial waste as a partial or complete replacement for regular sand in concrete. It has been discovered to be suitable for use as a partial replacement for sand in structural grade concrete. This paper deals with the utilization of waste in construction and transportation sector in replacement of sand. The review shows that various studies has been on waste obtained from industries replaced by natural sand but still to make a sustainable product, there is need of continues research work. It has been found that there is an increase in strength properties and decrease in workability.

**Keywords:** Waste, Construction, Transportation, Sustainable

## 1. General Detail

In present time the most and widely used construction substances is concrete. This man-made material, till now goes through various types of development and research. The term bitumen concrete, is a type of concrete which is composed of binding material-asphalt, fine aggregate, coarse aggregate, admixtures. It is a man-made substance. In starting it's soft, ductile or fluid, and after some time progressively become solid. We will think about this material as a man-made stone. The most important ingredient of concrete is asphalt and cement as filler. The process of development of this substance creates tons of greenhouse emission. It's documented, that greenhouse releases harmful environmental changes in atmosphere. It is measured that regarding 9/10 tons of CO<sub>2</sub> is disposed within the environment for the creation of 1 ton of cement. CO<sub>2</sub> comes within the class of greenhouse gas and is essentially the main reason behind the global warming. This prompts us to check the assorted substitutes of cement to form the mix surroundings eco-friendly. The concrete was formed with the help of alternative materials which create less amount of heat and carbon dioxide is termed as green concrete. Substitute concrete makes use of disposed factories waste substances like Fly ash etc. The by-products are not injurious for the surroundings and therefore it is used in concrete not solely helps in safe disposal of such leftover

substances however additionally also helps to decrease the rate of cement production and it is good for environment. Nowadays researchers build proper methods to decrease factories discharge of greenhouse emission. The prior effective route to reduce the discharge the carbon dioxide from cement manufacturing industries. The various materials which are used as alternative of binding material in concrete. According to the Wikipedia, the 8% of the overall manmade carbon emission is due to the cement industries. The CO<sub>2</sub> discharge from the concrete is totally dependent on the amount or percentage of cement content in the concrete. Cement as filler is the widely used materials in the construction work and pavement.

## 2. Review

### A. Utilization of Fly Ash as Industrial Waste in Bitumen Concrete

S.D.Katara et al studied the Influence of Modify Bituminous Mix with Fly Ash. Fly ash is the main solid waste discharged by coal-fired power plant. In India, the annual emission of fly ash is more than 0.3 billion tons, and it is one of the main industrial waste residue. The use of four wheeler, two wheeler vehicles etc. is increasing day by day. As a result amount of waste tyres also increasing. Waste tyres in India are categorized as solid or hazardous waste. It is estimated that about 60 per cent of waste tyres are disposed via unknown routes in the urban as well as rural areas. This leads to various environmental problems which include air pollution associated with open burning of tyres and aesthetic pollution. Therefore, it is necessary to utilize the wastes effectively with technical development in each field. A good design of Modify bituminous mix is expected to result in a mix which is adequately strong, durable and resistive to fatigue and permanent deformation and at the same time environment friendly and economical. A mix designer tries to achieve these requirements through a number of tests on the mix with varied proportions of material combinations and finalizes the best one. The research result shows that the Marshal method of bituminous mix design was carried out for varying percentages of Fly ash to determine the different mix design characteristics.

M. Abukhettala studied the Use of Recycled Materials in Road Construction. Several waste by-products and materials have been investigated, assessed, evaluated for utilizations and practiced in the field. Depending on the attributes of the characteristics of the recycled material, the inclusion varies. Some recycled materials have been proven to possess preferable properties over the other and have performed satisfactorily in the field. However, there are numerous concerns regarding such incorporation based on both laboratory experimental, and field observations which have turned out to be of the essence for further in-depth studies. Reclaimed asphalt pavement, recycled concrete aggregates, plastic wastes, scrap tires, mine wastes, recycled crushed glass, foundry sand, coal combustion products as fly ash, bottom ash, and pond ash, steel slag, oil sand, oil shale sand, lateritic soil, are amidst the long list. It is believed that magnificent preservation of natural and precious resources would be attained from the inclusion of secondary and tertiary materials in road construction. Nonetheless, without rigorous cooperation between the academia and the industry and educating people who

are in routinely interact with paving activities, several performance-related issues would not be resolved and would remain in existence. This paper present a literature review report on the most viable recycled materials currently in practice by the industry and it aims towards developing a noble idea on better inclusion of a recycled material in the road industry.

Debashish Kar et al studied the influence of fly-ash as filler in bituminous mixes. A bituminous paving mixture is a mixture of coarse aggregate, fine aggregate and bitumen mixed in suitable proportion to result strong and durable mix to withstand traffic load. In this paving mix, normally cement and stone dust are used as filler material. A study has been carried out in this study to explore the use of fly ash, a by-product of a coal based thermal power plant in bituminous paving mixes. For comparison, control mixes with cement and stone dust have also been considered. Marshall Test has been considered for the purpose of mix design as well as evaluation of paving mixes. Other performance tests such as indirect tensile strength and retained stability have also been carried out. It is observed that the mixes with fly ash as filler exhibit marginally inferior properties compared to control mixes and satisfy desired criteria specified by a much higher margin. Hence, it has been recommended to utilize fly ash wherever available, not only reducing the cost of execution, but also partly solve the fly ash utilization and disposal problems.

Poorna Prajna.S et al studied the Marshall Test Properties of Bituminous Concrete Mixes Using Fly Ash Modified Bitumen. Flexible pavement with bituminous surfacing is used in India. Distress symptoms, such as cracking, rutting, etc., are being in-creasingly caused earlier by high traffic intensity, over loading of vehicles and significant variations in daily and seasonal temperature of the pavement. Investigations have revealed that modifiers can be used to improve rheological properties of bitumen and bituminous mixes to make it more suitable for road construction. Also there are many materials that may be tried as modifiers in bitumen. This paper reports an investigation carried on bituminous concrete mixes corresponding to grade-1, prepared at mid-point gradation using Fly Ash as modifier. The conventional Marshall Stability test was conducted on the specimens as per ASTM D 1559. The present investigation comprises of determining the Marshall test properties of Bituminous Concrete Mixes Using 60/70 penetration grade bitumen modified with Fly Ash as Modifier. The results such as stability, flow, volume of air voids, voids in mineral aggregates, voids filled with bitumen, bulk density etc was de-termined. The study helps to ascertain the suitability of Fly Ash as modifier.

Giaccio GM et.al concluded that high-volume fly ash concrete had excellent mechanical properties and satisfactory resistance to repeated cycles of freezing and thawing. The use of ASTM Type I cement appeared to be essential when high strengths at early ages were required. For concretes made with ASTM Type I cement, the use of beneficiated fly ash and condensed silica fume, did little to enhance the properties of concrete compared with *ias received* fly ash.

### 3. Conclusions

The review work done in this paper concluded that the construction requires such waste material for the sustainable product. The waste from the industry proves to be a better alternative as it increases the strength but there is lot to investigate. The workability of waste sand is not much effective which is a point to be worked on. Similarly, the waste from the industry can also be used in pavement as discussed in this paper. Also it can be incorporated in bitumen concrete act as filler and binding agent. The bitumen pavement made from waste material will create a better environment.

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