

# A REVIEW STUDY ON THE USE OF MARBLE DUST IN THE FLEXIBLE PAVEMENT

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**Abstract:** Indian road network of 33 lakh km is second largest in the world and consist of Expressways, National Highway, State Highway, Major district roads and Rural and other roads. Number of vehicles has been growing at an average pace of 10.16% per annum over the last five years .The most common binder used for road surfacing is bitumen obtained from petroleum. However, petroleum is nowadays becoming scarce due to depletion of its sources. In addition to this, bituminous pavements have some drawbacks such as high temperature susceptibility, low temperature cracking etc which demand frequent maintenance and hence increase in life cycle cost of the pavement. Roads are mainly constructed now to use the mineral aggregate and bitumen. Even though the amount of bitumen used is very small as compared to that of mineral aggregates, the performance of the road pavement is mostly determined by the properties of the bitumen, as bitumen is the continuous phase and the only deformable component. In this review paper, different writing concentrates done by different writers are discussed on Marble Dust.

**Keywords:** Marble Dust, Road Development, Flow value, Marshall Stability.

## 1.1 INTRODUCTION

The Highway development exercises have taken a major jump in the creating nations since a decade ago. Development of roadway includes immense cost of speculation. A bituminous solid blend is a mix of coarse total, fine total, filler and spread. The mechanical properties of really compacted black-tops are liable to the interlocking of the aggregate and the consistency of the clasp. Dark top bond is the most typically used material in black-top because of its unrivaled organization execution in giving driving comfort, trustworthiness, and quality and water restriction. The uplifting cost of materials and essentialness and nonattendance of advantages available have roused expressway designers to examine new options in structure new avenues. The usage of good quality standard materials in road advancement is twisting up continuously exorbitant in India as a result of the growing solicitation and furthermore its deficiency in nature. Energize the improvement and use of new changed clearing materials in road advancement realizes tip top black-top to meet the systems. Along these lines, tries should be made to utilize current and green wastes effectively being developed to address regular and money related concerns. Reusing is the showing of setting up the used material for use in making new thing. Stone waste for example Marble and Granite waste has been commonly used as structure materials.

The job of filler on the mechanical exhibition of black-top solid mix was researched. Filler characterized as that part of a latent mineral residue passing the 200-work strainer in a bituminous blend can play out a few capacities. One capacity is that of filling voids in coarser totals, which builds the thickness, solidness, and

strength of a regular bituminous clearing blend. Another is the formation of filler-black-top mastic in which the particles of residue either might be separately covered with black-top or are joined into the black-top in mechanical and colloidal suspension. These types of mastic are created by unique procedures, for example, cooking, atomized black-top, and frothed black-top. In clearing blends the mastic fills in as the solidifying operator. The impact of fillers in customary sort blends is articulated. Abundance amount of filler will in general increment security, fragility, and proclivity to splitting. Insufficiency of filler will in general increment void substance, lower dependability, and diminish the blend. In mastic blends the amount of filler utilized isn't basic. At the point when filler particles are exclusively covered with flimsy movies of black-top, solid, steady, intense blends might be readied made out of 100 percent filler with 20 to 25 percent of asphaltic mix.

## 1.2 LITERATURE REVIEW ON MARBLE DUST

**Gopalakrishna et.al** detailed from near research that solid with 25% fly powder performs superior to concrete with half fly fiery debris. A similar perception was made regarding split rigidity and flexural quality. Use of mechanical waste, for example, fly fiery remains as a fractional swap material for bond gives an increasingly strong concrete as well as finds the path for the sheltered transfer of generally squander material in this way shielding the earth from contamination.

**Siddique Rafat et al** Compressive quality, part rigidity, flexural quality, and modulus of versatility of fine total (sand) supplanted fly cinder solid examples were higher than the plain solid (control blend) examples at all the ages. The quality differential between the fly fiery remains solid examples and plain solid examples turned out to be progressively unmistakable following 28 days. Compressive quality, part rigidity, flexural quality, and modulus of versatility of fine total (sand) supplanted fly fiery remains concrete by half kept on expanding with age for all fly powder rates.

**TEJA TALLAM et al** studied the assessment of stone mastic asphalt Performance with the inclusion of fiber Material on resilient characteristics. The main objective of this study is to compare the inclusion of polyester fibers in SMA Mix for understanding the behaviour of resilient characteristics. Optimum binder content (OBC) of SMA Mix is arrived 6.5% and the corresponding fiber content (OFC) was arrived as 0.4% when performed through drain down test. Polyester fibers have good drain down characteristics and provide good homogeneous mixture compared with conventional SMA. It is observed from test results that resilient modulus increased with the addition of polyester fibers by 18% and tensile strength ratio by 1.2%. This indicates that fiber inclusion provides better cracking resistance when compared with conventional SMA Mix.

**Moghadas et al.** 2014 assess the conceivable utilization of Recycled marble total (RMA) in hot blend black-top for medium traffic volume. For this reason, RMA was supplanted by ordinary total at rates of 15, 25, 40, and 60% in HMA. Execution assessment of the blends demonstrated that, for blends containing RMA, versatile modulus and exhaustion life were marginally lower than those for the control blend, and they diminished when

the RMA expanded in the blend while backhanded elasticity proportion got increment with increment in RMA. The exploration recommended utilization of RMA up to 60% by weight of ordinary total.

**A.K. Jain et al** Large amount of fly fiery remains and impact heater slag are produced in India and numerous other creating nations consistently. Without appropriate mindfulness and innovation improvement, an enormous bit of these side-effects remain unutilized causing serious transfer and ecological issues. The fly fiery debris influences different properties of cement in its green and solidified state, which are vital to the sturdiness of the solid structures. The nature of fly powder shifts from plant to plant, yet it might differ inside a similar plant because of progress in the wellspring of coal or conflicting heater conditions. In this way a ceaseless quality affirmation program is to be created to maintain a strategic distance from the utilization of second rate conflicting material. The utilization of good fly powder of a steady quality with low carbon content, more prominent fineness and high pozzolanic movement can create monetarily a solid of good quality and higher sturdiness. He additionally examined the present status and the future prospects of fly fiery remains usage by Indian Cement Industry. The Indian Cement Industry, which positions second on the planet have entire heartedly taken the double difficulties to use the fly cinder to determine the issue of transfer of the waste item and to improve the exhibition of cementitious materials.

**Hai-Yong Kang et al** talks about the patterns in the current E-squander reusing programs, accumulation strategies and so forth., specifically different recuperation and reusing innovations for the glass, plastics and metals found in E-squander are examined in a point by point way. The creators featured the plastic reusing forms including destroying, partition and pelletization methods. The reusing procedures talked about for plastics were embraced as the essential procedure of this examination work. It is accounted for that there are three basic roles for size decrease. First is the age of particles that can be more effectively taken care of than massive parts. Second is the age of uniform measured and molded particles that can be isolated viably in downstream procedures. The third design is the freedom of disparate materials from each other.

**R. Muniandy et al** assessed the impact of nature and size of residue on fastener and filler mastic research center estimated properties. Utilization of filler with folio in black-top cement creates thicker black-top movies around total particles that expansion obstruction against lasting disfigurements in HMA concrete. Size of filler passing sifter No.200 has more noteworthy effect on HMA properties. AASHTO recommends at any rate 70% going by weight through sifter No 200. Research facility results uncovered that filler going 100% through strainer No. 200 improves the marshal structure properties of black-top blends.

**Jaya R.S et al** decided the Binder Film Thickness for Bituminous Mixtures arranged with different Types of Fillers. In this examination the film thickness was dictated by Hveem strategy by deciding the complete surface zone and the impact of fillers subsequently is talked about. The impact of sorts of fillers in fluctuating rate, in the presentation of hot-blend black-top is likewise considered. Three sorts of fillers to be specific, Hydrated

lime, Ordinary Portland Cement, and Fly fiery remains were utilized as fillers in the present examination. Their rate by weight of totals was changed as 2%, 4% and 6% to investigation their impact on the blend arranged for BC Grade II. The ideal fastener substance was resolved for the different fillers and dampness defenselessness of bituminous blends was assessed. The aftereffect of film thickness assurance uncovers that a normal film thickness of 6  $\mu\text{m}$  is gotten for all fillers which is fundamental for toughness of the blends. The Fatigue results demonstrate that Lime at 4% can be utilized for improved execution and 2% is prescribed, when concrete or fly slag is utilized as filler material.

**Devesh ojha et al** proposed the plan of Flexible Pavement utilizing Waste Plastic. In the present period of financial improvement with such a heavy populace, it is required to have a thick system of street for the smooth transportation of merchandise and travelers. India, notwithstanding having one of the biggest railroad organize moves for the most part on streets. Be it traveler or cargo all proceed onward streets. About 65% of cargo and 85% of traveler traffic use streets for their development. Today India has 3.34 million km of street organized out of which 65579km is the system of national roadways. In this examination the system and structure of proposed plastic tar street.

**Benevolence Joseph Poweth et al** contemplated the utilization of plastic waste in street development. This examination talked about the appropriateness of plastic waste materials for asphalt development. The waste is blended in various extents to the dirt example and their effects on geotechnical properties were examined. The consequences of the tests showed that plastic alone isn't appropriate for asphalt subgrade. At the point when quarry dust was included alongside soil plastic blend, it keeps up the CBR esteem inside the required range. First period of studies were on the dirt plastic blends. From the standard compaction test it was seen that as the extent of plastic expanded, the most extreme dry thickness was diminishing. Subsequently another loss with most extreme thickness was blended with soil-plastic waste and again the standard delegate test was completed. Notwithstanding the over two waste, another locally accessible tire was additionally blended and a similar test was finished. From these different tests distinctive ideal soil-squander tests were acquired and CBR tests were completed.

**Athanasopoulou A. Kollaros G. et al** studied the environmental benefits by Slag Use in Transportation Projects. The major objective is physically makes sense to use slag in pavement layers and to understand the environmental implications which include the reduction of virgin materials use, thus yielding cost and energy savings. Slags being used in roadway and pavement construction projects are by-products of the process of steel-making and electric power production where coal is burnt. Slag types vary according to their chemical composition, specific weight, and porosity. This lack of uniformity does not exist only between slags from different sources, but even in the same furnace and among its different loadings. Hardness and durability tests have been performed on various Greek slags, in order to define the engineering properties and characterize the material for use in pavement construction. The results have been compared with outputs for conventional hard

aggregates. Synthetic aggregates can be used improving the costs of road products, while yielding significant energy savings and having mild impacts on the environment. A crucial factor for the successful use of a particular slag is the type of the material, which basically depends on the procedures followed in the metallurgy industry. So, criteria are needed for the mechanical behaviour of waste materials, especially slag, in road pavement construction. For a complete design procedure, a proper quantification of samples it is also needed.

**Avula Vamshi** examined the utilization of waste plastic in development of bituminous street. Huge numbers of the squanders delivered today will stay in nature for a long time prompting different ecological concerns. Hence it is important to use the squanders adequately with specialized advancement in each field. Numerous results are being created utilizing the plastic squanders. Our present work is dealing with these perspectives. Plastic waste, comprising of convey sacks, containers and other used plastic can be utilized as a covering over total and this covered stone can be utilized for street development. What's more, subsequent to examining the different writings, the expansion in level of polymer diminished the entrance esteem. This demonstrates the expansion of polymer builds the hardness of the bitumen and the malleability diminished by the expansion of plastic waste to bitumen. The decline in the malleability esteem might be because of interlocking of polymer atoms with bitumen.

**Boris Radovskiy et al** audited the historical backdrop of VMA and normal film thickness where he expressed that the base VMA necessity has been a property proposed since 1950's for use in bituminous blend configuration arrangements, however issues in accomplishing VMA in blends have prompted a few new research thinks about. A few scientists suggest utilizing the normal fastener film thickness to enhance the base VMA criteria in the volumetric blend plan and the customary estimation of the film thickness does not require any data on porosity of blend or on level of compaction. He presumed that another meaning of film thickness is proposed. A model for film thickness estimation is created. The consequences of figurings are sensible and concur with some significant information detailed in past distributions.

**B Durga Priyanka et al** examined the probability of utilizing fly fiery debris as filler in Bituminous blends where when all is said in done bond, stone residue are utilized. For correlation, stone residue likewise used to get ready traditional blend. Marshall soundness test is embraced to acquire the properties like security, stream esteem, % air voids, voids in mineral total (VMA), voids loaded up with bitumen (VFB) for a Dense Bituminous Macadam (DBM) blend of Grading I. The speculative work is completed by utilizing particulars from MORTH. By substituting the stone residue with fly cinder at different rates like 4%, 8%, 12% the outcomes were examined. The variety of mechanical properties, ideal bitumen substance and fly cinder substance were assessed. It was seen that the blends with fly fiery remains as filler not vary much in properties when contrasted and regular blend and fulfill wanted criteria determined by an a lot higher edge. Henceforth, it has been prescribed to use fly fiery debris any place accessible, lessening the expense of execution, yet additionally halfway illuminate the fly cinder usage and transfer issues.



## CONCLUSION

Based on the results of the experimental investigations conducted on Virgin and modified bitumen using fillers, the following conclusions have been drawn:

1. Modified bitumen by using Marble Dust show less penetration value, thus low grade bitumen can be modified to withstand higher loads.
2. The Marshall properties of the blend demonstrates that the expansion of marble residue to the black-top cement improved properties than black-top solid blend with stone residue as filler
3. Hence the utilization of marble dust as filler in black-top solid blend is empowering and it tends to be effectively used in bitumen, will give us a progressively efficient and condition cordial asphalt.
4. The Marshall Flow value also increases with the use of fillers and this indicates improvements in the resistance to permanent deformation of bituminous mixes with addition of these fillers.
5. The density of bituminous mixes prepared with using modified binder increases up to certain limits and then decreases.
6. Marble Slurry/Dust can be effectively utilized and safe to dispose in environment.

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