DOUBLE LAYER RUBBERISED CONCRETE PAVING BLOCK

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ABSTRACT

The objective of this research is to investigate the potential using of crumb rubber for the production of double layer rubberized concrete paving block and to investigate the rubber based cement composite morphological behavior. The Double Layer Rubberized Concrete Paving Block (DLRCPB) manufacturing process which is different from Concrete Paving Block (CPB). Two types of mixing required for base layer and facing layer. The Based layer which is totally rubberized layer and the facing layer which is concrete layer. The mechanisms of thermal degradation of PU forms is often describe as being as very complex. The thermal degradation of polyurethane occurs in main two stages. The isocyanates to polyol ratio affect the freezing properties between crumb rubbers to concrete composite.

Keyword: *Double Layer Rubberized Concrete Paving Block, Base layer, Facing Layer, CPB, Freezing.*

1. Introduction:

Paver is first introducing in European countries in 1925. The reason behind this invention is that the brick pavers were to much less durable and broken easily. Concrete pavers also give different shapes and design for attractive outdoor appearance. The latest development is that little bit of recycled rubber is also added with concrete for property enhancement. Now, one of the most possible and challenging solution for this problem by, the rubber materials are mixed with the cement material and to makes the rubber cement composites.

2. Manufacturing process:

The manufacturing process and the design of Double layer Rubberized Cement Paving Block different from the Concrete paver block given below.

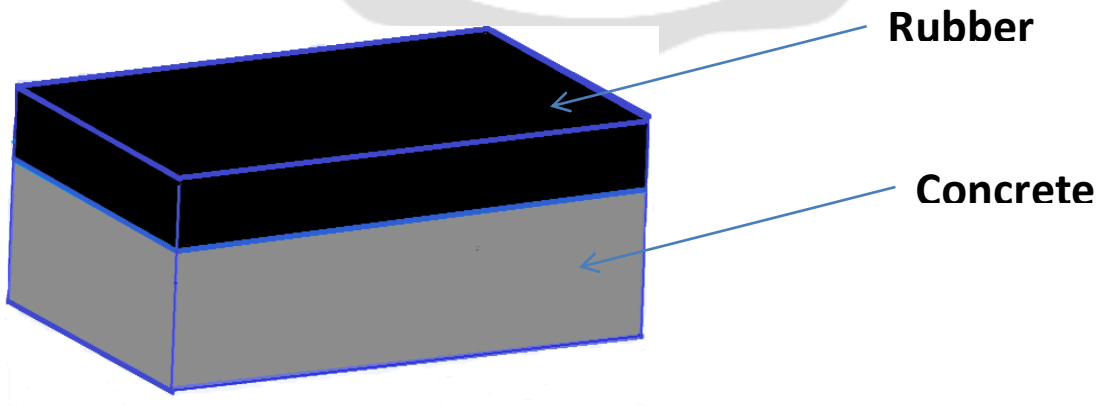

Fig 1: Double Layer Rubberized Concrete Paving block.

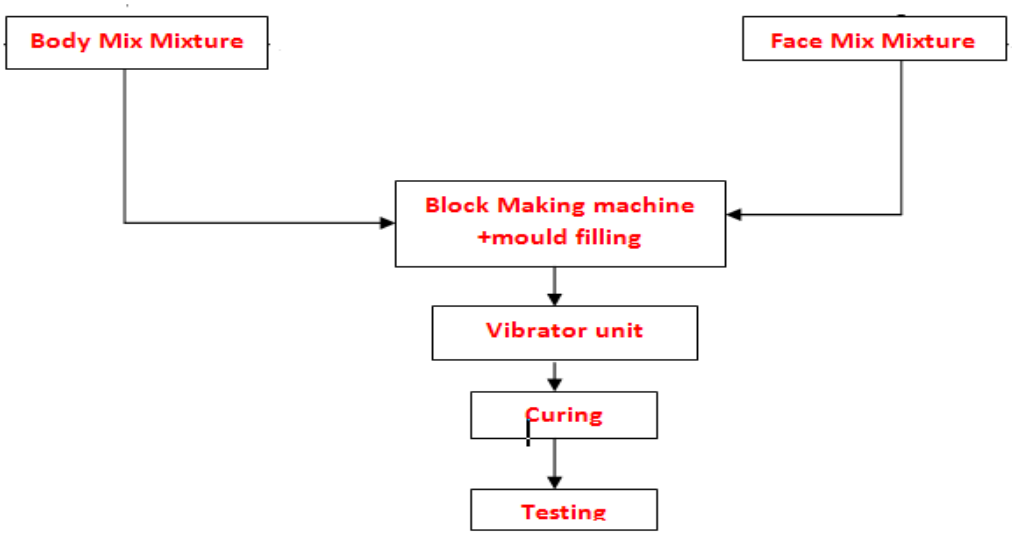

Fig 2: Double layer Rubberized concrete paver process control flowchart.

For, the mixing of base layer making by the raw materials crumb rubber, polyurethanes and water. Crumb rubber rinse by water for the properly spread of the polyurethanes materials. The mixture should use between about 10 min. Now, the mixing of facing layer we used the pan mixture machine. All the raw materials of facing layer cement, sand, aggregate feed into the feed hopper of pan mixing machine. Now start the pan mixture and homogenized mixing then adding the water which gives the strength of the concrete.

After the two different layer mixing process steel mould 200*100*60 mm filling by first the base layer and then facing layer mixture feed in the mould. The mould is properly feed by the mixture then we applied the vibrating mod on the mould surface by vibrating unit for the reducing the air entrapped. Now the mould is curing in the sun light at 24 hours. Then remolding of paver block and subjected to testing paver.

3. Morphological Behavior:

The surface morphology of paver block was observed using by a JEOL JSM 5610 LV scanning electron microscope which has a resolution of 3.0 nm and an acceleration voltage of 0.3 to 30 kV having the maximum magnification of 2,00,000 times.

Fig.3: JEOL JSM 5610 LV scanning electron microscope

SEM is an incredible tool for revealing the unseen world of micro space. It shows very detailed three-dimensional images at much higher magnification than is possible with an optical microscope. An electron gun (at the top) emits a beam of high-energy electrons.

4. Result and Discussion:

1) Hydration of cement

The rubber cement composite work is depend upon the Hydration of cement, Rubber Cement Interaction mechanisms. The process of hydration of cement details are given below.

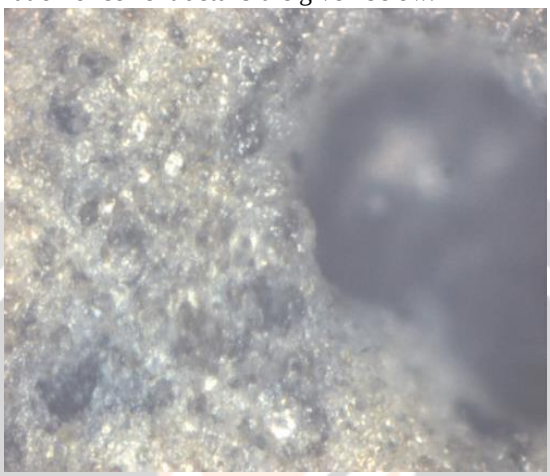

Fig. 4: Hydration of cement with water

The reaction between cement and water is exothermic which observed that the Hydration of cement refers to the total changes undergone by anhydrous cement or one of its constituent phases, when it mixed with water material. Anhydrous cement does not bind the sand and aggregates without use of water. Instead of it develops the adhesive property after the addition of water. During the hydration are given below.

2) Interaction Between Crumb Rubbers To Polyurathene

The Scanning electron microscopy observed interaction between two different materials crumb rubber and polyurethane shown in the figure.

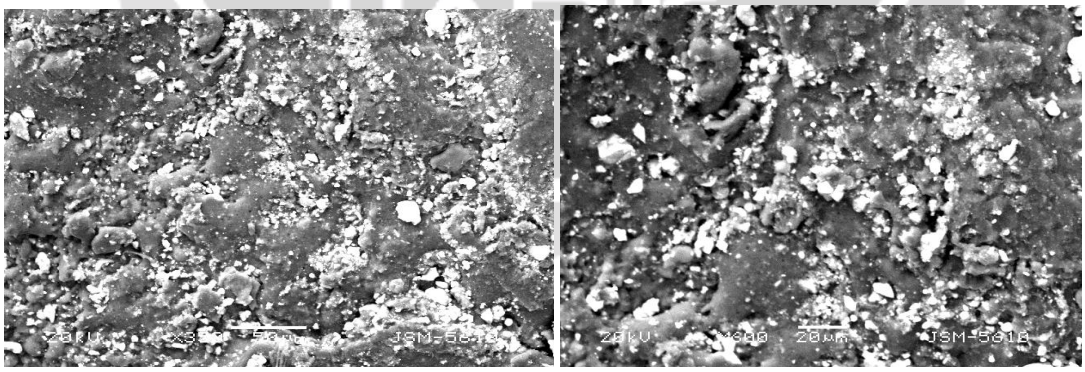

Fig.5: SEM image dispersion of crumb rubber and polyurathene

The micrographs obtained using two different detectors which is back scattered electrone and secondary electron.Back scattered electron detect the material behaviour crumb rubber and polyurathene is organic material and secondary electrone etect the surface details of the sample.

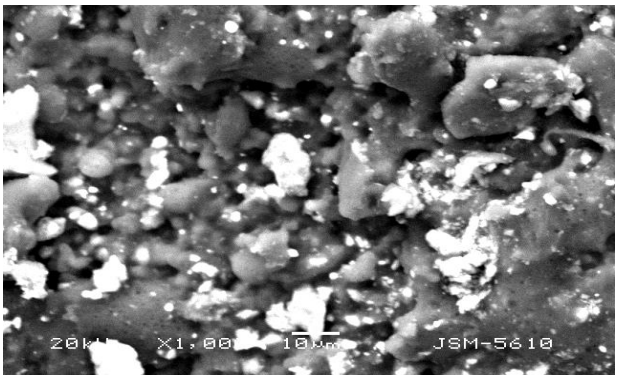

Fig. 6: SEM image surface details of crumb rubber and polyurathene

The scanning election microscopy analysis shown at 350 and 600 magnitude revoluation the dispersion of the materials very good.The white bubbles which is a polyurathene and the black part are crumb rubber have homogeneous mixing.At 1000 magnitude revoluation the microscopy detect the surface details of the sample.The bonding between crumb rubber and polyurathene better and smooth surface on the rubber surface.

5. Conclusion:

The rubber cement composite material rubber paver block physical properties are depending upon the dispersion of crumb rubber to polyurethane and the homogenized mixing. The incorporation of crumb rubber into PU foam which increased the value of apparent density of the finally mixing material, simultaneously decrease the volumetric expansion rate of foam resulted which increased the apparent density. The hydration of cement which is important for the strength of the product and easy to control cements setting time.

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