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EXPERIMENTAL STUDY OF PAVEMENT BLOCKS BY USING BIO-BRIQUETTES ASH

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Abstract— In India the major use of biomass briquettes is in industrial application usually to produce steam. Therefore huge amount of ash is produced. This ash is thrown away nearby land as it is, which seems to be anaesthetic and harmful to living begins. To tackle this problem we use this ash for manufacturing of pavement blocks. In present investigation pavement blocks are preferred by using M40 grade mixing of 10 mm coarse aggregate, Portland pozzolana cement and sand. The dimension of paver block is 200 x 200 x 55 mm. The sand is partially replaced using bio briquettes ash in 50 percentages. The test where conducted on blocks to find its compressive strength. The main objective of this study is to use large amount of waste material like bio briquettes ash for manufacturing of paver blocks.

Keywords— Bio- briquettes, Ash, Compressive Strength, Pavement Block.

I. INTRODUCTION

Now a days concrete plays a vital role in construction of pavement blocks for road construction, pedestrian walks, parking area, container yards etc. The performance of concrete paver blocks usually depend on its mix proportion, water cement ratio, mixing and curing. The conventional sources of fine aggregates for paving blocks are river sand or alternatively, artificial sand by crushing rocks. Recently, rapid developments have caused an increased demand for river sand, which is largely used as a fine aggregate for construction. The removal of sand from river bed and river banks may cause unfavorable effects on the environment, like erosion of river banks, degradation of river beds and deterioration of river water quality [1]. In past several research work have been carried out to study the feasibility of utilizing waste materials and industrial by-products in the manufacturing of concrete paver blocks. Replacement fine aggregate by crusher dust up to 50% by weight has a worthless effect on any physical and mechanical properties of paver blocks while there is a saving of money[2].It is also possible to use recycled plastic aggregates in concrete mix up to 20% in the making of paver blocks [3].The addition of polyester fiber by 0.4% in paver blocks gives maximum compressive, flexural strengths and minimum water absorption at 7 and 28 days[4]. The aim of this work was to study the use of bio briquettes ash as fine aggregates to produce concrete paving blocks.

II. METHODOLOGY

A. WHAT IS BRIQUETTE?

Fig. 2.2 Briquettes

The white or coloured longitudinal cylindrical or random shaped pieces of solid combustible fuel converted from agricultural and forest waste residues in the form of briquette are termed as agro briquettes. The agro briquette functions as a combustible fuel and it may possess some colour depending upon the raw material used as input. However, because conventional coal is always black, in order to distinguish this product which has similar function as coal is termed as white coal. It can be efficiently and effectively and eco-friendly used to replace coal, fire wood, furnace oil or any such

fuel in heat processing plants. The white coal i.e. solid briquettes are produced from agro waste in to solid cylindrical random shaped and sized longitudinal solid blocks. The white coal is generated from agro waste after applying immense mechanical pressure to the extent of 2000kg/cm^2.It is very interesting to note that during the production process no external binder or chemicals are used to bind the crushing of raw material. This white coal is the good substitute to coal fuel.

B. DERIVE ASH

After using the bio briquettes in industries as a fuel large amount of ash is derived. This ash is to be collected for manufacturing pavement blocks.

Fig. 2.2 Burning Of Bio- Briquettes

C. MIXING PROCESS

Mixing is process in which materials like cement, aggregate, sand and water are added in proportion to make concrete. Proper mixing of materials is essential for the casting the uniform and strengthens blocks. The mixing should ensure that the concrete becomes homogeneous, uniform in color and consistency. For the casting of blocks we use 1:1.65:2.98 proportions. We use water cement ratio 0.45.

TABLE I
MIX PROPORTIONS

Types Of Blocks	Nos	Wt. Of Cement (In Kg)	Wt. Of Sand (In Kg)	Wt. Of Aggregate (In Kg)
Conventional Blocks	10	8.8	14.6	26.3
Project Blocks	10	8.8	50% SAND- 7.2 50% ASH- 7.2	26.3

D. MOULDING

Rubber based moulds of size 200 x 200 x 55 mm were used for the preparation of squere- shaped paver block. The materials used for the casting of paver blocks such as cement, water, bio-briquette ash, fine aggregate and coarse aggregate were mixed together properly. The mixture is then poured into the paver block mould and is compacted by using tamping rod or steel rod. The surface is finished by using trowel. Before placing the mixture into the mould, the sides of the mould are oiled to easy removal of paver block. Mould removed after 24 hours and blocks are allowed to curing in water tank. The mould is used for preparing block in uniform shape.

Fig. 2.3 Moulding Process

E. TESTING

After moulding paver blocks were kept in under shade for one day and after that samples were kept in curing tank for 7, 14, 28 days and then it is used for further testing.

TABLE III
MAXIMUM LOAD

Days ⇒ / Type Of Blocks ⇓	7 Days Reading (In Kg)	14 Days Reading (In Kg)	28 Days Reading (In Kg)
Conventional Blocks			
1.	973.20	1405.89	1597.70
2.	1023.33	1413.67	1594
3.	998.70	1411.34	1608.10
Prtoject Blocks			
1.	759.3	1251.24	1419.19
2.	756.54	1247.91	1422.03
3.	762.96	1251.12	1421.02

III. TEST RESULTS AND DISCUSSION

Sample calculation: [For Project block, 7 days]

1) Size of block= 20 x 20 x 5.5 cm
2) Area of specimen= 400cm^2
   =40000mm^2
3) Mean load applied= (759.3+756.54+762.96)/3=759.6KN
   = say 760KN
   = 760 x 10^{3}N
4) Compressive strength= (Load in N/Area in mm^2)
   = 760 x 10^3/40000
   = 19 N/mm^2

Therefore, Compressive strength of block at 7 days is 19 N/mm^2.

The compressive strength of paver blocks for various mix proportions are given in Table III. From the test results, it can be seen that, for paver blocks without groundnut husk ash, the compressive strength values are comparatively higher as compared to that of paver blocks containing bio-briquette ash as fine aggregates.

TABLE IIIII
MEAN LOAD AND COMPRESSIVE STRENGTH

Types Of Blocks ⇓	No Of Days ⇒	7 Days Strength	14 Days Strength	28 Days Strength
Conventional Blocks	Mean Reading (In Kn)	1000	1410	1600
	Compressive Strength (In N/Mm^2)	25	35	40
Project Blocks	Mean Reading (In Kn)	760	1250	1420
	Compressive Strength (In N/Mm^2)	19	31	35

IV. CONCLUSIONS

In our study it was found that the blocks prepared by using bio briquettes ash gained less compressive strength as compare to conventional blocks. As blocks gain less strength they can be used for light traffic commercial vehicles, shopping complex ramps, car parking, office complexes, rural road with low volume traffic, tourist resorts, farm houses, residential roads etc.

REFERENCES

[1] S.Revathi, Dr.R.Kumutha and Dr.K.Vijai, Properties of Paver Blocks with Groundnut Husk Ash as Fine Aggregates, International Research Journal of Engineering and Technology(IRJET), vol. 2, pp. 657- 660,May-2015.

[2] P.Radhikesh, Nanda, Amiya K.Das and N.C.Moharana, Stone crusher dust as a fine aggregate in concrete for paving blocks," International Journal of Civil and Structural Engineering, vol. 1, pp. 613-620, 2010.

[3] Ganesh Tapkir, Satish Parihar, Pramod Patil and Hemraj R Kumavat, Recycled plastic used in concrete paver blocks," International Journal of Research in Engineering and Technology, vol. 3, pp. 33-35, 2014.

[4] G. Navya and J.Venkateswara Rao, Influences of polyester fiber on concrete paver blocks," IOSR Journal of Mechanical and Civil Engineering, vol. 11, pp. 70-75, 2014.

[5] Jay Kute, Aditi Kundkar, Prayaga Bande, Pallavi Doke and Prof. Manoj Deosarkar, White coal made by using agro waste," International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES), vol. 5, pp. 127-129, 2019.