Experimental Studies on Ternary Blended Concrete

Y. Pradeep Kumar Reddy, Y. Pramod Kumar Reddy, V. Vasugi

Abstract: ***Concrete is the most commonly used material in the construction. This paper suggests ternary blended concrete and results of an experimental investigation on concrete properties, By the addition of additional material with the partial replacement of cement, The properties are going to be investigate are fresh properties and hardened properties of Ternary blended concrete. This paper discusses about the percentage to be added to get high strength and good durability. Cement replaced with bagasse ash and marble powder of different proportions.***

Keywords: Bagasse ash (B.A), marble powder (M.P) compressive strength, marsh cone test, consistency test, specific gravity.

I. INTRODUCTION

Economic and Environmental considerations plays a major role in utilizing industrial wastes like, bagasse ash which is a waste product produced from sugar mills and marble powder which is produced from marbles and granite industries, as A partial replacement of cement in making of concrete. As concrete is the second most consumed material in the world after water. There are so many surveys saying that if the concrete is prepared with the materials which occur naturally like river sand, ballast that are going to be exhaust in future Considering that this journal comprises of not only utilizing other materials for concrete production but also minimizing the waste generated by industries and with addition to that the concrete properties can be improved by using these industrial wastes .In this an experiment is carried out to calculate strength and behavior of concrete .

II. LITERATURE REVIEW

Ratan raj et al. in Jan 2012-2013, M60 mix of ternary blended high strength concrete with different percentage replacement of cement by metakaolin (MK) and redmud (RM) is arrived[1]Kanchana Mala et al in sep 07 2013 investigated high in ternary concrete than in binary concrete in all aspects and Binary blend:OPC+FA, opc+sf Ternary blend:opc+7%sf+fa, :opc+10%sf+fa

[2]. Reinforced Concrete-Code of Practice.Bureau of Indian Standards, New Delhi, India Compressive strength reduction of 1.4% is seen when 4% CFA and 16% BFS replacing 20% cement in concrete.Split tensile strength for 28 days was in between 64.3% and 99.7% of reference concrete… [3].D.Audinarayana et al. The fine aggregates along with granite powder and fly ash is mixed with cement. Content based on mix proportions to obtain M40 mix design.[4]. K.Ganesan on his total of five combinations were studied. 5% Micro Silica + 15% Fly Ash, 5% Micro Silica + 20% Fly Ash, 10% Micro Silica + 15% Fly Ash , 10% Micro Silica + 20% Fly Ash and 0% Micro Silica + 0% Fly Ash by weight of cement with different W/B ratios of 0.55,0.45 and 0.35 were Studied.[5]. M.Sharfuddin evaluated that Blended cement by replacing 5%,10%,15%,20%,25%,30% by the wt of cement and 35% reduction in water permeability28%reduction in chloride diffusion75% reduction in chloride penetration [6]. Deepa A .Sinha experimntedCeme that by replacing 25%,50%,75% in addition silica fume at 10% replacing by wt of cement. Flyash+silicafume increases the chloride permeability[7]. Tongshengzhang et al experimented by cement by replacing flyash metakaolin, silicafume, ggbs upto 30% by wt of cement combinations(FA+SF), (FA+GGBS), (FA+MK)as(0+0),(30+0)(25+5)(20+10)(15+15)(10+20)(5+25)(0+30)respectively. Silicafume gives high Compressive strength after 90 daysMetakaolin gives high Compressive strength after 28 days.[8]. MohamuthaharHussail et al. evaluated that Preparation of inter ground blended cement Controlled range is 350+-10 m^2/preparation of gap graded blended cement95% cement clinker+5%fgd gypsum,ggbs, fly ash, limestone were ground and classified by an air classifier.[9]. Odilade et al.Flyash experimented that replacementby 10%, 15%,20%,30%, 35%, 40%, of fibers 0.5%,, 1%,1.5%, 10%mk, 30%fly ash[10]. Sahu,A.K. and SunilKumarSachan experimented that the workability of fresh concrete increases with increase in GGBS content up to 30% replacement and density of fresh mix increases with Micro Silica and GGBS.[11]. G.Saranya et al experimental work was conducted on the ternary concrete specimens made with ordinary Portland cement with 5%, 7.5%, 10%, 12.5%, replacement with both flyash and silica fume for mechanical properties like compressive strength and flexural strength, replacement done by 10% gives high strength.[12]. Shail B. Heggond evaluated that case of triple blended concrete 10% silica fume and 5% metakaolin gives highest strength without fiber reinforcement highest tensile strength is obtained with 10% silica fume and 5% metakaolin.[13]. S,VijayaBaskar Reddy experimental of 30% replacement of rice husk ash and saw dust ash gives good strength after 28 days. Maximum compressive strength will attain at (25%+5%) of rice husk ash and saw dust ash. [14]. Yatheesh Kumar .k et al investigated that the compressive strength of ternary blended hybrid fiber reinforced concrete is high for 30 (5%+25%) (FA+SF) replacement similarly compressive strength of ternary blended hybrid fiber reinforced concrete is high for FA+MK and FA+GGBS at a replacement of (0%+30%) and (10%+20%) replacement.[15]. Manoj et al. experiment shows that Concrete with 80% pc,

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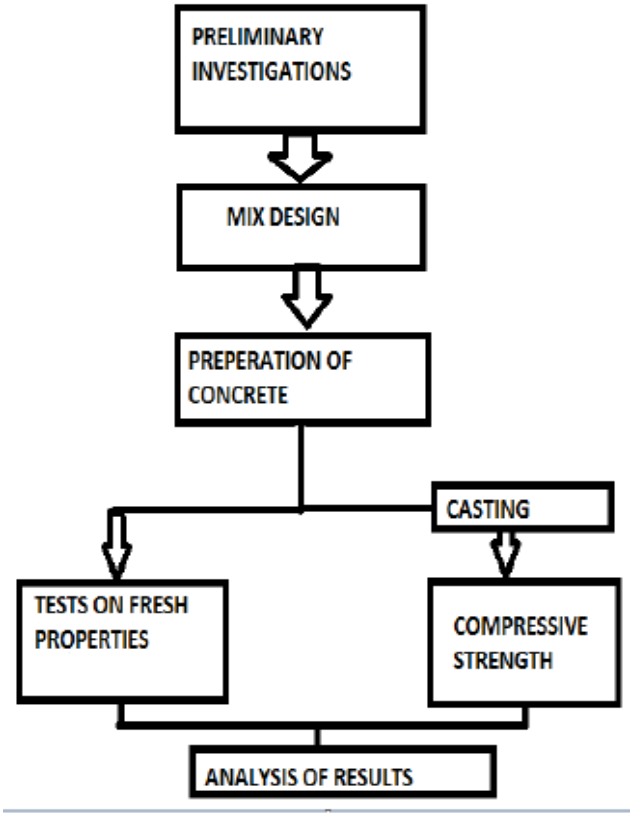
10%periwinkle shell ash (PSA), 10% bamboo leaf ash (BLA) content outperformed that the reference mix which is 100% gives good compressive and tensile split tensile strengths [16].

III. OBJECTIVE

To study the fresh and hardened properties by varying the percentage replacement of blends. Sample 1) To obtain a sustainable concrete with ternary bended cement (BA+MP).

IV. METHODOLOGY



Materials used:

Bagasse ash which is collected from sugar mills
Marble powder
Coarse and fine aggregate
Super plasticizer (conplast sp-430 es2)
Cement

V. SCOPE OF WORK

Concrete is going to made with marble powder, bagasse ash, which are industrial wastes released by granite industries and sugar mills industries which release them in a huge quantity .These are very fine and are airborne, that means these are easily carried out by wind. These particles are also going to adverse effects on human beings who inhale them as these are airborne. These are going to breathing problems to those who subjected to that polluted environment.

Concrete made with bagasse ash, marble powder will be the key to decline these wastes in the environment. The concrete also utilizes these wastes without going to cause any problems to human health after the usage them as the raw materials

Table: 1. Composition

Parameters (mass)	Marble powder	Bagasse ash
Silica	1.20	56.70
Alumina	0.5	15.52
Ferrous oxide	-	6.81
Calcium oxide	-	4.50
Carbonate of lime	95.16	-
Carbonate of magnesia	1.20	-

EXPERIMENTAL RESULTS:

Specific gravity of marble powder and bagasse ash;
Specific gravity of marble powder: 2.5
Specific gravity of bagasse ash: 1.3

Table: 2. Marsh Cone Test Results

% of super plasticiser	Cement (kg)	Water (ml)	Super plasticiser (ml)	Time (min) for B.A+M.P
0.6	2	700	12	9.2
0.8	2	700	16	7.3
1	2	700	20	4.1
1.2	2	700	24	3.5
1.4	2	700	28	3.5
1.6	2	700	32	3.5

Table: 3. Consistency Results

Wt of cement (gms)	BA gms	MP Gms	Water (ml)	Consistency (%)	IST for B.A+M.P
320	40	40	132	33	45
280	60	60	140	35	45
240	80	80	148	37	50

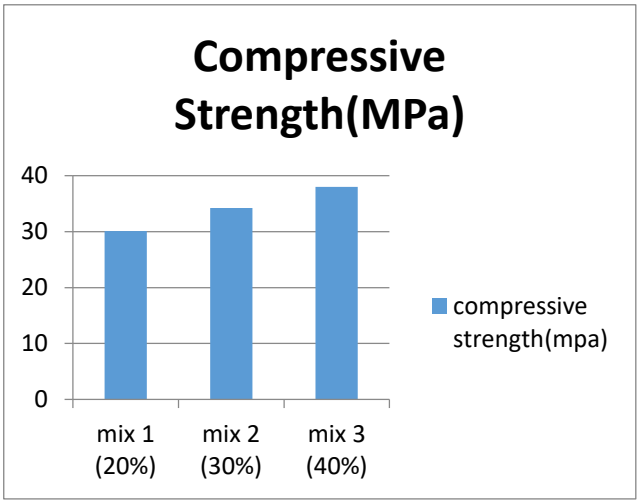
Blending of cement with various percentage of replacement:

Table: 4. Sample

	Cement replacement with B.A and M.P		
Ingredients	**Mix 1 20%**	**Mix 2 30%**	**Mix 3 40%**
Cement(kg/m^3)	310	271.75	232.25
Fine aggregate(kg/m^3)	820.24	785.15	760.34
Coarse aggregate(kg/m^3)	1000	1000	1000
Bagasse ash (kg/m^3)	38.75	58.125	77.5
Marble powder(kg/m^3)	38.75	58.125	77.5
Super plasticizer(lit)	4.65	4.65	4.65

Table: 5. Compressive Strength

S. NO	% of replacement	Compressive strength (MPa)
1	20(MP+BA)	30.09
2	30(MP+BA)	34.2
3	40(MP+BA)	38



Specimen testing for compressive strength

VI. CONCLUSIONS

Based on the investigation carried out on the ternary blended concrete mix, the conclusions are.

1. The optimum percentage of cement replacement by MP, BA blends are 20%, 30% & 40% for achieving maximum compressive strength. The 28 days compressive strength ratio of TBC with MP , BA replacement are tabulated above.
2. Consistency increases with the increase in percentage replacement of BA and MP.
3. Maximum percentage of super plasticizer to be used is founded out by using marsh cone test.

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