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Revolutionizing Construction: Roller- Compacted Concrete

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ABSTRACT
The use of roller compacted concrete (RCC) in pavements are widely used for a variety of industrial and heavy duty pavement application that involves low-speed traffic. The aim of this investigation is to evaluate the effect of bagasse ash and triangular polyester fiber (TPF) on mechanical properties of RCC mixtures addressed. Optimal water content value for the maximum dry density of each RCC mixture is one of the main concerns for mix design. In this study, an effect of TPF used as 0.25%, 0.50% and 0.75% per one cum with bagasse ash 15%, 30% and 45% by cement weight as a partial cement replacement on optimum water content, mechanical properties was investigated. The mechanical properties of RCC mix with TPF decrease due to water requirement increase. RCC mixtures with bagasse ash 30% partial replacement of cement and TPF at 90 days curing should be designed to fulfill the requirement of strength and workability

Keywords: RCC, Bagasse ash, TPF (Triangular Polyester Fiber), optimum water content, mechanical properties

1. INTRODUCTION

This state-of-the-art report contains information on applications, material properties, mix Proportioning, design, construction, and quality control procedures for roller compacted Concrete pavements (RCCP). Roller compacted concrete (RCC) use for pavements is relatively recent and the technology is still evolving. Over the last ten years several major Pavement projects have been constructed in North America using RCC and the performance of these pavements has generally been favorable. Roller compacted concrete pavements are also gaining acceptance in several European countries and Australia The advantages of using RCC include cost savings as a result of the construction method and the increased placement speed of the pavement. RCC pavements do not use dowels, steel reinforcement, or forms. This also results in significant savings when compared to the cost of conventionally constructed concrete pavements. Roller compacted concrete is used in two general areas of engineered construction: dams and pavements. In this document, RCC will be discussed only in the context of its use in pavements.

RCC for mass concrete is discussed in ACI 207.5R The materials for RCC are blended in a mixing plant into a heterogeneous mass which has a consistency similar to damp gravel or zero slump concrete. It is placed in layers usually not greater than 10 in. (254 mm) compacted thickness, usually by an asphalt concrete paving machine. The layers are compacted with steel wheel vibratory rollers, with final compaction sometimes provided by rubber tire rollers. The pavement is cured with after or other means to provide a hard, durable surface. RCC pavements are usually designed to carry traffic directly on the finished surface. A wearing course is not normally used, although a hot mix asphalt overlay has been added, in some cases, for smoothness or rehabilitations. Transverse and longitudinal contraction

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joints for crack control are not usually constructed in RCC pavements. RCC P has been used for a wide variety of applications. These include log sorting yards, lumber storage, forestry and mining haul roads, container intermodal yards, military vehicle roads and parking areas, bulk commodity (coal, wood chips) storage areas, truck and automobile parking, and to a lesser extent, municipal streets, secondary highways, and aircraft parking ramps

2.LITERATURE REVIEW

Adamu, M., Mohammed, B.S.(2018)This study deals with the development of an environmentally sustainable roller-compacted concrete (RCC) using high-volume fly ash (HVFA) and crumb rubber as partial replacement for cement and fine aggregate respectively, and nano-silica as an additive to cementitious materials. Response surface methodology (RSM) was used to design, develop statistical models, and carry out the optimization for the mixtures using the variables crumb rubber, HVFA, and nano-silica. The responses used for the RSM are compressive, flexural, and splitting tensile strengths. The proposed models demonstrated a high correlation among the variables and responses. An optimised HVFA RCC mix can be achieved by partially replacing 10% fine aggregate with crumb rubber by volume, replacing 53.72% of cement with fly ash by volume, and the addition of 1.22% nano-silica by weight of cementitious materials. Further experimental investigations showed that the HVFA RCC pavement exhibited lower fresh density, Vebe time, compressive strength, splitting tensile strength, flexural strength, modulus of elasticity, abrasion resistance, and impact resistance compared to conventional (control) RCC pavement. These effects further escalate with increase in partial replacement of fine aggregate with crumb rubber. On the other hand, nano-silica increases the mechanical properties and performance of HVFA RCC pavement with or without crumb rubber. This is because of the ability of nano-silica to partially mitigate the negative effect of crumb rubber on the properties of HVFA RCC by densifying the interfacial transition zone between the cement matrix and crumb rubber and filling the pores in the hardened cement matrix. Furthermore, nano-silica partially ignited the pozzolanic reactivity of fly ash at early ages which leads to higher performance of HVFA RCC pavement at early age.

In another study of compressive strength of concrete with millet husk ash (MHA) as partial replacement for ordinary Portland cement (OPC) is presented. The strength characteristics was investigated by casting and testing 54 specimen cubes sizing 100 mm x 100 mm x 100 mm for varied percentage replacements of cement (0%, 10% and 20%) with water cement ratio of 0.65. These cubes were cured for 7 days, 14 days, 28 days and 35 days to target strength design of 25 N/mm² at 35 days crushing. The result shows that at 35 days the compressive strength for 0%, 10% and 20% replacements are 32.00 N/mm², 25.56 N/mm², and 23.18 N/mm², respectively. It is clear that MHA as a pozzolanic material can be incorporated into cement in amounts of no more than 10% replacement in order to develop a good and hardened concrete

Yuvraj Rathaur, Yash Shukla, Arpita Yadav Anand Bhatt (2023): Investigating the viability of sugarcane bagasse ash (SCBA) as a sustainable alternative in concrete production, this experimental study by Rathaur et al. explores the material's impact on concrete properties. The findings from this research, published in Volume 11 of the International Journal of Concrete Research & Technology, offer insights into SCBA's potential as a supplementary material in enhancing concrete performanceTo predict influenza in Shanxi Province, Zhao, et al. (2023) developed a SARIMA model for influenza, SARIMA-LSTM combined model, SSA-SARIMA-LSTM combined model. For the first week of 2010 to the 52nd Pritish Gupta, Eric Wirquin, Chandradeo Bokhoree (2021): The innovative application of sugarcane bagasse ash as a promising cementitious material within the construction sector. Examining its potential benefits, the research explores its role in enhancing construction practices, shedding light on sustainability and efficiency. This work presents valuable insights into the utilization of agricultural waste in construction materials, opening avenues for eco-friendly and resourceful building solutions. Through comprehensive analysis, the authors contribute to the evolving landscape of sustainable construction methodologies.

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The sustainable utilization of sugarcane bagasse ash within cement-based compositions. Their study explores the potential of this renewable by product in enhancing the properties of cement, providing valuable insights into eco-friendly alternatives for construction materials. This research contributes significantly to the ongoing discourse on sustainable practices in the construction industry, offering a promising avenue for reducing environmental impact while improving material efficiency by Waqas Ahmad, Ayaz Ahmad Krzysztof Adam Ostrowski (2021).

B. Mahesh,T. Mahesh Kumar,U. Nikhil,A.Yakaswamy (2020**)** Usage of Sugarcane Bagasse Ash in Concrete," the authors investigated the incorporation of sugarcane bagasse ash into concrete. The research, published in the International Journal of Current Research and Trends, explores the potential benefits and impact of using sugarcane bagasse ash as a supplementary material in concrete mixtures. This paper contributes valuable insights into sustainable construction practices by examining the performance and properties of concrete with sugarcane bagasse ash.

3. METHODOLOGY

3.1 Material Properties

Cement

Cement consists of four major compounds Tricalcium Silicate (C_3S), Dicalcium Silicate(C_2S), Tricalcium Aluminates (C_3A) & Tetra calcium Aluminoferrite (C_4AF). Tricalcium Silicate (C_3S) and Dicalcium Silicate (C_2S) are the most important compound responsible for strength. Together they constitute 70 to 80 percent of cement. The average C_3S content in modern cement is about 45 percent and that of C_2S is about 25 percent. During the course of reaction of C_3S and C_2S with water, calcium silicate hydrate (C-S-H) and calcium hydroxide ($Ca(OH)_2$) are formed. Calcium silicate hydrates are the most important products and determines the good properties of concrete. C_3S readily reacts with water and produces more heat of hydration. It is responsible for early strength of concrete. C_2S hydrates rather slowly produces less heat of hydration. It is responsible for later strength of concrete. The C_3A portion of cement hydrates more rapidly, thereby reducing the workability of fresh concrete. Regarding particle size distribution, it may be noted that finer particles hydrate faster than coarser particles and hence contribute more to early age strength concrete; however, at the same time, the faster the rate of hydration may lead to quicker loss of workability due to rapid and large release of heat of hydration. After reviewing all above requirements, Ordinary Portland Cement (OPC) of 53 grades cement confirming to IS: 12269-1987 is used for this experimental investigation throughout. The cement is tested as per IS: 4031-1988.

Table No. 3.1: Properties of Cement

Sr. No.	Test Conducted	IS References	Result
1	Fineness of cement	IS 269-1976	1.00%
2	Soundness (mm)		3.22
3	Standard consistency of cement	IS 4031-1988	31%
4	Setting time of cement:	IS 269-1976	
	A) Initial setting time		81 min
	B) Final setting time		379 min

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Fine Aggregate (Sand)

Concrete is an assemblage of individual pieces of aggregate bound together by cementing material, its properties are based primarily on the quality of cement paste. This strength is dependent also on the bond between the cement paste and aggregate. If either the strength of the paste or the bond between the paste and aggregate is low, a concrete of poor quality will be obtained irrespective of strength of the aggregate, for making strong concrete, strong aggregate is an essential requirement. By and large naturally available mineral aggregate are strong enough for making normal strength concrete.

Locally available sand, from "PRAVARA RIVER", is used as fine aggregate, it confirm IS 383-1970.

Table No.3.2 : Properties of Fine Aggregates

Sr. No.	Test Conducted	Result
1.	Fineness Modulus	2.92
2.	Moisture content	2.21%
3.	Specific Gravity	2.67%
4.	Soundness (mm)	4.42

Table No. 3.3: Sieve Analysis of Fine Aggregates

Sr. No.	Sieve size(mm)	Weight retained (gms)	Individual %retained (gms)	Cumulative % retained	%Wt. Passing
1	10mm	0	0	0	100
2	4.75mm	320	16	0	100
3	2.36mm	410	20.5	2.78	97.22
4	1.18 mm	630	31.5	9.9	90.1
5	600µ	315	15.75	17.9	82.1
6	300µ	205	10.25	67.9	32.1
7	150µ	100	5	94.03	5.97
8	Pan	15	0.75	99.75	0.25
			Total =	292.26	

Fineness modulus = sum of cumulative % of mass retained on the sieve (without pan) / 100

= 292.26 / 100

= 2.92

Fine aggregate confirms to grading zone I (IS 383-1970)

Coarse Aggregate

The nominal maximum size of coarse aggregate should as large as possible within the specified limits but in no case greater than one fourth of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of the form. Locally available crushed stone with 20mm&12.5mm size aggregates confirming

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to IS 383:1970 are used.

Table No. 3.4 Properties of Coarse Aggregates

Sr. No.	Test Conducted	Result
1.	Fineness Modulus of coarse aggregates	
	20mm	7.73
	12.5mm	2.67
2.	Specific Gravity	
	20mm	2.88
	12.5mm	2.78
3.	Water Absorption	1.5%
4.	Impact test	18.36%
5	Crushing test	28.8%

Table No. 3.5: Sieve Analysis of Coarse Aggregate (12.5mm)

Sr. No.	Sieve size (mm)	Retained	Individual % retained (gms)	Cumulative % retained (gms)	Cumulative % retained
1	12.5	975	19.5	19.5	80.5
2	10.0	1670	33.4	52.9	47.1
3	4.75	2205	44.1	97	3
4	2.36	78	1.56	98.56	1.44
5	Pan	72	1.44	-	-
				267.96	

Fineness modulus = sum of cumulative % of mass retained on the sieve / 100

=267.96/ 100

Fineness modulus = 2.67

Table No. 3.6: Sieve Analysis of Coarse Aggregate (20 mm)

Sr. No.	Sieve size	Retained	Individual % retained(gms)	Cumulative % retained (gms)	Cumulative % retained
1	20 mm	3910	78.2	78.2	21.8
2	10 mm	1055	21.1	99.3	0.7
3	4.75 mm	5	0.1	99.4	0.6

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4	2.36 mm	-	-	99.4	0.6
5	1.18 mm	-	-	99.4	0.6
6	600 μ	-	-	99.4	0.6
7	300 μ	-	-	99.4	0.6
8	150 μ	-	-	99.4	0.6
9	Pan	-	-	-	-
				773.9	

Fineness modulus = sum of cumulative % of mass retained on the sieve / 100

=773.9 / 100

Fineness modulus = 7.739

Table No 3.7 : Specific gravity of fine aggregate (sand) & coarse aggregate (20mm & 12.5mm)

Sr. No.	Particulates	Fine Aggregate	Coarse Aggregate	
			20mm	12.5mm
1	W_1=mass of pycnometer.	625	625	625
2	W_2=mass of pycnometer + mass of aggregate.	1025	1000	1125
3	W_3= mass of pycnometer + aggregate + distilled water	1775	1770	1845
4	W_4=mass of pycnometer + distilled water	1525	1525	1525
5	Sp. Gravity = $G_S=[W_2- W_1] / [(W_4- W_1)-(W_3- W_2)]$	2.67	2.88	2.78

Water

Water is an important ingredient of concrete as it actively participates in the mix design consideration. It is generally stated in the concrete codes and also in the literature that the water chemically reacts with cement. The strength of cement concrete mainly due to the binding action of the hydrated cement gel i.e. C-H-S gel. The requirement of water should be reduced to that required for chemical reaction of anhydrite cement as the excess water would end up in only formation of undesirable voids (and/or capillaries) in the hardened cement paste in concrete. As per IS-456:2000 water used for mixing and curing shall be clean and free from injurious amounts of oils, alkalis, salts, sugars, organic materials or other substances that may deleterious to concrete or steel. In the present work, available tap water is used for concreting.

Table No. 3.8: Tests conducted on water

Sr. No.	Test Conducted	Result	Is Requirements
1.	pH	8.5	Greater than 6
2.	TDS (PPM)	125	(100-150)

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Bagasse ash.

The SCBA was obtained from the burning of sugar cane bagasse, which was initially used for the co-generation of electricity in Medine Ltd sugar cane factory. In this research, the black colour bagasse ash was burnt in the Université des Mascareignes laboratory's oven at a temperature of 240 °C for 12 h. The material obtained was light brown in colour, and much finer than the raw SCBA, as part of the remaining sugar cane fibres have been converted into ashes. The treated SCBA was then sieved as per BS 812 Part 103.1: 1985 with sieve size 75 µm. All materials passing through the 75 µm size was collected for use in this experiment.

Fig. Bagasse ash

Recron -3s Fibre

Recron -3s Fibre is a non-toxic man-made fibre. Proper use has not been associated with any special hazard or any detrimental effects on health. mechanically. Some finish components may vaporize or decompose at temperatures above 130 °C

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4. RESULTS AND DISCUSSION

4.1 Compressive strength

The compressive strength results for RCC, RCC with bagasse ash (BA), and RCC with TPF and TPF-BA mixtures at 7, 28, and 90 days of curing are presented in Table 5. From these results, it can be observed that for BA-incorporated concrete, the 7-day and 28-day strengths are primarily due to cement hydration, while BA contributes significantly to the long-term strength of the mix. The most notable increase in compressive strength for BA concrete mixtures occurs at 90 days, particularly when compared to the 7-day and 28-day strengths of the control RCC mix. This increase is attributed to the pozzolanic activity of the bagasse ash. Specifically, the 7-day compressive strength decreases from 29 MPa to 15 MPa, and the 28-day strength decreases from 40 MPa to 29 MPa as the BA content increases from 0% to 45%. However, the 90-day strength increases at a bagasse ash content of 30% (F30) and decreases at 40% BA (F40), with the compressive strength ranging from 48 MPa to 52 MPa.For the concrete mixes containing TPF, the compressive strength results are also shown in Table 5. The compressive strength of RCC and TPFRCC mixtures at 7, 28, and 90 days ranged from 30 to 21 MPa, 35 to 30 MPa, and 48 to 35 MPa, respectively. As the TPF content increases, the compressive strength of the TPFRCC mix decreases. The compressive strength results for RCC mixtures with bagasse ash (BA) and TPF are presented in Table 5. The findings show that the optimal water-to-cement (w/c) ratio of the combined BA and TPF mixture is influenced by the individual properties of each component. As the bagasse ash content increases up to 30%, the optimal water content increases, while an increase in TPF content leads to a decrease in the optimal w/c ratio. By combining bagasse ash and TPF, the optimal w/c ratio can be controlled, resulting in improved strength for the RCC mix. For all TPFRCC mixtures with 0.25%, 0.50%, and 0.75% TPF and 15%, 30%, and 45% BA, the compressive strength increases at 90 days. The 7-day and 28-day compressive strengths of the TPF-BA mixtures, at various proportions, ranged from 26 to 15 MPa and 39 to 29 MPa, respectively. At 90 days, the compressive strength of these mixtures increased, ranging from 42 to 51 MPa.Typically, RCC is required to achieve a compressive strength of 30 to 35 MPa at 28 days. The 28-day compressive strength for the TPF0.25%-BA30 mixture, with a w/c ratio of 0.39, was 29.61 MPa, while the TPF0.50%-BA30 mixture, with a w/c ratio of 0.39, achieved a strength of 35.32 MPa. Therefore, RCC mixtures containing 30% bagasse ash and 0.25% to 0.50% TPF can be designed to meet the required strength for RCC pavement. According to IRC: SP: 62-2014 and ACI 325.10R-95, these mixtures meet the minimum compressive strength requirement of 30 MPa at 28 days.

Table No. 4.1: Compressive , Flexural & Split tensile Strength Test

Mix proportion	Compressive Strength Mpa			Flexural Strength Mpa			Split tensile Strength Mpa		
	7 days	28 days	90 days	7 days	28 days	90 days	7 days	28 days	90 days
TPF-BA0%	25	39	51	2.4	4.1	4.4	2.9	3.2	3.4
TPF-BA15%	23.5	37	48	2.1	4.0	4.7	2.44	2.9	3.2
TPF-BA30%	22.8	35	46	1.6	4.4	5.2	1.9	3.1	3.9
TPF-BA45%	21	31	44.5	1.7	3.9	4.2	2.5	2.9	3.4
TPF0.25%-BA0%	26	32	48	3.1	4.7	5.3	3.41	4.1	4.3
TPF0.50%-BA0%	24	29	42	3.3	5.4	5.7	3.7	4.0	4.51

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TPF0.75%-BA0%	23	30	40	4.1	5.6	5.9	3.4	3.9	4.24
TPF0.25%-BA15%	13.2	21	38	2.27	3.85	5.3	2.37	3.39	4.57
TPF0.50%-BA15%	14.2	25	42	2.57	3.92	5.7	2.44	3.12	4.75
TPF0.75%-BA15%	13.0	22.4	41	2.21	3.98	5.8	2.36	3.58	4.9
TPF0.25%-BA30%	21.3	29.6	43	3.55	5.4	4.9	3.59	4..2	5.0
TPF0.50%-BA30%	25.1	35.3	48	3.58	5.60	5.9	3.66	4.1	4.8
TPF0.75%-BA30%	24.3	32	43	3.52	5.21	5.4	3.70	4.5	5.0
TPF0.25%-BA45%	16.4	29.2	42	2.18	3.59	3.5	2.29	4.1	4.9
TPF0.50%-BA45%	17.7	31.9	44	2.29	4.1	3.7	2.39	4.3	5.0
TPF0.75%-BA45%	16.3	29.0	39	2.13	4.25	4.0	2.37	4.1	5.1

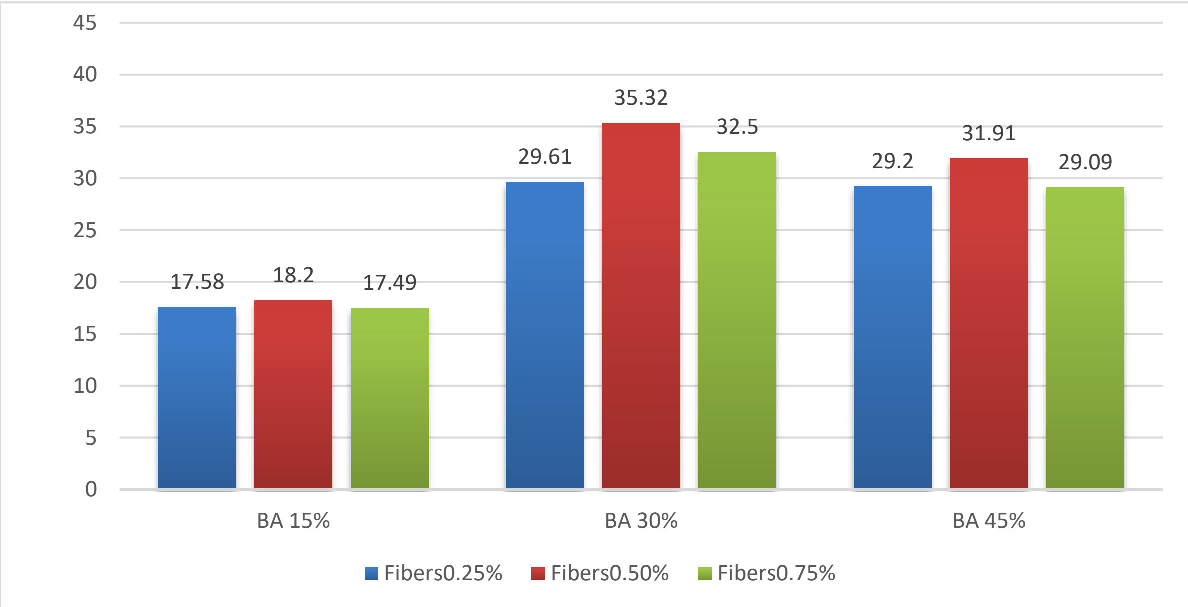

Fig. 4.1 : Compressive Strength Test Against varying bagasse ash and TPF proportions.

4.2 Flexural Test

Table presents the test results for the effect of bagasse ash and TPF in varying proportions. As observed, the flexural strength decreases with increasing bagasse ash content at both 7-day and 28-day curing periods. For instance, the 7-day flexural strength of the control mix (BA0) is 2.4 MPa, but it drops to 1.6 MPa when the bagasse ash content is increased to 30% (BA30). This trend highlights the inverse relationship between bagasse ash content and flexural strength over time..

At 28 days of curing, the flexural strength of the control mix (BA0) is 4.1 MPa, which increases to 4.4 MPa when the bagasse ash content is 30% (BA30). However, with a further increase in bagasse ash to 45% (BA45), the flexural strength decreases to 3.9 MPa. Notably, the flexural strength at both 28 and 90 days of curing for concrete mixtures containing 15% to 30% bagasse ash surpasses the strength of the RCC control mixture. After 90 days of curing, the RCC mix with 30% bagasse ash exhibited a flexural strength of 5.2 MPa.

Table 4 presents the effect of adding TPF at varying percentages (0.25%, 0.5%, and 0.75% per 1 m³)

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on the flexural strength of RCC control mixtures. At 90 days of curing, the flexural strength of both RCC and TPFRCC ranged from 4.4 MPa to 6.1 MPa. An increase in TPF content within the RCC mixtures led to a corresponding increase in flexural strength, whereas the strength of the fiberless mixtures remained lower. Additionally, the addition of TPF not only improved the flexural strength but also enhanced the ductility and energy absorption capacity of the specimens. For mixtures containing 0% and 15% bagasse ash (BA0 and BA15), the inclusion of TPF had a relatively minor effect on flexural strength compared to those without fiber. However, in mixtures with 30% bagasse ash (BA30), the addition of TPF significantly improved the flexural strength, with the 0.75% TPF mixture showing the highest strength. According to IRC: SP: 62-2014 and ACI 325.10R-95, the compressive strength of RCC at 28 days should be between 3.5 MPa and 7 MPa, and the mixtures tested meet these requirements.

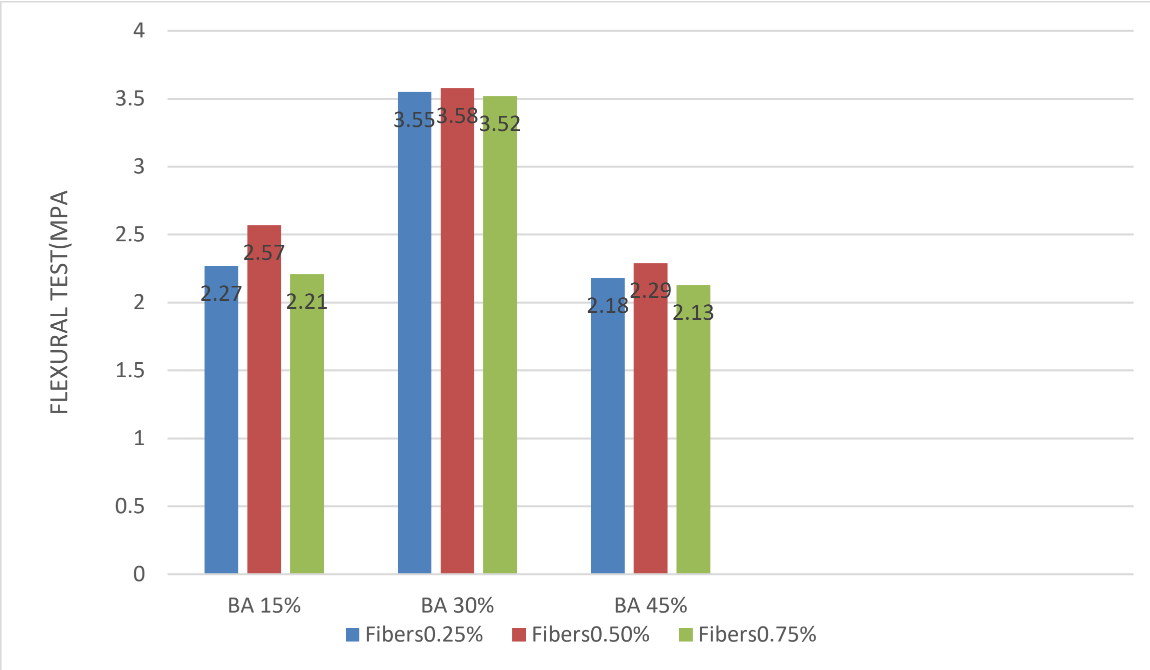

Fig. 4.2 : Flexural Test Against varying bagasse ash and TPF proportions.

4.3 Split Tensile Strength

The splitting tensile strength of the RCC mixtures is summarized in Table 5. The results show a decrease in splitting tensile strength at both 7 and 28 days of curing with an increase in bagasse ash content. However, concrete mixtures containing 15% to 30% bagasse ash exhibited higher splitting tensile strength at both 28 and 90 days of curing compared to the RCC control mixtures.. After 7 days of curing, the splitting tensile strength of the RCC and TPFRCC samples ranged from 3.2 MPa to 3.9 MPa. After 28 and 90 days of curing, the splitting tensile strength increased, ranging from 3.2 MPa to 4.2 MPa and from 4.2 MPa to 5.0 MPa, respectively. The control mixtures showed brittle fracture behavior, while the TPFRCC samples exhibited ductile fracture behavior .for mixtures containing higher proportions of bagasse ash and TPF, the splitting tensile strength increased with curing time. Specifically, at 7, 28, and 90 days of curing, the splitting tensile strength varied from 1.7 MPa to 4.3 MPa, 2.8 MPa to 4.6 MPa, and 3.1 MPa to 5.2 MPa, respectively. According to ACI 325.10R-95, the splitting tensile strength of these RCC mixtures meets the required standards.

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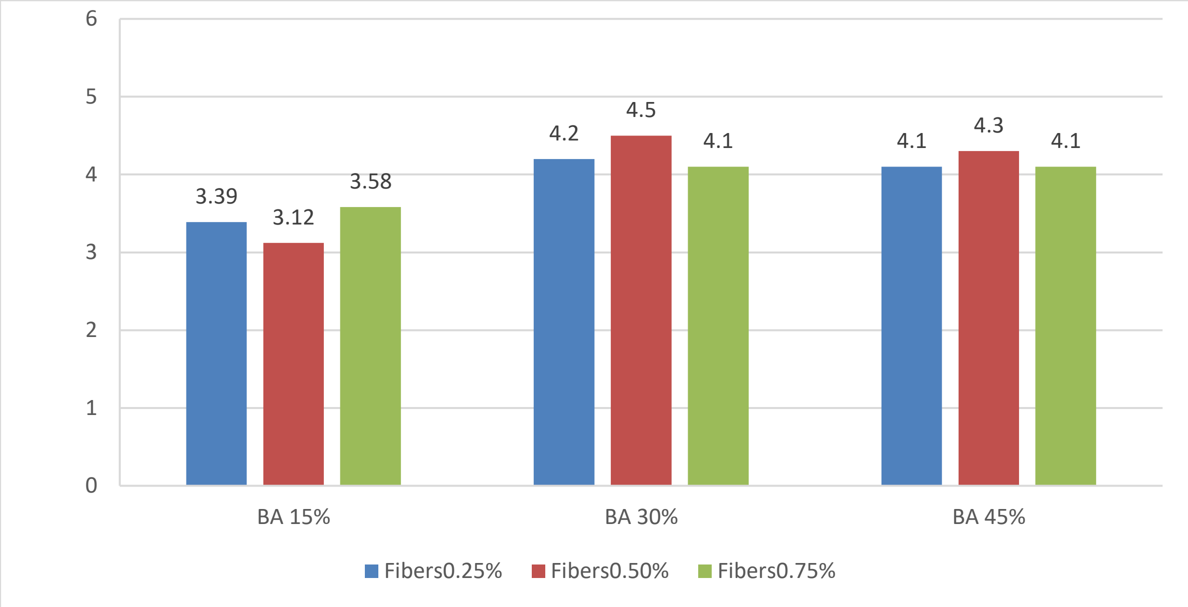

Fig.4.3 : Split Tensile Strength Against varying bagasse ash and TPF proportions.

4.4 Time Lag Period :-

This study tested the compressive strength and flexural strength due to the cold joint in concrete.

The material used consists of cement, water, fine aggregate, coarse aggregate, superplasticizer and

Polypropylene fiber. Variation of casting time was 120 minutes and 240 minutes . The time variations used is the estimated time of late arrival of the mixer truck in the casting process at site . In the process, the slump value was tested first to determine the workability of fresh concrete. After this, the compressive strength were tested . Compressive strength testing was used on cube specimens measuring 150 x 150 x 150 mm3 . The compressive strength testing standard used refers to ASTM C39. The curing method used in this study was water curing for 28 days.

Table 5 presents the test results for the effect of bagasse

ash and TPF in varying proportions. As observed TPF0.50% BA30% gives optimum condition for RCC.

Table No. 4.2: Compressive Strength Test Against time lag period.

Elapsed time	Compressive strength		
(Min)	7 days	28 days	90 days
0	18.94	32.67	42.74
45	20.54	32.89	43.64
90	21.35	34.12	46.23
135	22.54	35.11	47.33
180	21.14	33.29	44.87

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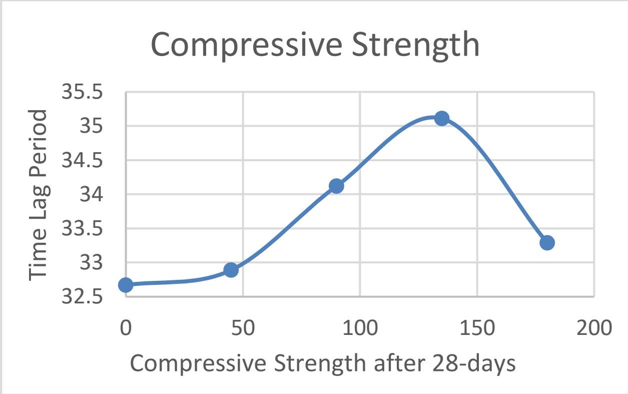

Fig 4.4 Compressive Strength Test Against time lag period

4.5 Initial And Final Setting Time

The initial and final setting times for roller-compacted concrete (RCC) are similar to those for conventional concrete but may vary based on the mix design, materials, and environmental conditions. Generally initial setting time is the time when the concrete begins to lose its plasticity and cannot be worked or finished effectively. Final setting time is usually marking the point when the concrete has hardened sufficiently and is no longer moldable.

The test is done by V Cat apparatus , apply force gradually and uniformly until the needle penetrate 25 ± 2 and time required to penetrate 10 ± 2 seconds required the forced and time . subsequent test should be made at half or one hour interval until the resistance readings equals to 27.6 Mpa its our final setting time and for initial setting time until the resistance readings nearly equals to 3.2 Mpa .

The study investigates the impact of different bagasse ash (BA) contents, used as a partial replacement for cement at 15%, 30%, and 45% by cement weight. Three levels of TPF were incorporated into the mixtures, at volumes of 0.25%, 0.50%, and 0.75%. It was observed that the addition of bagasse ash (BA)

Fig 4.6 presents the test results for the effect of bagasse ash and TPF in varying proportions. As observed TPF0.50% BA30% gives optimum condition for RCC. We conduct the initial and final setting time on above proportion

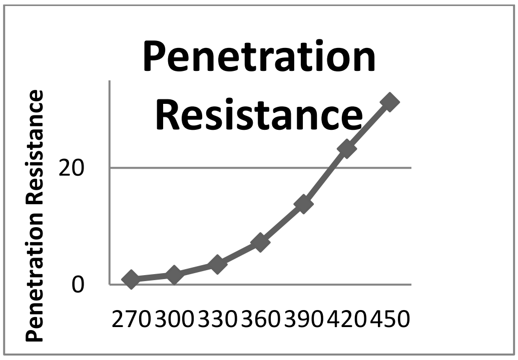

Fig. **4.6 :** Initial And Final Setting Time Of RCC

Thus We Find the initial Setting Time Of Concrete is 326.37 Min And Final Setting Of Concrete is 436 Min.

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CONCLUSION

In this paper, Based on the findings of this laboratory study, the following conclusions can be drawn The optimum water content and the water-to-cement-plus-fiber (W/C+F) ratio for RCC mixes incorporating bagasse ash are higher compared to those without bagasse ash. In terms of mechanical properties, RCC mixes containing 30% bagasse ash (BA30%) as a cement replacement showed a decrease in strength at 7 days of curing, but exhibited improved strength and workability at 28 and 90 days of curing. This improvement is attributed to the Pozzolanic effect of bagasse ash .

In the case of RCC mixes with TPF, the optimum water content and W/C+F ratio decreased with the addition of fibers. The results indicate that the flexural strength of the RCC mixes with TPF significantly improved, although the peak compressive strength slightly reduced due to the decrease in the W/C ratio. Overall, RCC mixes with 30% bagasse ash and TPF can be successfully proportioned to enhance mechanical properties, particularly at 28 and 90 days of curing.

Decrease strength and higher strength property and workability at 28 and 90 days curing due to pozzolanic contribution . The RCC mix with TPF of optimum water content values and W/C+B ratio are decreases. Results obtained from the RCC mixes with TPF flexural behavior significantly increase but peak compressive strength reduce slightly due to W/C ratio decreases. RCC mixes can be successfully proportion with BA30% with TPF increases mechanical property at 28 and 90 days curing.

By the Result of time lag period we concluded The use of 30% bagasse ash and 0.50% Recron fiber in RCC presents a highly effective strategy for reducing the time lag period in concrete curing. This combination enhances the early strength gain, improves the material's workability and crack resistance, and reduces curing time, leading to faster project completion.

By the Result of initial and final setting time the VB Time Gradually decreses as the concrete sets . The Different Combination of bagasse ash and Recron fiber results differently . The Optimum combination of 30% bagasse ash and 0.50% Recron fiber in RCC aligns with sustainability goals by utilizing waste materials like bagasse ash and enhancing the durability of the final structure.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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