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REVIEW PAPER ON CONCRETE USING SOFT DRINK ALUMINUM CANS FIBER

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Abstract:- The influence of soft drink aluminum cans fibers has been studied in different proportions and fiber length to improve the performance characteristics of the concrete.it has similar mechanical properties like steel fiber. Concrete has good characteristics in compressive strength but it is too weak in tensile strength. Researchers suggest some waste material to increase the weakness of tensile strength. By adding soft drink aluminum fiber it increase both flexural and tensile strength up to 40% than the conventional concrete. It finds everywhere as waste material. It is a recyclable material, about 51% of the cans are wasted and landfilled every year. This review paper has been shown different proportions of 0.5%, 1%, 1.5%, and 2% of soft drink aluminum cans fiber by weight of cement. The experiment of compressive strength, tensile strength, and flexural strength are tested for 7 and 28 days.

Keywords: *fly ash, soft drink aluminum cans fiber, compressive strength, Tensile strength, and flexural strength.*

Introduction:

Concrete is one of the most versatile utilize material in construction industries. Which comes second in rank after water. Concrete is the most utilized, economical, and harden material, able to be cast in any shape, superb against the resistance of water and fire. And concrete is that material which can effectively use with steel and reinforcement bars. Concrete is fine material in compressive strength but low in tensile strength. Concrete generates from these ingredient cement/lime, fine aggregate, coarse aggregate, water, some admixture. There are about 10 billion tons of consumption of concrete in the world, which creates huge anxiety for natural resources, like fine aggregate and coarse aggregates. To reduce these anxiety researcher have conducted studies on utilization of some waste materials like (fly ash, silica fume, GGBS ground granulated blast furnace slag, steel powder, foundry sand, rice husk ash, plastic, etc…) in concrete for making eco-friendly environment and also reduce utilization of natural resources.) concrete has a lot of cracks due to shrinkages and some other reasons, to reduce the cracks and increase the mechanical properties of concrete, some of the fibers are suggested from the researcher's like (steel fiber, glass fiber, coconut fiber, polypropylene fiber, sisal fiber, bamboo fiber and etc…) can fiber has similar properties like steel fiber but it's very cheap and easily available everywhere as waste material. It increase the tensile strength significantly. About 51 percent of empty aluminum cans are wastes and 49 percent are recycled each year. Researchers have been used a different proportion of aluminum can fiber it has a good result on 1% and 1.5%. In this review paper, we utilize different proportions of 0.5%, 1%, 1.5%, and 2% percent of soft drink aluminum cans fiber by weight of cement. And replace the cement with fly ash 35%, the replacement of fly ash with cement is constant for every proportion. The experiment of compressive strength, tensile strength, and flexural strength are tested for 7 and 28 days.

Literature Review

A.Oan. (2019) The aluminum can fiber have been used at ratios of 0.5%, 1%, 2% and 3% by weight of cement, The results showed that the compressive strength is negatively affected by the addition of the fibers to the mix, while both tensile strength and flexural strength improves with increasing of the fibers. For 3% usage of aluminum can fiber flexural and tensile strength increase significantly[1]

.M. Haque et al. (2019) have partially replaced the sand with stone dust in concrete with 0%, 0.5% and 1% of condensed milk-can fiber based on the weight of cement. The test results show that samples made of full stone dust with 1% fiber give 1.05% higher compressive strength than samples made of sand with no fiber at 28days. Besides, the use of stone dust and 1% fiber has increased flexural strength by 11.12% at 28 days[2].

Amritha P et al. (2019) the study has been conducted on the M25 mix with water-cement ratio 0.40. The fine aggregate has been partially replaced with glass powder at percentages of 10, 20, 30, 40 and 50. The addition of soft drink tin fibers has been

studied at various percentages of 0.5,1,2 and 3%. The accelerated curing process has been adopted. Optimum 30% of glass powder has good compressive and tensile strength while 0.5% of fiber has good compressive and tensile strength. Both Glass powder and tine strips can be used separately in concrete to increase the mechanical properties of the concrete. Because of

- Lack of bond between glass particles and tins strips.
- The corrosion of the aluminum strips[3].

K. Kishore et al. (2019) have used the fractions of 0%, 0.50%, 0.75%, 1.0% & 1.5% in the preparation of concrete. Steel fiber has a high compressive and tensile strength at 0.5%. With an increase of steel fiber content, the compressive strength of concrete first increases then decreases, however, the compressive strength of tin can chips decreases from the starting stage. Split tensile strength of tin chips fiber has no significant changes while the split strength of steel fiber increases gradually from 0.5% steel fiber fractions[4].

I. Wijatmiko et al. (2019) this study has cleared the effect of various fractions (10%, 15% and 20% by volume of concrete), followed by two types of fiber shape (hooked and clipped) to the lightweight concrete. The result showed that the introduction of 10% of fiber performed in higher tensile strength with an increase of 23%, while the hooked shape of fiber increased the compressive strength by more than 40%. The inclusion of fiber, especially with interlocking, gives additional advantages as it helps keeps pumice from floating to the surfaces and hold pumice at the evenly distributed places. Design for 17mpa Indonesia code (SNI 03-2834-2000)[5].

A. Mediyanto et al. (2018) in this research cylindrical concrete of 150 mm dia 300 mm high for the compressive test. The fiber volume fraction is 0.75%_of concrete. Aluminum fiber with aspect ratio 50. From the discussion of the results of the study can be concluded: The minimum time to recovery of lightweight concrete compressive strength with water curing is 42 days after combustion, while for aluminum fiber lightweight concrete to recovery compressive strength is 28 days[6].

Y. Haryanto et al. (2017) the volume fraction of the fiber was varied 0, 0.3, 0.6, and 0.9%. With 2% of superplasticizer in partial replace of cement. The optimum fiber volume fraction for better performance in terms of strength is 0.3% concrete. The mechanical properties of lightweight concrete are significantly improved by soda can waste fibers[7].

J Ilya et al. (2017) OPC concrete with 0%, 1% and 2% of a soft drink can aluminum fiber was prepared based on the weight of cement. The mark is M30. Among two volume fractions, concrete with 1% of a soft drink can fiber have performed better result in compressive strength and flexural strength compared with 2% amount of soft drink can fiber. The optimum proportion of aluminum fiber to be added in the concrete as fiber reinforcement is 1% fiber content by weight of cement which gave all the positive response from all the tests conducted[8].

D. Kumar R et al. (2017) influence of the addition of soft drinks can waste material as fibers with various aspect ratios keeping the dosage of fiber constant as 1% by volume of concrete. The sizes of the fiber vary from 10mm to 40mm respectively. The study is conducted on an M40 grade concrete mix for pavement application. Adding 1% of the fiber reduces pavement thickness i.e.24 cm than normal concrete which is 28 cm and it also gives 11.05 % of cost-saving in construction. Also, it takes care of temperature stresses and corner stresses. Hence one can say that TFRC can become an option in the future[9].

M. A. Akhund et al. (2017) proportion of fibers 1%, 2% and 3% by weight of cement using (½", 1" and 1 ½)" long strip respectively. Results show that with the increase in the percentage and size of strips in concrete, the workability of concrete is decreased and the compressive strength is significantly increased in fiber made mix concrete. Maximum compressive strength, i.e. 33% more than control mix concrete, is obtained using 1.5" long with 3% of fiber strips. In general experimental study shows that with the increase in size and percentage of the fiber the workability of fiber reinforced concrete mixes decreases and the compressive strength increased than the control concrete mix[10].

K. Ravinder (2016) influence of the addition of soft drink-can waste material as fibers at a dosage of 0%, 0.5%, 1.0% and 1.5% by volume of concrete. By adding 0.5% the compressive strength increase, while increasing tensile is by 1.5%. While increasing the dosage of fiber content in the concrete specimen, the compression strength of a specimen is slightly decreasing, on M20[11].

G.Murali et al. (2012) addition of waste materials like lathe waste, soft drink bottle caps, empty waste tins, waste steel powder from workshop at a dosage of 1% of the total weight of concrete as fibers. Using the M25 mix. The result showed that waste steel powder has good strength than waste cans caps. And waste cans caps have good strength than waste aluminum fiber[12].

Table -1: Literature review papers and their comparison

No	Year	Author	% of soft drink cans fiber	Material used	Tests	Result
1	2019	A.OAN	(0.5%, 1%, 2%, 3%)	OPC Fine aggregate Course aggregate Tine Fiber	Compressive Tensile Flexural	Increase in tensile and flexural
2	2019	M.Haque et al	(0.5%, 1%)	PLC Fine aggregate Stone dust Course aggregate Condensed milk cans	Compressive Flexural	Increase
3	2019	Amritha P et al	(0.5%, 1%, 2%, 3%)	PPC Fine aggregate Coarse aggregate Glass powder Tins stripe as a fiber	Compressive Tensile	Increase
4	2019	K. Kishore et al	(0.5%, 0.75%, 1.0%, 1.5%)	OPC Fine aggregate Coarse aggregate Steel fiber Empty tin Bottle caps	Compressive Tensile	Increase in tensile
5	2019	I. Wijatmiko et al	10%, 15%, 20	OPC Fine aggregate Coarse aggregate Cans fiber Scrape cans	Compressive Tensile	Increase
6	2018	A. Mediyanto et al	0.75%	OPC Fine aggregate Coarse aggregate Cans fiber	compression	Recovery time is 28 day
7	2017	Y. Haryanto et al	0.3%, 0.6%, 0.9%	saturated surface dry river sand artificial coarse aggregate cement soda cans fiber	Compressive Tensile	Increase
8	2017	J Ilya et al.	1%, 2%	OPC Fine aggregate Coarse aggregate Soft drink cans fiber	Compressive Tensile Flexural	Increase
9	2017	D. Kumar R et al.	1%	OPC Fine aggregate Coarse aggregate Soft drink cans fiber	Compressive Flexural	Increase
10	2017	M. A. Akhund et al.	1%, 2%, 3%	OPC Fine aggregate	Compressive strength	Desirable

				Coarse aggregate Soft drink tins fiber		
11	2016	K. Ravinder	0.5%, 1%, 1.5%	OPC Fine aggregate Coarse aggregate Soft drink cans fiber	Compressive Tensile strengths	Increase
12	2012	G.Murali et al	1%	OPC Fine aggregate Coarse aggregate Soft drink tins fiber Steel powder Bottle caps	Compressive Tensile and flexural	Increase

Conclusions

1: Researchers have used different percentages of soft drink cans fiber but the 1% has desirable results.

2: By adding soft drink aluminum cans fiber the compressive strength increase but some time affect negatively.

3: With the utilization of soft drink aluminum cans fiber the split tensile strength increase up to 40%.

4: Also with the utilization of soft drink aluminum cans fiber the flexural strength increase significantly.

5: Soft drink aluminum cans fiber decrease the workability of concrete.

6: By using soft drink cans fiber the crack and voids become decrease.

7: Replacement of cement with fly ash it decrease the amount of cement, cement has more CO_2 that is so harmful to the environment, for this reason, we replace it 35% with fly ash. And also it reduce the cost.

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