WASTE AND RECYCLED MATERIAL IN CONCRETE TECHNOLOGY

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ABSTRACT

India is an industrializing nation on the rise. Every day, the population grows, and this trend will continue. These two contribute significantly to the development of numerous types of solid waste, the majority of which is discarded in an indiscriminate manner. These actions have a harmful impact on the ecosystem and the health of several animals. Furthermore, many researchers have made attempts to guarantee that part of these wastes are recycled and used in the creation of different alternative materials as a way of sustainable technology in order to maintain the environment. Among numerous alternate building materials. They are also cost-effective and quite handy. This research looks at several recycled waste materials that may be used in buildings. Some recycled waste material or risers, fly ash, and concrete recycling, include their advantages and problems in India. Concrete use per person in the world exceeds 1000 kg. Demand is likely to rise in the future. Concrete is the most abundant man-made substance in terms of volume. Waste is also accumulating on a daily basis. These recycled materials have been acknowledged internationally owing to the unique qualities that make them acceptable for use in the building sector. These reuse also investigate the limitations associated with the adaption of these resources as alternative building materials. However, it is widely understood that the reuse of waste materials in the building sector has a low environmental effect and that their research would have a significant economic benefit.

1. Introduction

The supply of social infrastructures such as roads, buildings, and bridges is an important aspect of India's future growth that must be maintained. Sustainable development necessitates addressing daily needs without jeopardizing the country's future. Adequate safeguards should be put in place in this manner to assure the availability of materials for future growth. Waste products such as fly ash, risers, and destroyed concrete have been a hazard for the well-being of species in recent years. In several regions, these materials have been examined, and various studies have looked into employing them as an alternative. The pace of garbage creation is growing all across the globe. As a growing nation, India creates 62 million tonnes of trash every year, with the figure expected to rise to 165 million tonnes by 2030. Solid waste is classified into industrial, agricultural, and home waste. The majority of these waste items, such as fly ash, rises, and destroyed concrete, are quite valuable and recyclable. Materials produced via different techniques of changing discarded materials into new ones are referred to as recycled materials. Today, recycled materials are accessible for highway buildings all around the globe. Most of these materials are easily accessible in the form of trash and were in use at the time. Underutilized resources, of which zero to seventy percent are recyclable. Some of them, which are biodegradable, include compounds that are detrimental to the environment, whereas the vast majority are not. This has become a serious worry for everyone, and it is in line with the second trend of identifying possible resources from created solid waste. Some researchers devised methods for recycling these materials, which are widely accessible and suitable for highway building. This idea was considered in light of the fact that most roads, particularly in India, are in poor condition and the cost of standard building materials is too expensive. Aside from the high expense, widespread usage of recycled materials has become a possibility. Building utilizing both new and recycled materials is a sustainable technique. Concrete, formed from Portland cement, water, admixtures, and aggregates, is the most abundant of all man-made materials. Historically, if new compounds were developed or waste material was gathered in industries, they were used as a component of concrete. Examples include fly ash rises and destroyed concrete, among others. The universal desire to save resources and the environment will place a strong focus on the use of waste materials and byproducts. They have several remarkable technical qualities that make them acceptable for use in pavement construction, and their use will encourage waste reduction, a cleaner environment, cost reduction, and construction work, as well as as alternative construction materials

2. Literature Review

2.1 Fly-ash

2.1.1 Introduction

The use of fly ash in Portland cement concrete (PCC) and the pavement has several advantages and enhances concrete performance in both the fresh and hardened states. The addition of fly ash to concrete increases the workability of flexible concrete as well as the strength and durability of hardened concrete. The usage of fly ash is also cost-efficient. The quantity of Portland cement used in concrete may be lowered when fly ash is added.

2.1.2 Challenges of fly ash in India-

Though fly ash breach incidents have become more common in recent years, the deadline for legacy ash utilization is being considered for an extension by another ten years in the government's latest draught notification, yet another fly ash breach incident was reported from the Chhattisgarh district of Korba. The breach happened at the NTPC Korba Power Plant and the ACB India Power Plant, causing outrage among those living nearby. NTPC Korba is a decommissioned plant with a capacity of 2,600 megawatts (MW). Its five units were put into service between 1983 and 1989. Despite being an elderly plant, it has a plant load factor of more than 95%. The facility, which is almost at full capacity, generates massive volumes of ash but is unable to adequately use it. Its average ash usage over the last decade has stayed at 40%, resulting in a massive build-up in its ash ponds. Several major ash dyke breaches have been reported in the last two years from the North Chennai Power Station in Tamil Nadu, the Sasan power plant, NTPC Vindhyachal and Essar Power Plant in Madhya Pradesh, NTPC Talcher in Odisha, the Bokaro Power Plant in Jharkhand, and the Khaparkheda and Koradi Power Plants in Maharashtra. In a few instances, a sudden ash deluge of surrounding villages has resulted in the loss of life. These accidents occurred despite the fact that several power plants have reported increased fly ash use percentages to the Central Electricity Authority in recent years. With such instances on the increase, the ground reality of ash management looks to be very different and bleak. A significant let-down. Despite similar events, the Union Ministry of Environment, Forests, and Climate Change issued a fresh draught fly ash notice this year, pushing the date even further. The notion of a 3–5-year compliance cycle is introduced in this draught notice in order to accomplish the aim of 100% fly ash usage by the conclusion of the cycle.

Worryingly, the draught notice also grants power stations a 10-year extension to gradually use their legacy ash. Giving extra ten years for legacy ash and just extending the deadline would only make matters worse. The legacy ash issue arose only as a result of numerous facilities failing to comply with earlier notices year after year and failing to handle their ash. Even in terms of fulfilling the 2015 emission standards, the industry failed poorly. Instead of taking harsh action against non-compliant facilities in the past, the deadline to fulfill emission regulations has simply been extended every time. Extending deadlines year after year sets a bad precedent. Plants will continue to pollute and will refuse to comply with the legislation

2.1.3 Benefits Of Fly Ash

In general, fly ash helps new concrete by lowering the amount of water required for mixing and enhancing the paste flow behavior. The following are the advantages a result:

Improved workability- spherical-shaped fly ash particles serve as small ball bearings inside the concrete mix, giving lubrication. This similar impact enhances concrete pumpability by lowering frictional losses during the pumping process and improving flatwork finish ability. Reduced water consumption- The use of fly ash for cement decreases the water requirement for a given slump. Water consumption is decreased by around 10% when fly ash is added at roughly 20% of the total cementitious. Higher fly ash levels result in greater water savings. Drying shrinkage/cracking is unaffected by decreasing water demand. In certain cases, fly ash has been shown to minimize drying shrinkage.

Reduced heat of hydration By replacing cement with the same quantity of fly ash, the heat of hydration of concrete may be reduced. This decrease in hydration heat does not jeopardize long-term strength improvement or durability. Heat rise concerns in bulk concrete installations are lessened due to the lower heat of hydration.

The interaction of fly ash with accessible lime and alkali in concrete produces extra cementitious compounds, which is one of the key advantages of hardened concrete. The pozzolanic interaction of fly ash with lime to create extra calcium silicate hydrate (C-S-H) binder is shown by the following equations:

(hydration)

Cement Reaction: C3S +H C-S-H + CaOH Pozzolanic Reaction: CaOH + S C-S-H Pozzolanic Reaction: CaOH + S C-S-H

silica derived from ash component

Improved durability- The reduction in free lime and the accompanying rise in cementitious compounds, together with the reduction in permeability, improves the durability of concrete. This has various advantages: Resistance to ASR has improved. Fly ash interacts with accessible alkali in concrete, making it less available to react with particular silica minerals in aggregates. Resistance to sulphate assault has been improved. Three events are induced by fly ash that increase sulphate resistance: Because fly ash eats free lime, it is no longer accessible to react with sulfate. The decreased permeability prevents sulfate from penetrating the concrete. The availability of reactive aluminates is reduced when cement is replaced. Corrosion resistance has been improved.

Workability- Fly ash is utilized in PCC to reduce costs and increase performance. Fly ash is often utilized to replace 15% to 30% of the Portland cement, with even higher percentages used for mass concrete pours. For the cement removed, an equal or larger weight of fly ash is supplied. Fly ash to Portland cement substitution ratios are commonly 1:1 to 1.5:1. A mix design should be tested with different ratios of fly ash. For each condition, time versus strength curves may be plotted. To satisfy specification criteria, curves for different replacement ratios are created, and the best replacement % ratio is chosen. Using the given building materials, a mix design should be created. It is advised that the performance of the fly ash concrete being evaluated contains local components.

2.2 Rice Husk

2.2.1 Introduction

As an alternative to cement, rice husk ash is utilised in concrete building. The notion of employing rice husk arose as a result of the growing incidence of environmental degradation and the consideration of the sustainability element. Around the globe, about 100 million tonnes of rice paddy manufacturing by-products are obtained. They have a low bulk density ranging from 90 to 150kg/m3. This leads in a higher dry volume value.

2.2.2 Challenges by Rice Husk-

EVERY YEAR, at the start of the winter season, Delhi and the surrounding regions suffer an air pollution issue caused by the burning of rice stubble and straw in Delhi, Haryana, Punjab, and the National Capital Region. The impoverished farmers, who are responsible for these states' development, are blamed for pollution by governments and courts.

The issue has existed for a long time, however the severity of the pollution was lower. When winter arrives, the northern region's atmosphere becomes frigid and thick. The chilly air above stops the smoke from rising. As a consequence, it lingers in the atmosphere until it is blown away by the wind. The issue has become worse in recent years as the amount of rice grown in these states has risen. Farmers burn the root stubbles and straw on the spot since there is no financial incentive to gather and dispose of it. Because cattle do not ingest rice straw, there is little market for it in the northern area. The collection of these byproducts is costly, and farmers are unwilling to invest time and money in it. There is also a limited amount of time remaining after the rice harvest to prepare the ground for wheat planting. As a result, the farmer has discovered that burning it in place is the best option. Although all states in India produce rice, the land is not often utilized for producing a subsequent crop immediately, which is peculiar to the northern area. As a consequence, the field leftovers, or stubbles, degrade before the following planting season. Furthermore, unlike the cattle in Haryana and Punjab, cattle and other ruminant animals in the rest of the nation consume rice straw. Cow-dung cakes prepared during the summer months are used as fuel by inhabitants in the northern region. When these cakes are burned, they emit a thick smoke that contributes to the issue of air pollution. Pollution from automobiles and power plants exacerbates Delhi's and the neighboring regions' pollution problems. The issue will not be remedied simply by making the burning of rice straws illegal. So yet, governments have done little to alleviate the situation. Almost 80% of irrigated land in these three states now follows a rice-wheat cycle, and the area has continually expanded. As a consequence, the amount of rice residue has grown. Rice yields an equal quantity of grain, straw, and stubble. These two states alone generate over 15 million tonnes of paddy, as well as an equivalent quantity of straw and root stubble. It's not as if there aren't any answers to the situation. Farmers, both large and small, are unwilling to invest money on trash collection and disposal. They believe that burning in place is the best answer. Harvesting is now mechanical, and the machines leave a significant amount of the straw uncut. Stubble is a tough substance that doesn't breakdown quickly. Straw is not eaten by cattle in Punjab and Haryana, and the large material is difficult to transport. The crisis spurred creativity, and distilleries started utilising rice husk as a fuel, resulting in a remunerative price for rice mills for a previously problematic byproduct. This removed the mountains of rice husk that had accumulated surrounding the mills. Initially, rice mills gave it out for free, but as demand grew, they started charging for the husk. Today, owing to innovation in boiler systems, the rice husk issue has been significantly decreased, as has the smoke output during combustion. Why single out the farmers? Instead, with a little technology and money, this issue can be solved. Putting the burden of proof on the farmers and penalizing them is unjust. If further technology is needed to build on what has been proposed, all of the northern states have strong agricultural, veterinary, and engineering colleges. These organizations should be enlisted to help fix the situation.

2.2.3 Benefits of rice husk-

When used as a partial replacement for cement, rice husk ash has high reactivity. These are prevalent in places with considerable rice cultivation. The appropriately prepared rice husk ashes were discovered to be active inside the cement mix. As a result, the utilization and practical use of rice husk ash for concrete making are critical.

Properties of concrete with rice husk-

When rice husk ash is mixed with concrete, it becomes an environmentally acceptable additional cementitious ingredient.

The following properties of the concrete are altered with the addition of rice husk:

When rice husk ash is mixed with concrete, it becomes an environmentally acceptable additional cementitious ingredient.

The inclusion of rice husk changes the following qualities of the concrete:

The hydration heat is minimized. This aids in drying shrinkage and increases the durability of the concrete mix.

The permeability of a concrete building is reduced. This will aid in the penetration of chloride ions, preventing the concrete structure from disintegrating. Resistance to chloride and sulfate assault has increased significantly. More hydration products are produced when the rice husk ashes in the concrete react with the calcium hydroxide. The intake of calcium hydroxide reduces the reactivity of chemicals in the environment.

2.2.4 Application of rice husk ash

Rice husk ash is a green supplemental material with uses ranging from small to big. It is suitable for waterproofing. It is also used as an additive in concrete to make it resistant to chemical penetration. The following are the primary uses of rice husk ash in construction:

High-performance

Concrete

Insulator

Concrete that is eco-friendly

Floors in bathrooms

Factory floors in industrial settings

The foundation is being concreted.

Pools for swimming

Waterproofing and restoration

2.3 RECYCLED/DEMOLISHED CONCRETE-

2.3.1 INTRODUCTION-

Many construction projects begin with the destruction of concrete foundations, sidewalks, driveways, and other concrete buildings, which may leave a contractor dealing with a large number of heavy, thick debris. Concrete, fortunately, can be recycled and reused in a variety of ways. Typically (but not always), the procedure involves crushing or pulverizing concrete debris near the demolition or construction site. The optimal procedure is frequently determined by the size and form of the concrete chunks to be recycled.

Reusing concrete may help you save money on construction while also helping the environment. Recycled concrete not only keeps waste out of landfills, but it also substitutes resources like gravel that would otherwise have to be mined and transported for use.

CHALLENGES –

India recycles just one percent of its construction and demolition (C&D) waste, a new report released by the Delhi-based non-profit, Centre for Science and Environment (CSE) on August 25, 2020, has shown.

The country generates an estimated 150 million tonnes of C&D waste every year, according to the Building Material Promotion Council. But the official recycling capacity is a meager 6,500 tonnes per day — just about one percent. What's more, unofficial estimates of the total waste generated in the country put the figure at three-five times more than the official estimate.

Even the Swachh Bharat Mission has recognized the need for C&D waste management. Ranking points for C&D waste management for Swachh Survekshan 2021 have been doubled to 100 points, divided equally between management infrastructure and waste processing efficiency. Cities will need to have a C&D waste collection system in place; notified charges for C&D services and segregation of waste in five streams.

Under waste processing efficiency criteria, ranking points will be awarded based on the percentage of collected waste that is processed and reused.

2.3.2 Benefits of concrete recycling –

Recycling concrete reduces building waste, extends the life of landfills, and saves builders money on disposal or tipping costs. It also saves money on shipping since concrete can typically be recycled near the demolition or building site. If a builder is pursuing LEED Green Building certification, using recycled concrete can earn them points. In certain cases, new job possibilities emerge as a result of a recycling activity that would not have existed otherwise.

2.3.3 How Concrete Is Recycled-

Industrial crushing equipment with jaws and massive impactors is used to recycle concrete. After the concrete has been broken up, it is frequently sent through a secondary impactor before being screened to remove dirt and particles and separate the big and small aggregate. To separate certain materials from crushed concrete, additional procedures and equipment such as water flotation, separators, and magnets may be utilised. Pulverizing the concrete is an alternate approach, but it is not always the ideal solution since it makes the separation process more difficult and may leave more pollution from smaller by-products

2.3.4 Uses for Old Concrete-

Many of the same applications as new materials, such as gravel, paving materials, and aggregates, may be made from recycled concrete.

•Permeable pavement for sidewalks, driveways, and other outdoor hard surfaces: Carefully set broken concrete forms a solid, porous traffic surface through which rainwater may flow. This strategy decreases the quantity of runoff water that must be handled by storm sewer systems while also aiding in groundwater replenishment.

•Rubblization is a technique that creates a foundation for fresh asphalt pavement. Old concrete pavement may be broken up and reused as a foundation layer for asphalt pavement.

•Bed foundation material for trenches containing underground utility lines: To aid drainage, utility trenches are oven covered with gravel, and crushed concrete is a good, low-cost substitute for gravel.

•Aggregate for new concrete mixing: Crushed concrete can substitute for some of the virgin (new) aggregate used in ready-mix concrete.

•Controlling streambank erosion: bigger chunks of crushed concrete put along susceptible stream banks or gullies may aid in erosion management.

•Landscaping mulch: When properly crushed and sorted, ground concrete may be utilised as a ground cover or mulch in lieu of river rock or other gravels broken in place and used as a base layer for asphalt pavement laid over it.

•Fill for wire gabions: Crushed gravel filled wire cages (gabions) may be used to create ornamental and useful privacy screen walls or retaining walls.

•Material for constructing new marine reef habitats: big slabs of concrete properly placed offshore may serve as the foundation for coral to construct new reefs.

SN.	Model Type	Seismic Zone	Displacement
1	Model-A	4	10.044 mm
2	Model-B	4	11.335 mm
3	Model-C	4	10.248 mm
4	Model-D	4	11.364 mm
5	Model-E	4	12.16 mm
6	Model-F	4	10.99 mm
7	Model-G	4	11.29mm
8	Model-H	4	13.20mm
9	Model-I	4	9.2mm

3. Methodology

Materials and methods

Materials

Cement

Portland cement CEM I–52.5 N is used in all mixtures. It has been tested in comparison with the ES 4756–1/2013. It presents the physical and chemical features of cementitious materials.

Aggregate

The fine aggregate which is clean and rounded is used in this experiment is natural siliceous sand with, bulk unit weight of 1680 kg $m^{-3,}$ a particular specific gravity of 2.67, and a fineness modulus of 2.85. The coarse aggregate was local squashed limestone (dolomite) with a specific gravity of 2.70, bulk unit weight of 1700 kg m^{-3} and it has a maximum nominal size of 13 mm, according to ES 1109/2008. The ratio of 1:2 is ideal between the fine and coarse aggregate.

RHA

It is formed by burning husk under a high temperature. The resultant ash was passed through a British Standard (BS) with a sieve size of 75 micrometers to remove large particles. The produced RHA has grey in color. Energy-dispersive X-ray (EDX) composition analysis and transmission electron microscopy (TEM) analyses were applied to the produced RHA. By EDX test it has been observed that ash contains 96.2% silicon dioxide (SiO_2) and 0.47% calcium oxide (CaO). By the results, it has been shown that EDX is a more reactive material compared to cement and FA. The chemical compositions of RHA in this test are the same as those of Alkali metal. 15 and 52 μm is a varies sizes of particles.

FA

It is produced industrially with coal-fired power stations byproducts; the FA utilized in the current test is fall underclass 'F' in accordance with the requirements of ASTM C618–19. The chemical composition of FA is determined via X-ray fluorescence.

Superplasticizer (high rang water-reducing admixtures)

A high-performance superplasticizer is used to increase the workability of the concrete mixture which is formed by the admixture of the aqueous solution of modified polycarboxylate basis (Viscocrete-5930). Viscocrete-5930 complies with ASTM C494/C494M-17, with a specific gravity of 1.11. To balance the reduced water the dosage should be approximately 3.2% and cementitious contents of 450 and 550 kg m3 increase the workability of the mixture.

Water

The ratio (w/c) was set to 0.58 for water-to-cementitious material mixtures with 350 $kg\,m^{-3}$ cementitious content. However, it is reduced to 0.25 to improve the compressive strength of concrete mixtures with cementitious contents of 450 and 550 $kg\,m^{-3}$.

•Mixture proportions

In this research, 21 mixes are created and classified into three groups. Each group has seven different combinations. There are three cement contents: 350, 450, and 550 kg m3 for groups one, two, and three. The mixes in each group were categorised as follows: control mixture, three mixtures containing 10, 20, and 30% RHA, and three mixtures containing 10%, 20%, and 30% FA. The fine aggregates-to-coarse aggregates ratio was kept constant at 1:2. The mixes were created using 0.55 w/c and 350 kg m3 of cementitious ingredients. To increase the compressive strength of the concrete, the w/c was lowered to 0.25 for groups two and three. To compensate for the lower water content, superplasticizer was added to the concrete with 3% cementitious content in groups two and three.

The following are the experimental mixing steps: For the first minute, the fine and coarse particles were mixed together. The cementitious components were then added, and the mixture was agitated for 3 minutes. In relation to the superplasticizer addition, water was added to the mixture during the mixing phase. Following that, the mixing procedure was extended for 3 minutes.

•Test procedure

Slump values (ASTM C143/C143M-15a) and air content values (ASTM C231/C231M-17a) were used to assess the consistency of new concretes. Concrete compressive strength was measured on cube-shaped specimens (150 mm) at 3, 7, 28, 60, and 90 d (BS 1881–116). The splitting tensile test was performed on cylinder samples (150 300 mm) at 28 days (ASTM C496/C496M-17). The flexural strength test (ASTM C78/C78M-18) was done after 28 days. The flexural strength test was performed on prism specimens (100 100 500 mm). The average values of the three specimens were recorded for each testing age and all strengths. To test the modulus of elasticity at 28 days (ASTM C469/C469M-14), cylinder forms (150 300 mm) were manufactured. Pulling steel bar from cylinder samples was used to test the bond strength. To evaluate the depth of water penetration in concrete, permeability was tested at 28 days on specimens with a diameter of 150 mm and a length of 150 mm.

Saturated Water Absorption and Porosity

The water absorption and porosity values for various mixtures of concrete were determined on 100 mm ×100 mm ×100 mm size cubes as per ASTM C 642. The specimens were taken out of the curing tank at 60 days to record the water-saturated weight (Ws). The drying was carried out in an oven at a temperature of 105oc. The drying process was continued until the difference between two successive measures becomes small. Oven-dried specimens were weighed after they were cooled to room temperature (Wd).

Using these weights, Saturated Water Absorption (SWA) was calculated by the equation:

SWA = [(Ws – Wd)/Wd] ×100 (1) where,

Ws: Weight of specimen in the fully saturated condition

Wd: Weight of oven-dried specimen

The porosity obtained from the absorption test is designated as effective porosity.

It is determined by using the following formula, Effective porosity=(Volume of voids)/(Bulk volume of the specimen)

The volume of voids was obtained from the volume of water absorbed by an oven-dry specimen or the volume of water lost on oven drying of a water-saturated specimen at 105oC to constant mass. The volume of the specimen is given by the difference in mass of the specimen in air and its mass under submerged condition in water.

4. RESULTS AND DISCUSSION

FLY ASH

For testing fly ash compressive we cast concrete cubes of size 150 150 150 mm and prism size of 100 100 500mm with minimal water. We replace fly ash with cement 30% 40% 50% for M20 M25 and M30 grades of concrete. For the study the durability of fly ash replaced concrete. A replacement of fly ash 30% to 40%50% was chosen for this study to find the effect of fly ash on compressive strength and flexural strength of concrete.

RICE HUSK

We conduct a compressive strength test on rice husk ash. we take 150 150 150 cube specimens for each grade of concrete and tested them under compressive load at various ages. we test all the specimens after wiping out the surface moisture. For each mix combination, we use different tests for different ages i.e 7,14,28,56 days with the help of a compression testing machine. The compressive strength was calculated as per IS-516.

Sl. No.	Mix ID.	RHA Content (%)	SP content by Weight of Binder (%)	Saturated Water Absorption @ 60 Days (%)	
				without SP	with SP
1.	BC	0	0.40	1.62	1.40
2.	BR1	5	0.40	1.68	1.34
3.	BR2	10	0.80	1.74	1.20
4.	BR3	15	1.40	1.88	1.56
5.	BR4	20	2.80	2.15	1.98

•compressive strength

It varies with respect to the percentage of replacement of RHA and no. Of days of curing. we observe that for both M30 and M60 grades of concrete there is a reduction in compressive strength at early ages with increasing RHA content in the mix proportions of concrete. The required strength could not be achieved after 90 days for 15% and 20% of replacement of cement by RHA. But with the addition of SNF-based plasticizers, the compressive strength of M30 concrete improves 5% to 10% cement replacement by RHA.

Sl. No.	Mix ID.	RHA Content (%)	SP Content by Weight of Binder (%)	Saturated Water Absorption @ 60 Days (%)	
				without SP	with SP
1.	CC	0	1.80	1.18	1.38
2.	CR1	5	2.00	1.50	1.32
3.	CR2	10	3.20	1.61	1.29
4.	CR3	15	4.50	1.74	1.32
5.	CR4	20	5.80	1.92	1.78

5.CONCLUSION

FLY ASH.

The use of fly ash reduces environmental pollution. It has a high percentage of unutilized concrete by use of this material many problems can be handled and it is also very economical.

RICE HUSK

Rice Husk is an organic and fibrous material. It absorbs more water and after the addition of plasticizer, it improves the workability property of concrete. Compressive strength increased by 6% and 10% of replacement of rice husk are 4% and 5% at 28 days respectively for M10 grade concrete. We know that how harmful is rice husk solid waste for country so, it is good we can use rice husk ash in construction and also can improve the strength of structure.

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