International Journal of Computer
Science and Engineering (IJCSE)
ISSN (P): 2278–9960; ISSN (E): 2278–9979
Vol. 13, Issue 1, Jan–Jun 2024; 21–26

International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

AN REVIEW ANALYSIS OF M-30 GRADE CONCRETE MADE FROM LIMESTONE AND FLY ASH

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ABSTRACT

Since the dawn of time, sand, cement and rocky iron have been continuously combined in order to form concrete. This process has led to the creation of concrete. Ever from the beginning of time, this process has been going on. The overuse of these not only decreases the amount of natural resources that are available, but it also has a substantial impact on the composition of the environment in terms of the resources that are available. This is because the overuse of these impacts the composition of the atmosphere. In addition, during the processing of stacked slabs by quarries, a significant amount of wastage of stone material is tossed down the besides of roadways. This is done in order to prevent accidents. The habitations that are situated in the surrounding area are subjected to a large quantity of annoyance and an unhealthy atmosphere as a consequence of this. Due to the fact that fly ash is not employed in the production of concrete, large quantities of the material are discarded close to steel mills. Furthermore, despite the fact that fly ash possesses remarkable cementitious characteristics, this is the case. Each of these examinations is carried out at predetermined intervals. The assessment of the consistency of all of the components that are utilized in the creation of concrete is finished or finished, and then the execution of these tests takes place after the evaluation has been finished or completed. Compressive strength testing was performed on the cast after it had been cast and allowed to cure for a period of twenty-eight days initially. There were twenty distinct mix combinations, and nineteen of them had compressive strengths that were marginally lower than the M1 basic mix. However, each and every one of the other mix combinations possessed compressive strengths that were more than the needed value for the characteristic strength of M-30 grade concrete. This was the case for each and every one of the mix combinations.

KEYWORDS: *Fly Ash*

Article History

Received: *20 Jun 2024* | ***Revised:*** *20 Jun 2024* | ***Accepted:*** *21 Jun 2024*

INTRODUCTION

In terms of the commodity that is utilized for commercial purposes all over the world, concrete has surpassed water as the commodity that is utilized the most frequently. Since the present state of the environment and the generations that will come after us have been taken into consideration, alternative materials for the manufacture of concrete have been identified. This is owing to the fact that the current state of the environment has been taken into consideration. Hard granite and river sand are rapidly being depleted as a result of the abundance of concrete that is being used without pay. This is a

result of the recent events that have taken place. The construction industry, on the other hand, makes extensive use of concrete, which is only one of the components that is utilized the most frequently. The design of buildings and other structures that are the outcome of structural engineering is significantly impacted by cement, which is a vital component of concrete and plays a significant role in architectural design. The construction of structures makes use of concrete, which is utilized in the creation of structures. Improvements in concrete building have the potential to be of benefit to the entire globe by lowering the number of pollutants that are produced, as well as the amount of renewable resources and power supplies that are employed. This may be a win-win situation for everyone.

Fly ash is a byproduct of the combustion of fossil fuels. Additionally, the use of fly ash in cement in the appropriate quantities results in an increase in workability, a reduction in permeability in concrete, a reduction in bleeding, an improvement in surface finishing, and a reduction in the hydration heat level. All of these benefits are brought about by the utilization of fly ash. The usage of fly ash was the means by which all of these advantages were accomplished. Research is now being conducted on stone that is regarded as being of questionable quality. Garbage stone is easily accessible and can be acquired at starting prices that are not prohibitively expensive. In light of the facts that were presented before, this is the situation that has arisen. Consequently, this will result in concrete that is more sustainable and less harmful to the environment.

INDIA'S LIME STONE AVAILABILITY

There are a number of states in India that have been discovered to contain rock resources that are suitable for commercial use. According to the estimates that have been taken into consideration, the quantity of lime stone that is currently available in India is anticipated to be somewhere in the region of 93534 million tons. In the southern part of India, this material can be found in a variety of colors. These are only few of the colors that can be found in this material. The region in question is where the vast bulk of it may be located. A wide range of the criteria that are linked with architectural architecture standards that pertain to the elevations of structures are satisfied by these. There are many different criteria when it comes to architectural architecture.

Table 1: Characteristics of the Lime Stone in Quantity

S. No.	Properties	Value
1	Lime Stone	Soft Rock
2	Density	From 2.45 To 2.66 Kg/Cm3
3	Water Absorption	Less Than 1%
4	Hardness Range	On Mohr's Scale (3 To 4)
5	Compressive Strength	Between 1800-2100 Kg/Sq.Cm

LITERATURE REVIEW

Taking into consideration the fact that natural sand is in short supply, **Rajput Sarvesh PS (2018)** made the observation that it is necessary to make use of alternative resources in order to fulfill the need for natural sand. The use of crushed stone dust as an possibility fine aggregate replacement for natural sand, which is often utilized in cement concrete, is now being researched as a potential alternative. The investigation on this topic is now being carried out. Crushed stone dust is a material that is helpful to the region in India that is produced by industrial solid waste. This was done in compliance with the norms that were established by the Indian norms. Various amounts of crushed stone dust were used in place of conventional sand in the construction process. Each and every one of these tests was carried out in every and every instance proportion. According to the findings of the study, the strength qualities of cement concrete that is created using

crushed rock sand are superior to those of regular concrete. This is the conclusion that can be drawn from the findings. The findings of the study indicate that crushed stone dust has the potential to be exploited as a replacement to organic sand in concrete with cement building projects. This is because it is a solid waste that is readily available. According to the results of the research, this is the conclusion that can be derived from the findings. This is the conclusion that can be drawn from the findings of the study. In addition to helping to the successful resolution of environmental concerns, this would also result in a reduction in the prices of both construction supplies and construction itself.

According to the experiment that was carried out by **Ilangovana, R. (2008**) and his colleagues As a result of the high cost of transportation from natural sources, the price of ordinary river sand is significantly more than it should be. A great number of environmental issues are frequently brought about as a result of the widespread depletion of natural resources. Because of environmental, transportation, and other limits, river sand is becoming less available and desirable. As a result, the concrete industry requires a substitute or alternative product in order to meet the demands of the industry. River sand, which is the fine aggregate that is utilized the most frequently in the manufacture of concrete, is in short supply in a number of different regions at the moment. In terms of supply, expense, and the effects it has on the environment, whose continuous usage is beginning to bring grave challenges that are becoming increasingly difficult to deal with. Quarry rock dust is produced when rocks are harvested and ground into particles. In addition to its usage as a filler for roadway surfaces, quarry rock dust is frequently utilized in the building of hollow blocks and lightweight concrete prefabricated components. This is in addition to its potential application as a filler. Those who are engaged in the process of conducting research and studies are paying particular attention to the fact that quarry rock dust is utilized in concrete as a fine aggregate.

Within the scope of this study, the concept of using is studied. When it comes to the creation of concrete, rock dust from quarries might be utilized as an alternative to natural sand on occasion. Both the Indian Standard and the British method have been utilized in the development of a mix design that has been established for three different classes of quarry dust concrete and traditional concrete. Both types of concrete have been built into this design from the ground up. The results of the evaluation of the strength of concrete made from Quarry Rock Dust were compared to the findings of the evaluation of the strength of concrete created from natural sand. For the purpose of the evaluation, cubes and beams were utilized. Furthermore, an attempt was made to determine the level of hardness that Quarry Rock Dust and Natural Sand concrete possessed with regard to their respective properties. Quarry Rock Dust concrete was shown to have compressive, flexural, and durability attributes that were approximately ten percent higher than those of normal concrete. This was established through research.

According to the findings of the investigation that was carried out by **Rashad, Alaa M. (2013)**, the objective of this experiment is to ascertain whether or not it is feasible to utilize metakaolin as an alternative to fine aggregate in concrete. The percentages of weight that were utilized for the purpose of partially replacing sand with MK were as follows: 10%, 20%, 30%, 40%, and 50%. After much deliberation, it was determined to build a comparison combination that would have a compressive strength of thirty megapascals as its defining property. Abrasion testing was performed on the specimens in order to check whether or not they met the standards of the Egyptian Standard. All of the tests, including the abrasion tests, the compressive power tests, the breaking tensile strength tests, and the unit weight density tests, lasted for a period of time that may reach up to 500 days. In order to ascertain the various stages of breakdown that took place, the technique of X-ray diffraction (XRD) was applied as a method of investigation. This was accomplished by increasing the quantity of MK in the concrete mix. Nevertheless, when the percentage of MK replacement reached fifty percent, there

was a drop in the proportion of MK replacement. The abrasion resistance of concrete improved by approximately 24.12, 37.18, and 45.24 %, respectively, after 28 days, 56 days, and 400 days, when compared to a reference mixture with a 40% replacement. This improvement occurred, respectively, after 28 days, 56 days, and 400 days. This increase took place after the concrete had been at room temperature for a total of five hundred days.

METHODOLOGY

The results of this experiment indicate that waste stone was utilized for the purpose of evaluating the compressive and split tensile strengths of concrete. However, the results of this experiment are not conclusive. For the purpose of determining the strengths of concrete, this work was carried out. For the purpose of achieving this objective, natural aggregate was substituted with a percentage of 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent, and fly ash was substituted with a percentage of 0 percent, 10 percent, 20 percent, and 30 percent in cement. Both of these substitutions were made in order to achieve the desired outcome. Casting the material into cubes and cylinders was required in order to achieve the required levels of strength in the material. This was in order to meet the requirements.

- When it comes to the casting process, cubes and cylinders are both components that are utilized.
- A study to determine whether or not the drop is a plausible possibility after conducting the examination
- Compressive strength of cubes, as well as the performance of cylinders in split tensile strength tests and their overall performance, must be determined. It is also required to evaluate the overall performance of cylinders.

CONCLUSIONS

- A test conducted in a laboratory revealed that waste stone has the ability to absorb 0.15 percent of water, which is 0.10 percent higher than the capacity of natural granite aggregate to do so. The findings of the test were presented in the form of a percentage. Naturally occurring granite, on the other hand, is only capable of soaking up 0.05 percent of the water that is available in the surrounding environment.
- The workability of the mix of concrete is reduced as a result of this, and the value of slump is also reduced as a consequential consequence. At the same time, the amount of wasted stone in the mix for concrete grows for the same reason when it comes to the concrete mix. There exists a connection between these two aspects of the situation.
- The compressive and break tensile strength of the concrete mix decreases as the number of alternative components in the mix grows. This is because the mix contains more alternative components. Noting that this occurrence does take place is an essential point to make. The fact that the mixture contains a bigger number of possibilities is the cause of this to take place.

FURTHER SCOPE OF RESEARCH

- It has been determined that the flexure and shear strength tests are suitable for the conditions that have been presented.
- During the course of the item's existence, the durability of the item can be checked at any moment.

- In order to accomplish the same overarching objective, it is possible to make use of additional materials such as silica fume, rice husk ash, and other compounds that are analogous to these.
- In addition to being able to be utilized for the establishment of geo polymer concrete, this NWS aggregate concrete can also be utilized for the purpose of carrying out tests for the purpose of determining its strength and stability.
- The gathering of these aggregates has the potential to serve as a foundation for the execution of studies that include temperature.

REFERENCES

1. *Ilangovana, R., N. Mahendrana, and K. Nagamanib. "Strength and durability properties of concrete containing quarry rock dust as fine aggregate." ARPN Journal of Engineering and Applied Sciences 3.5 (2008): 20-26.*
2. *Rashad, Alaa M. "A preliminary study on the effect of fine aggregate replacement with metakaolin on strength and abrasion resistance of concrete." Construction and Building Materials 44 (2013): 487-495.*
3. *Rajput, Sarvesh PS. "An experimental study on crushed stone dust as fine aggregate in cement concrete." Materials Today: Proceedings 5.9 (2018): 17540-17547.*
4. *Elavenil, Dr S., and B. Vijaya. "Manufactured Sand, a Solution and an Alternative to River Sand in Concrete Manufacturing." International Journal of Civil Engineering Research and Development (IJCERD) 3.1 (2013).*
5. *Celik, Tahir, and Khaled Marar. "Effects of crushed stone dust on some properties of concrete." Cement and Concrete research 26.7 (1996): 1121-1130.*