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Brick Bat Mix with Concrete to Test Compressive Strength: A Review

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ABSTRACT: Concrete is being used at a greater rate in today's society as a result of the ever-increasing development of needs for foundations. This is done in order to keep up with the ever-increasing development of requirements. A significant scarcity of resources, including sand and coarse aggregate, has emerged as a direct consequence of the widespread use of concrete in the building and construction sector. Because of this, the sector is facing a severe lack of resources. In addition, the crumbling of concrete may be the consequence of a number of different circumstances, including as natural catastrophes, control outages, gas leaks, and other features of the environment. These variables can all contribute to the occurrence of fire accidents. These many aspects may also play a role in the progression of a fire. An organised review of the published material revealed that specific research on the behaviour of reused brick total concrete at higher temperatures is practically non-existent, which raises questions about the appropriateness of the statement. The review was conducted to reveal that specific research on the behaviour of reused brick total concrete at higher temperatures is practically non-existent. As a direct result of this, the inquiry that is now being carried out has as its primary objective the comprehension of the behaviour of reused brick in complete concrete when it is exposed to high temperatures. At room temperature, research was carried out to determine whether or not it would be possible to reuse bricks in concrete as a component of the material. Bricks that had previously been used were subjected to a battery of tests to establish their physical and mechanical qualities. These tests included measuring the fineness modulus, the affect esteem, the smashing esteem, the water retention, the flakiness, and the stretching records. During the investigation of the project's viability, the results of these tests were taken into account. In order to make reused brick total (RBA) concrete, the rock total was substituted with 25, 50, 75, and 100 percent by weight of certified reused brick total. This was done so that the concrete could be manufactured. This brought about the outcome that was sought. At room temperature, the properties of new and solidified reused brick total concrete, such as droop, thickness, and compressive quality, were investigated in order to optimise the rate substitution of reused brick total in order to realise the required M15 and M20 review RBA concrete. This was done in order to optimise the rate substitution of reused brick total in order to realise the required M15 and M20 review RBA concrete. The exploratory work was encouraged to be expanded on these two grades of standard concrete that were delivered with reused brick total concrete by subjecting it to different temperatures ranging from 100 to 1000 degrees Celsius for a term of three hours at an interim temperature of 100 degrees Celsius. This was done in order to determine the effects of these temperatures on the total concrete. The compressive, part malleable, and flexural characteristics of the material were taken into account in order to develop the technique for RBAC to be carried out at high temperatures. This was done for the goal of establishing the procedure. This chapter gives a summary of the findings in order to emphasise the relative conduct of reused brick in comparison to whole concrete when it was heated to high temperatures.

KEYWORDS: Concrete, Brick bat mix, compressive strength

I. INTRODUCTION

The improvement in the quality of life has been seen as an indicator of any civilized country over millennium. This metric has always been linked to infrastructure and the presence of items that aid in the development of daily activities. Buildings in the magnificent past were made of bricks and stones, with clay or mud employed as a binding medium. Around 45 centuries ago, the Egyptians started preparing concrete for the pyramids. The limestone blocks were held together with mud and clay mortar. By the first century AD, the Romans had greatly refined the material and constructed numerous elaborate constructions such as Le-Pont du gard (Figure1.1) in Southern France and the Colosseum (Figure 1.2) in Rome. It was I.C. Johnson, in 1845 taken note that a sintered fabric produces prevalent cement. Since at that point, the advancement related to concrete that have taken put over the world have showed themselves within the diverse concrete advances utilized at development sites today. Today, Concrete is the foremost broadly expended substance on soil after water with the worldwide consumption of approximately 25 billion tons annually. Concrete, is a very popular material for architects and sculptors due to its ability to mould into any shape. It is

also equally popular for civil engineers due to the availability of its constituents, enhanced properties like strength and durability when used along with other material such as steel.

Concrete could be a heterogeneous fabric which comprises of cement, fine total (sand), coarse total (by and large called as rock) and water. Cement when react with water acts like a binder between the aggregates (i.e. gravel and sand). As the aggregates in concrete are naturally available and it occupies the maximum volume, its usage was very common even in small villages.



(Source: <http://www.lsd-mag.com/blog/faire-le-pont/>)

Figure 1.1: Le-Pont du gard in France constructed (with concrete) in first century AD



Figure 1.2: Colosseum in Rome constructed (with concrete) in first century AD

India devours around 450 million cubic meter of concrete yearly, which roughly interprets to 1 tone per Indian . The coarse total produced from common sources such as marine source is getting reduced due to different reasons such as over the top utilization, mechanical and mechanical advancement, disintegration, over the top mining etc. This requires the require of empowering utilize of interchange materials within the put of coarse aggregate. On the other hand, the squander items from devastation of buildings are getting expanded and being amassed at certain places which cause the natural and arrive fill issues. The main reasons for increase in construction and demolition waste may be as follows:-

- Demolition of the structures like concrete pavements, bridges, old buildings etc., due to their over age;
- Excess material left out during new construction;
- Renovation of the existing old structures;
- Debris resulting from manmade disasters like blast etc. and natural disasters like earth quakes etc.



A considerable research on reuse of development and annihilation squander has been carried out in different countries like honking, Denmark, China etc. But in India, a very limited research was carried out.

1.2 Point AND Goals OF RESEARCH

The destinations of this think about are as follows:

- 1 To consider the possibility of the utilize of reused brick as coarse total in concrete.
- 2 To arrive the ideal substitution of stone total with reused brick total to create the RBAC15 and RBAC20.
- 3 To compare the fire execution of RBAC with GAC by surveying the mechanical properties.

1.3 SCOPE OF WORK

The reused brick total was used to develop two standard grade recycled brick aggregate concretes i.e. RBAC15 and RBAC20 in the present research. The recycled brick aggregate was obtained from only one source. The most center of this think about was to evaluate the execution of reused brick total concrete beneath fire. The same innovation and the gear right now utilized to make stone total concrete were moreover utilized to form the reused brick total concrete. The properties of reused brick total such as particular gravity, bulk thickness, affect and pulverizing values, flakiness and prolongation files, water retention, molecule measure conveyance were examined to explore its appropriate utilize. The flexural strength and temperature gradient at high temperatures of RBAC15 and RBAC20 were compared with that of GAC15 and GAC20.

II. LITERATURE REVIEW

Concrete could be a fabric made up of cement, fine total, coarse total, and water. The quality and fire resistance of concrete are for the most part decided by coarse total, which is in brief supply due to a assortment of variables. Numerous considers on the substitution of coarse total with reused totals have been distributed. At tall temperatures, the mechanical properties of such reused total concrete are still being investigated. This chapter gives an in-depth examination of the utilize of reused total in concrete and its execution when subjected to tall temperatures.

Pondroti Shanmukha Naga Saikumar (2021) The purpose of this research is to create an environmentally friendly concrete by employing fine aggregate and overheated broken brick blocks as coarse aggregate in addition to palm oil fuel ash and Cupola slag powder as cement. Aggregates, cement, and water are combined to form concrete. The larger part totals are made actually from stream sand and gravel. Due to the prerequisite to create room for unused, cutting edge developments due to present day living benchmarks, conventional aggregate has been totally supplanted with eco-friendly materials. Press slag could be a modern byproduct of the steel industry. In essence it is made up of totals that are joined by concrete and water. Following crushing and converting into a fine powder, palm oil fuel debris—which is obtained by ingesting palm products of the soil leaves of palm oil trees in palm oil plants—is also used to reduce the warming effect of hydration on concrete. Overconsumed blocks that have been shattered into fragments are known as block bats. After seven days of restoration, these block bats are mixed with concrete slurry and used in whole in concrete. In order to get the best quality specific replacement rate, palm oil fuel debris is being added to concrete at various rates in this study (5, 10, 15, and 20 %). The Cupola Slag is used by incompletely substituting in fine total with different rates (5 %, 10 %, 15 %, and 20 %) to obtain the above optimal quality rate. Accordingly, Brickbat is replaced as the coarse total up to the ideal quality at various rates (5%, 10%, 15%, and 20%) from the above ideal quality. Compression, Flexural, and Part Ductile tests were utilized to concentrate the mechanical properties.

Akshay N Kadu and P.M Kulkarni (2020) Concrete is one of the foremost widely utilised development materials within the world and has been around for an awfully long time. Aside from water and cement, coarse total is the foremost pivotal component within the creation of concrete. The fetched of utilizing characteristic assets as a component of concrete is noteworthy and it may before long reach an extraordinary level. The cost of concrete and the sum of it depend on the sort of total utilized. The lion's share of the total used in concrete is coarse aggregate, which can be obtained either naturally or by mechanically crushing rocks into the desired size and shape. Concrete's drying shrinkage qualities are decreased and many other properties, including compressive strength, are improved by the



addition of aggregate. Due to the excessive transportation costs for coarse aggregate, the majority of the cost of building concrete rises in areas with a lack of sources and a shortage of coarse aggregate. Last but not least, it becomes challenging to build affordable homes and structures. Local sources can help to lower transportation costs, but due to geographic limitations, they are not always accessible. As a result, it is crucial to research other sources. These issues force us to recover natural resources or to find an alternative source from the local area to address the issue. Due to the availability of rivers and their deposits, river washed gravel is currently the most often utilised coarse total for the fabricate of concrete. Be that as it may, due to a few nearby government regions that are not served by the waterway, these are not always readily available. Even with relatively inexpensive labour, the additional cost of transporting gravel to regions outside the river's catchment for crushing tends to drive up building costs. This is necessary in order to employ the locally accessible coarse aggregates as an alternate material. Due to the large number of structures that are currently being demolished, one of these coarse aggregates is used to replace overburnt and demolished bricks. This material is readily available and was chosen since, during the brick-making process, many bricks are discarded because of non-conformity, which is the twisted form of brick created as a result of high temperatures close to or over 10,000 C in the kiln. This causes the brick to lose its shape, shrink, and turn reddish, giving it the appearance of a stone with a reddish to blackish gradient.

Rahul Sharma and Ram Bharosh (2018) Economical assets administration and advancement have been at the bleeding edge of the imperative issue concerning the development industry for the past a few a long time. Particularly, the utilize of feasible building materials and reuse squander materials is picking up significance and getting to be common put in numerous zones. As one of the foremost commonly used development materials within the world, concrete composed of normal total, characteristic sand, cement, and water, out of this crude fabric for concrete, cement can be made in businesses but characteristic totals are nonrenewable assets and draining at an disturbing rate, comes about in shortage of great quality natural happening totals (coarse and better one). Within the present consider the solidified properties like compressive quality, part pliable quality, conjointly toughness properties like CSAT and UPV test were carried out on Brick furnace clean concrete. The %age of bricks furnace tidy that somewhat and completely supplanted by fine totals by weights were 0%, 10%, 20%, 30%, 40% and 50%. Tests were conducted for both Standard Concrete and bricks furnace clean Concrete with diverse %ages of BKD. It is watched from the exploratory comes about and its examination, that the compressive quality of concrete, part pliable quality of concrete increments with the expansion of moo %age of bricks furnace tidy. The comes about appear that the ideal substitution of reused bricks furnace clean with fine totals was 30%. Up to 30% substitution, it is conceivable to pick up the same quality as ordinary concrete.

AkshayTakle and PriyanshuKawade (2016) The utilize of concrete is genuinely huge and day by day the taken a toll of the ordinary fabric fetched is additionally rising. So, it is useful to utilize the discretionary materials for making the concrete. The venture centers on coarse total in concrete. In this extend work, the ponder has been done on the substitution of coarse total with decimated brick total known as jhama brick. The discretionary source is jhama brick as a coarse total. Jhama brick created due to over burning. The brick has irregular shape and it is additionally utilized as coarse aggregate in a few places where the stone total isn't easily accessible or in case accessible its taken a toll is tall. It's incompletely or totally a substitution of the customary fabric. We supplanted the coarse total in proportions of 15%, 25% and 35% in M25 review of concrete. Tests are conducted on new and solidified cement concrete, for illustration, compressive quality test, part malleable tests and flexural test at 7 days and 28 days of curing period. The 25% substitution of jhama brick is considered as the finest since of quality and economy, subsequently we utilize it in sufficient stacked structures the result appears that the total that concrete inferred from jhama brick total accomplished lower quality than the standard concrete.

Nilesh K. Vasoya and Dr.Harishkumar. R. Varia (2015) Within the world development, one fabric is utilized over all is concrete. Concrete is distant more created all over the world than any other man made fabric. It is fantastically versa- tile, and is utilized in nearly all major development ventures. The sum and sort of squander materials expanding since of in- wrinkle in population. Many of the non-decaying materials stay display in environment for hundreds and thousands of a long time. This squander materials cause transfer emergencies and subsequently contri- buting to the natural problems. So the utilize of squander in concrete has been done for secure and conservative transfer of squander materials. The utilize of squander materials not as it were spares natu- ral assets and dumping spaces but too it keeps up a clean environment. Partial substitution of squander material in concrete is done to realize the want properties of concrete such as quality, solidness and workability. This paper gives thought approximately different squander materials utilized in concrete and their impacts on different properties of concrete.



N.S. Apebo1 and M.B. Iorwuab (2013) The inquire was conducted to ponder the plausibility of squander over bricks inexhaustibly accessible in the main part of Gwer-West Nearby Government Zone of Benue, especially Naka, the Nearby Government capital, as coarse totals in basic concrete. 3d shapes of concrete were arranged and tried to think about the compressive quality. The result appear that the concrete having brick bats as aggregates may be named as medium light weight concrete having a thickness between 2000-2200 kg/m³. To convey the same workability, the brick sums concrete requires more unmistakable degree of water than the conventional shake add up to concrete. Utilize of broken over burnt bricks as coarse add up to for fundamental concrete is recommended when common add up to isn't easily open, tall quality of concrete isn't required and the bearing capacity of the soil is moo.

Akbar nezhad et al. (2013) The impact of the quality of the parent concrete, measure of the normal totals utilized within The effects of the parent concrete, the number of pulverizing stages, and the totals on the qualities of coarse reused concrete. Three grades of parent concrete M30, M60 and M90 were passed through two stages of smashing to get the reused total. The creators found an increment in mortar substance with an increment in parent review concrete independent of the measure of reused total created and number of pulverizing stages. The creators concluded that the quality of reused total concrete was not influenced by the mortar substance.

Xiao.et al. (2013) To examined the remaining compressive and leftover flexural qualities of reused concrete with 0, 30, 50, 70 and 100% substitutions of reused coarse total subjected to raised temperatures. The blends were assigned as NC, RAC-30, RAC-50, RAC-70 and RAC-100. The 3d shape example were uncovered to temperatures of 200, 300, 400, 500, 600, 700 and 800°C to evaluate the compressive quality and the crystals were uncovered to temperatures of 200, 400, 600 and 800°C to survey its flexural quality for a period of 2 hours. The creators concluded that the compressive quality and flexural quality of reused total concrete (RAC) at lifted temperatures was superior compared to characteristic total concrete (NAC). No unstable spalling was watched happened at lifted temperatures in case of RAC.

III. CONCLUSIONS

Concrete is being utilized at a higher rate in today's society to keep up with the ever-increasing development of requirements for foundations. The increased use of concrete in the construction industry has resulted in a severe lack of resources such as sand and coarse total. This has created a critical shortage in the industry. In addition, fire mishaps can be caused by a variety of factors, including natural disasters, control blackouts, gas spills, and other aspects, which can result in the crumbling of concrete. These factors can also contribute to the spread of fire. An organized review of the published material revealed that specific research on the behavior of reused brick total concrete at higher temperatures is practically non-existent, which raises questions about the appropriateness of the statement. As a consequence of this, the investigation that is being carried out right now is aimed at better understanding the behavior of reused brick in total concrete when it is subjected to high temperatures. At room temperature, investigations were carried out into the possibility of reusing bricks in concrete as a component of the material. Reused bricks were put through a series of tests to determine their physical and mechanical properties, including fineness modulus, affect esteem, smashing esteem, water retention, flakiness, and stretching records. The results of these tests were taken into consideration during the feasibility study. In order to produce the reused brick total (RBA) concrete, the rock total was replaced with 25, 50, 75, and 100 percent by weight of approved reused brick total. This created the desired result. At room temperature, the properties of new and solidified reused brick total concrete, including droop, thickness, and compressive quality, were investigated in order to optimize the rate substitution of reused brick total in order to realize the required M15 and M20 review RBA concrete. The exploratory work was encouraged to be expanded on these two grades of standard concrete that were delivered with reused brick total concrete by exposing it to different temperatures ranging from 100 to 1000 degrees Celsius for a term of three hours at an interim temperature of 100 degrees Celsius. For the purpose of establishing the procedure for RBAC to be carried out at high temperatures, the compressive, part malleable, and flexural qualities of the material were taken into consideration. This chapter provides a summary of the results in order to highlight the relative conduct of reused brick compared to total concrete at high temperatures.

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