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GEARLESS POWER TRANSMISSION USING ELBOW MECHANISM

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***Abstract*—The gearless transmission mechanism transfers the output power to the output shaft by sliding links that form a rotating pair with the hub. Bending to the desired angle, the link slides into the opening of the hub. So when the input pinhole rotates; it pushes the link to turn the output hub. This mechanism can be used as an alternative to fits in low-cost, low-torque applications. You can transmit at any angle between 0 and 180 degrees. In this paper, we explore the mechanism, create a possible card accelerator, and suggest future applications.**

Keywords: 1st class brick, 1st class Brick, Concrete Brick, Lime Brick and Fly Ash Brick, etc.

I. INTRODUCTION

Brick flour is a luxury product made from bricks and waste materials. This waste will be stored and used as a landfill, Harm to the environment results from this. Many natural and waste materials have been exploited by researchers all around the world to address issues with the environment and the economy. These wastes are converted into substantial or almost equal amounts of concrete. The study estimates that there are more than 220,000 brick and tile homes between the two nations, with 80,000 homes in China alone. Pakistan contributes roughly 1.5% of the nation's GDP. Brick sand is the waste product of this brick mill. In addition to taking up space, it affects the environment and human health. Concrete is the most expensive and dense material and must be used. To reduce costs, researchers use different materials for production and unwanted materials. These materials include fumed silica, fly ash, marble dust, rock dust, etc. This study examines the effect of using brick dust in cement mortar. Each mix contains different cement, not brick dust which reflects its condition and performance, compressive strength and tensile strength. Separately and all at once, the dough is made by replacing brick dust with concrete. For brick flour and lime flour, the results showed better performance behavior than the control blend. Adding brick dust to concrete reduces its both strength like Compressive & tensile. Strengthening properties of lime powder itself. Additionally, we may express the strength of materials and lower the cost of materials by using cement and powder brick.

Brick Dust

Bricks are moved and removed, as well as at kilns and construction sites, producing brick dust in the process. Fill the bag with this powder by pouring it in. Annually, millions of free bricks are produced worldwide and downloaded in an unregulated manner. Concrete has long utilised pozzolan components, such as this brick powder and other ceramic powders. Brick dust was utilised based on experimentation and experience in the past because its qualities were not understood. Sand and various types of clay are used to make the bricks. The clay is made up of several carbonates and oxides, 50–60% silica, and 20–30% alumina. The brick's pozzolanic bearing is made of clay. Whereas the clay by itself doesn't appear to have pozzolanic qualities, when it is mixed with lime to make bricks, pozzolana is also produced.

Effects of Brick Dust on Environment

Pollution in the air

Chemicals present in the air are defined by the World Health Organization (WHO) describes as air pollution, physical impurities, or biological agents in the indoor or outdoor environment that alter the atmosphere's normal qualities. Numerous factors, such as domestic lighting systems, automobiles, factories, and forest fires, contribute to air pollution (WHO, 2013). The most significant air pollutants, this included lead, carbon monoxide, Sulphur oxides, nitrogen oxides, and ground-level ozone, according to the Environmental Protection Agency (EPA). These toxins may have an effect on both health and the environment. In South Asia, brick kilns are a significant source of air pollution. In Bangladesh, India, and Nepal, the number of brick kilns is expanding quickly, generating air pollution. More than 108,000 brick kilns are currently in use across all of these nations, making them the primary cause of urban air pollution.

Impact on Health

It is impossible to know how many people will die or get sick from air pollution around the world. Since people are exposed to so many various contaminants in varying levels throughout their lifespan. The World Health Organization asserts that air pollution causes three million deaths annually. Air pollution, which can result in lung cancer, heart disease, and respiratory illnesses, kills 800,000 people annually (WHO, 2000). Nearly 150,000 deaths are thought to have occurred in South Asia. Inhalation is the preferred method through which pollutants enter the body and harm the airways. Lung cancer, asthma, chronic bronchitis, and emphysema are all brought on by air pollution. The body's defense mechanisms can be infected or damaged by air pollution. Other crucial systems, like the heart and central nervous system, might suffer harm from air pollution.

Brick Dust Use as a Cement Replacement

- Brick dust was used to measure cement concrete's properties when it was new and when it had already hardened.
- The ability to work is improved.
- Replaces cement by meeting the requirements for properties and features, and boosts the attributes of strength and workability.

II. OBJECTIVES

- To know the brick dust properties
- To study of the replacing material.
- To increase strength and workability by replacing with other material
- To use the waste as replacement
- To enhance the characteristics of concrete

III. METERIALS USED

Brick

Bricks are rectangular pieces of building material. Bricks are used to build masonry structures, walls, and pavements. It is used in substitute of stone when that material is not readily available. There are frequently brick chips included as coarse aggregate in concrete mixtures. Brick is primarily composed of six components. The two main components of brick clay are alumina (clay) and silica (sand). It becomes more plastic when combined with water in the right amounts. It is simple to form and dry the plastic mass. It shouldn't experience cracking, shrinking, or warping. Clay's primary ingredient is alumina. An unfinished brick serves as a cementing substance. Because alumina is present, brick clay is plastic. Bricks can be shaped because of their plasticity.

Clay with too much alumina may cause bricks to shrink, bend, or break when dried and burned, much like any other cementing material. Silica makes up 50–60% of high-quality bricks. It can be found both free and mixed. Free sand continues to be mechanically combined with clay. Alum in silicates are created when it is alumina mixed. Protect raw bricks with silica from deformation, shrinkage and cracks. The brick will have a more shaped and consistent texture as the sand content increases. However, too much silica weakens the bond between the clay particles used to form brick and makes it brittle and fragile. The right ratio of silica and alumina is crucial for the longevity of bricks. Bricks should contain finely ground lime powder. It allows the silica (necessary part) to melt at an oven temperature of 1650 ºC and bond the bricks together, producing a strong and durable brick. At around 1100 ºC, lime works as a catalyst to raise the furnace temperature to 1650 ºC, which is the temperature at which silica fuses. Strong cementing is possible with this partially fused silica. Bricks will get vitrified in brick clay with too much lime. As more silica than is necessary will fuse, it causes bricks to melt. This causes the bricks to deform and lose their shape.

Class Burnt Brick

The size is typical. These bricks all have the same yellow or red tint. It is evenly burned and has a regular texture and shape. The crushing strength is 280kg/cm^2 (mean) when it is 245kg/cm^2 and the absorption capacity is less than 10%. (Minimum). Efflorescence doesn't exist on it. When a hammer or another brick with a similar shape strikes it, it makes a metallic sound. If one tries to do it with a thumbnail instead of a fingernail, it is difficult enough to resist. There are no organic materials, gravel, or stones in it. It is typically used to

To produce coarse aggregates for concrete in a structure with a lengthy lifespan, let's say 100 years, the building must be exposed to corrosive conditions.

3.3 TYPES OF BRICK

1. Burnt bricks
2. Sun-dried clay brick
3. Concrete Bricks
4. Engineering Bricks
5. Lime Bricks
6. Fly ash bricks

IV. METHODOLOGY

Test Perform for Concrete

Fig. 1 Concrete slump testing

Fig. 2 Compressive strength test

Fig. 3 Flexural strength test

Fig. 4 Split tensile strength test

V. RESULTS & DISCUSSION

Results of Concrete Test

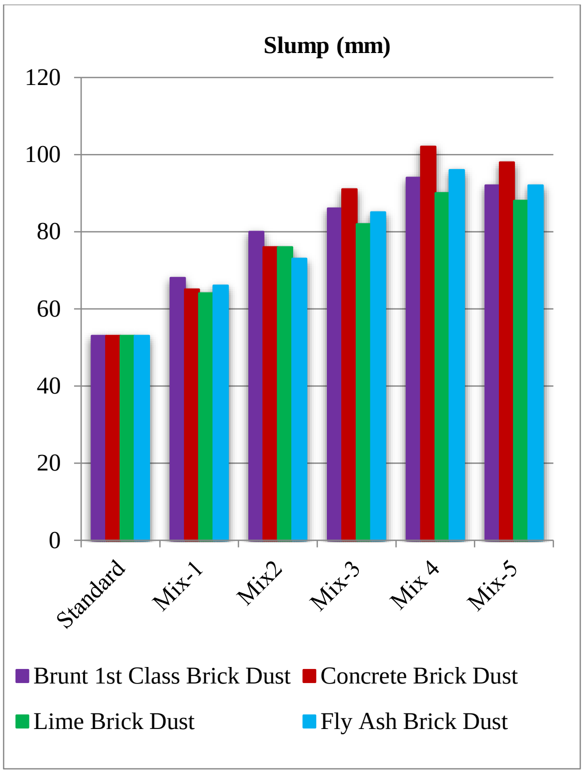

Fig. 5 Slump Test Using Various Amounts of First-Class Brunt Brick Dust in Place of Cement

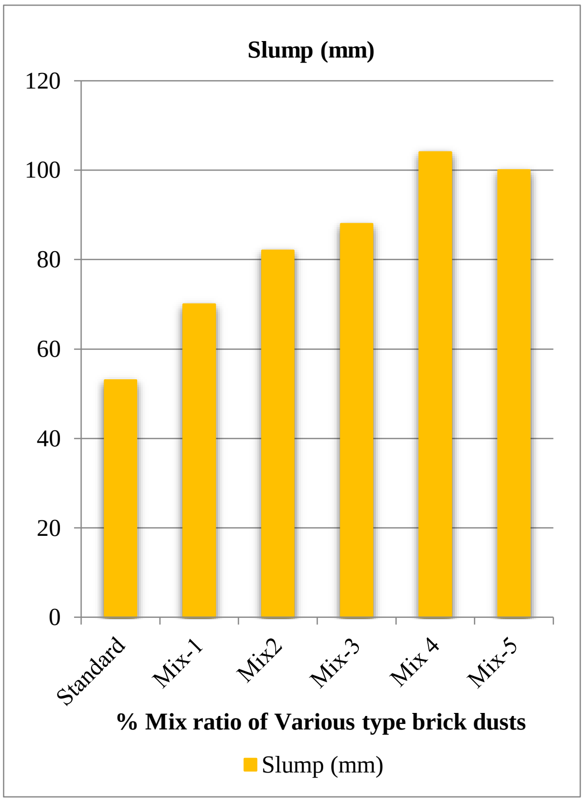

Fig. 6 Slump Test Using Various Amounts of Combine Brick Dust in Place of Cement

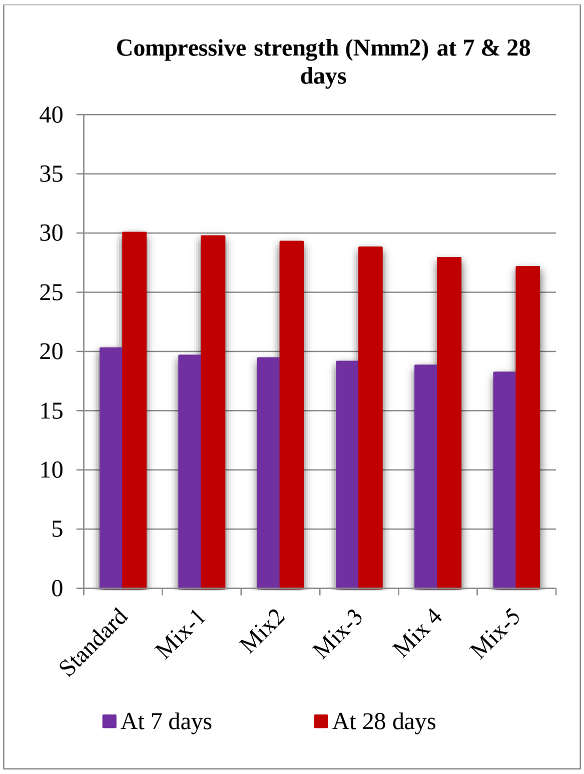

Fig. 7 Compressive Strength at 7 and 28 Days of Various Percentages of Brunt First Class Brick Dust in Place of Cement

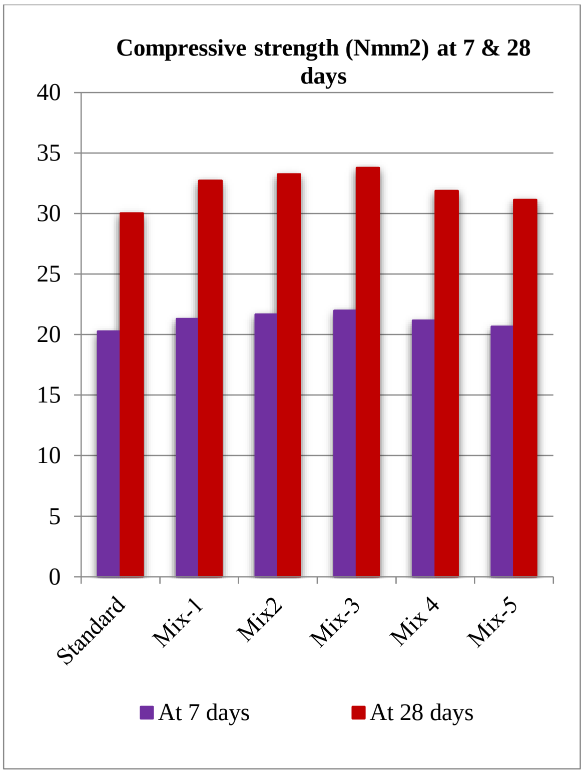

Fig. 9 Compressive Strength at 7 and 28 Days of Various Percentages of Lime Brick Dust in Place of Cement

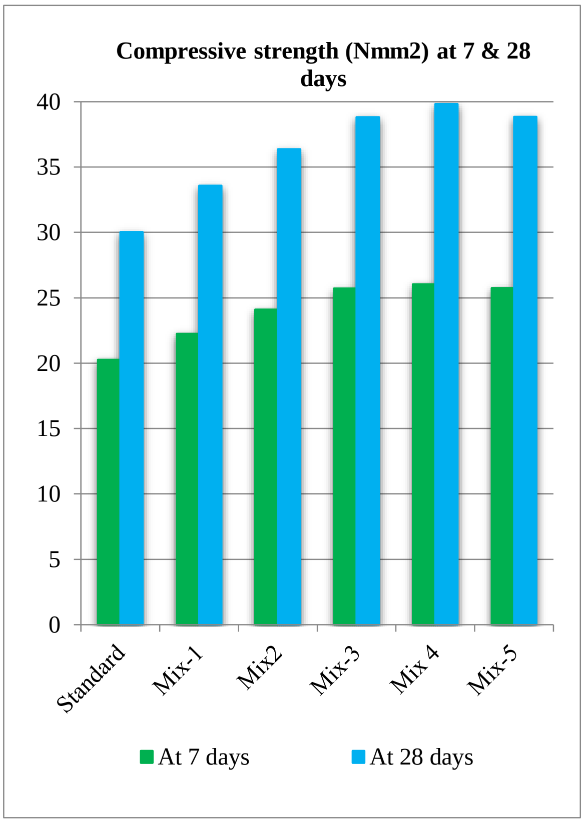

Fig. 8 Compressive Strength at 7 and 28 Days of Various Percentages of Concrete Brick Dust in Place of Cement

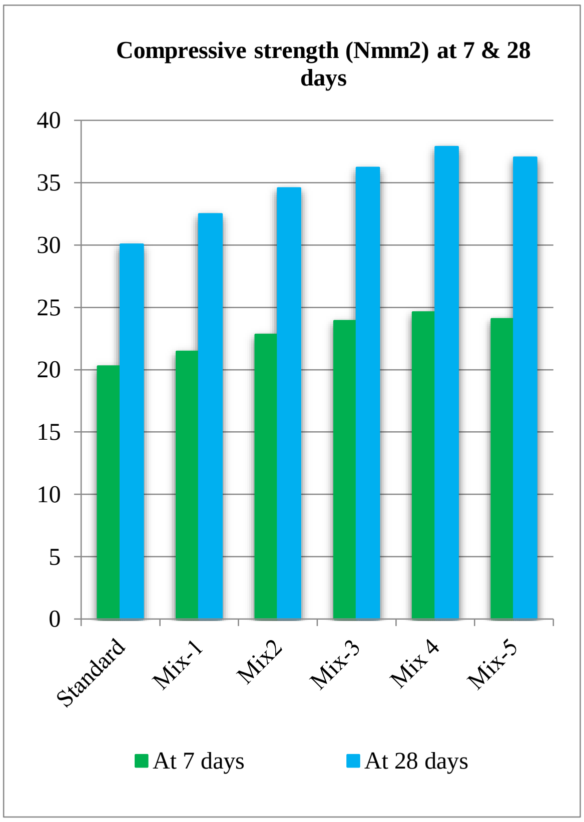

Fig. 10 Compressive Strength at 7 and 28 Days of Various Percentages of Fly Ash Brick Dust in Place of Cement

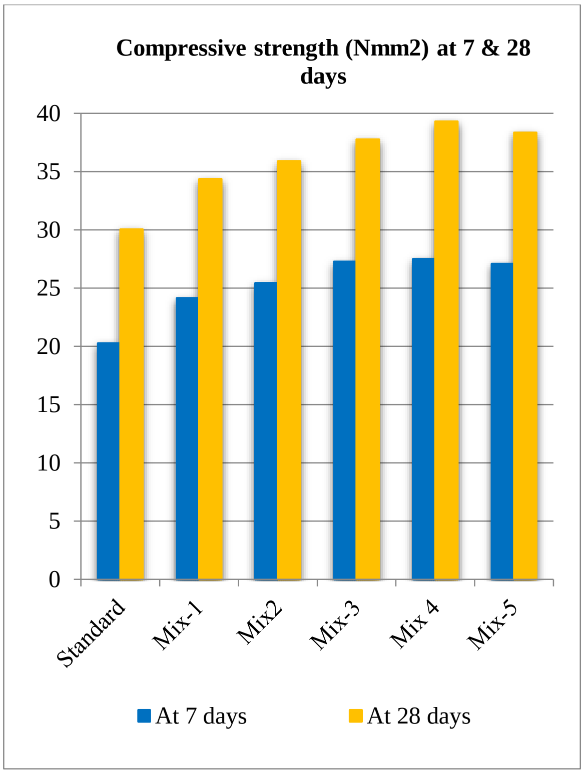

Fig. 11 Compressive Strength at 7 and 28 Days of Various Percentages of Combine Brick Dust in Place of Cement

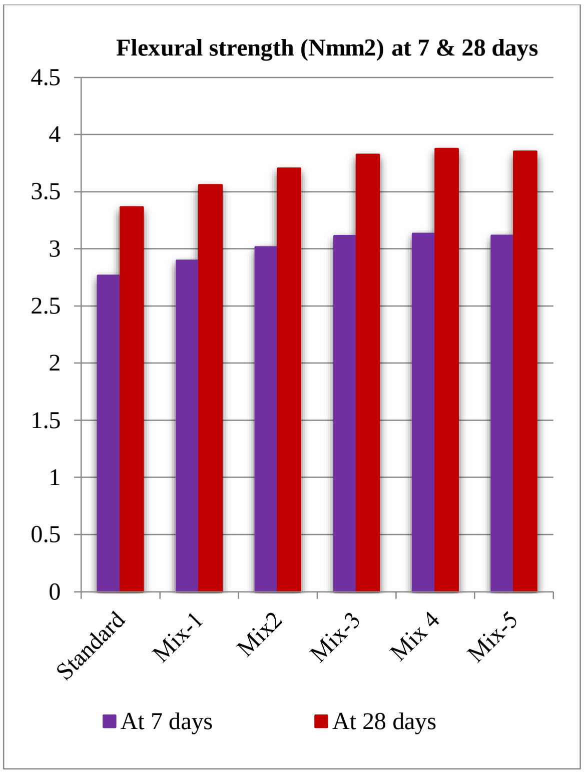

Fig. 13 Flexural Strength at 7 and 28 Days of Various Percentages of Concrete Brick Dust in Place of Cement

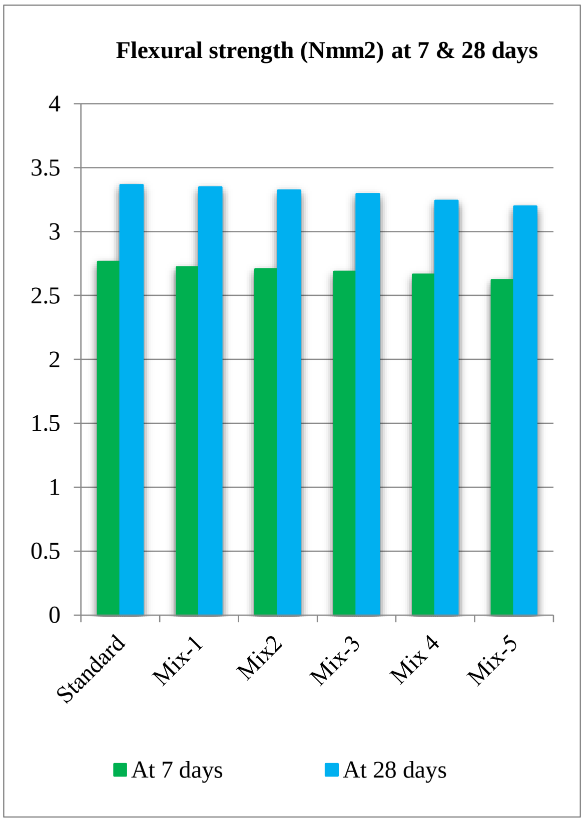

Fig. 12 Flexural Strength at 7 and 28 Days of Various Percentages of Brunt First Class Brick Dust in Place of Cement

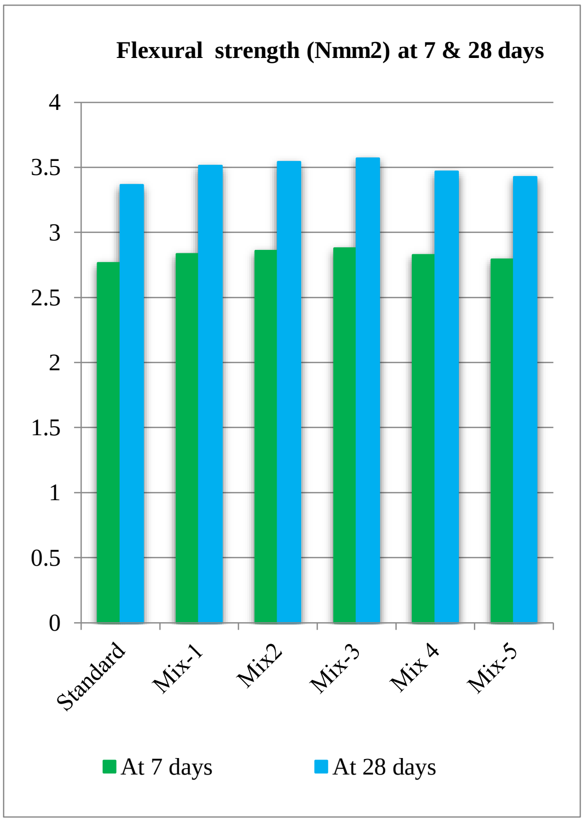

Fig. 14 Flexural Strength at 7 and 28 Days of Various Percentages of Lime Brick Dust in Place of Cement

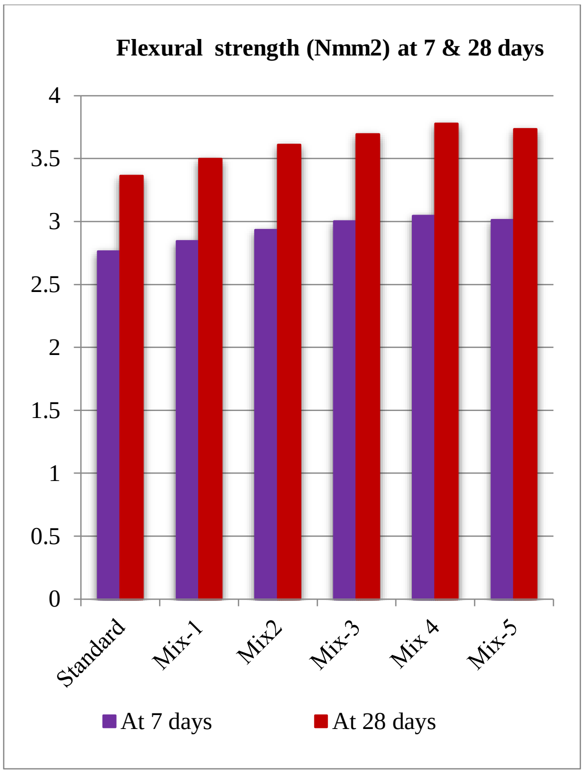

Fig. 15 Flexural Strength at 7 and 28 Days of Various Percentages of Fly Ash Brick Dust in Place of Cement

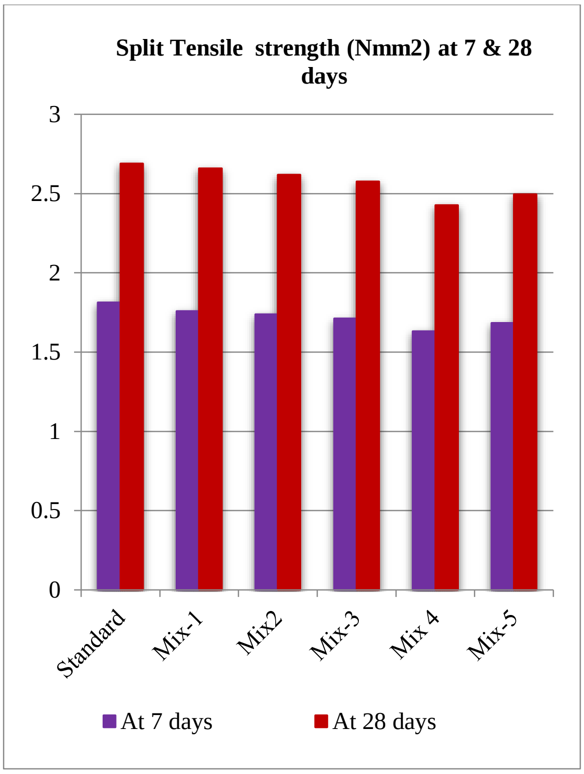

Fig. 17 Split Tensile Strength at 7 and 28 Days of Various Percentages of Brunt First Class Brick Dust in Place of Cement

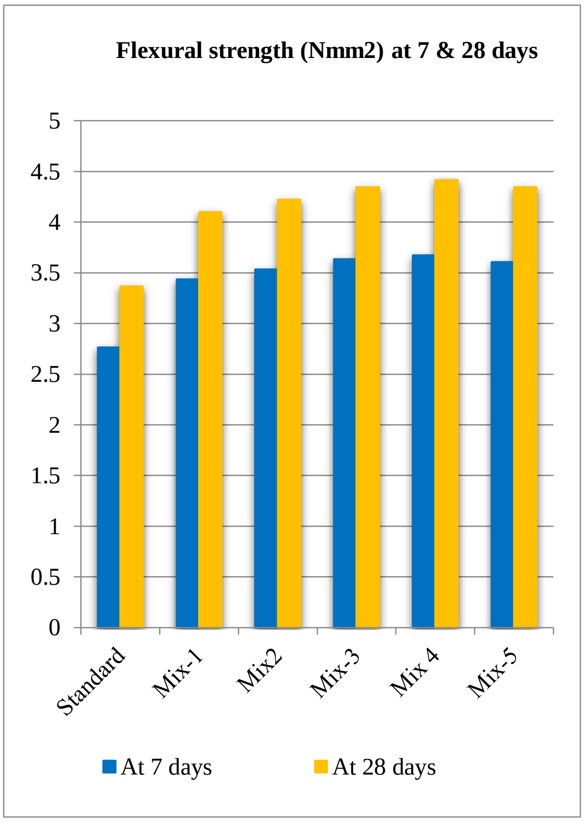

Fig. 16 Flexural Strength at 7 and 28 Days of Various Percentages of Combine Brick Dust in Place of Cement

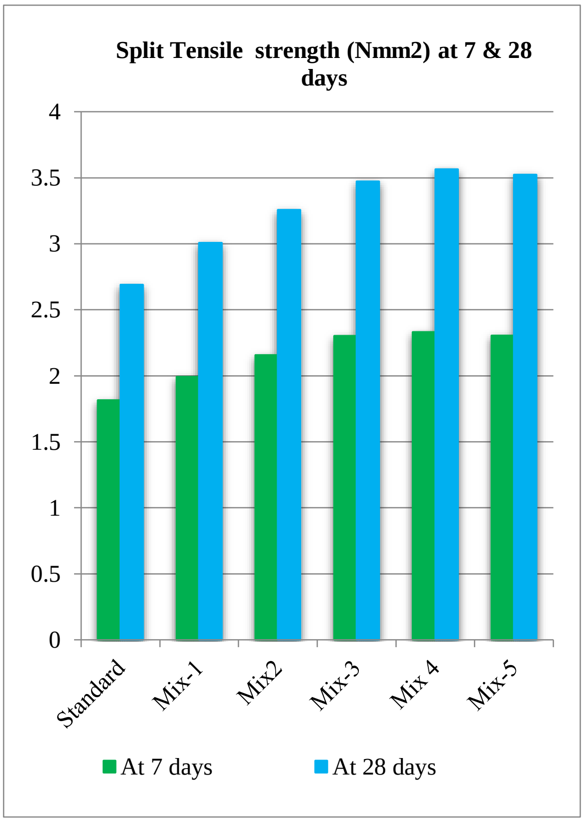

Fig. 18 Split Tensile Strength at 7 and 28 Days of Various Percentages of Concrete Brick Dust in Place of Cement

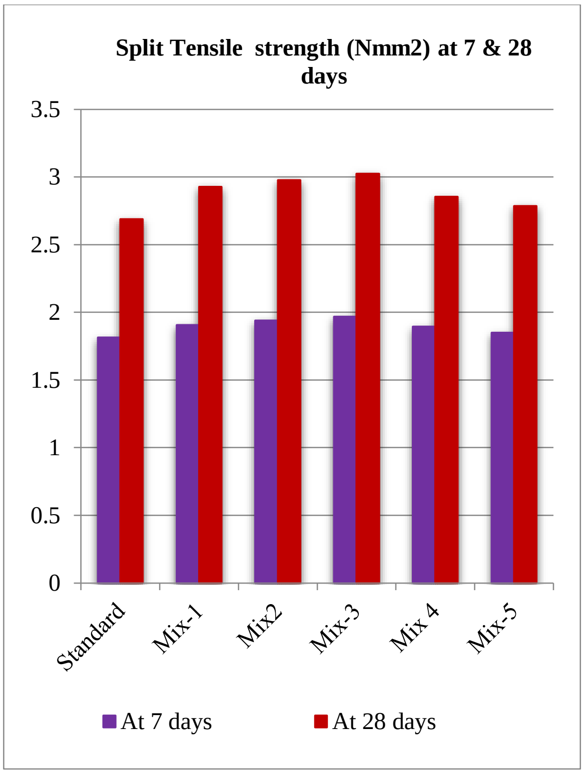

Fig. 19 Split Tensile Strength at 7 and 28 Days of Various Percentages of Lime Brick Dust in Place of **Cement**

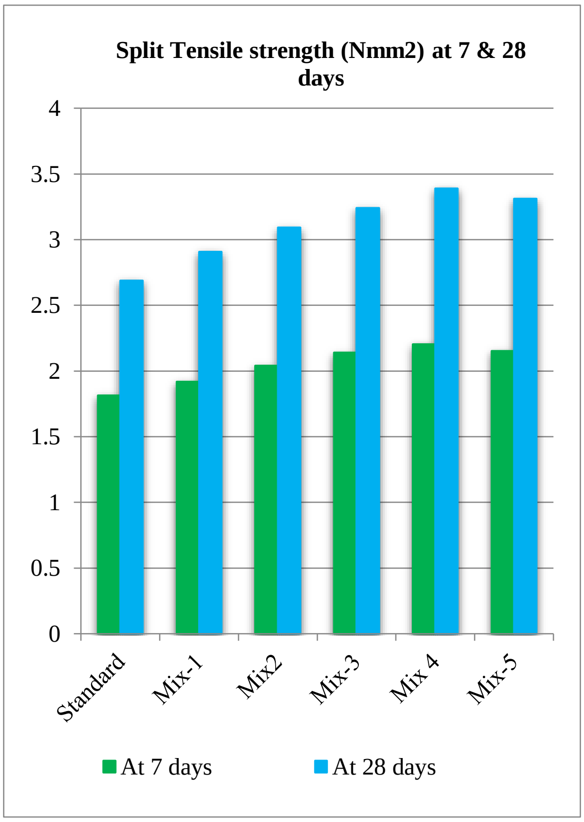

Fig. 20 Split Tensile Strength at 7 and 28 Days of Various Percentages of Fly Ash Brick Dust in Place of Cement

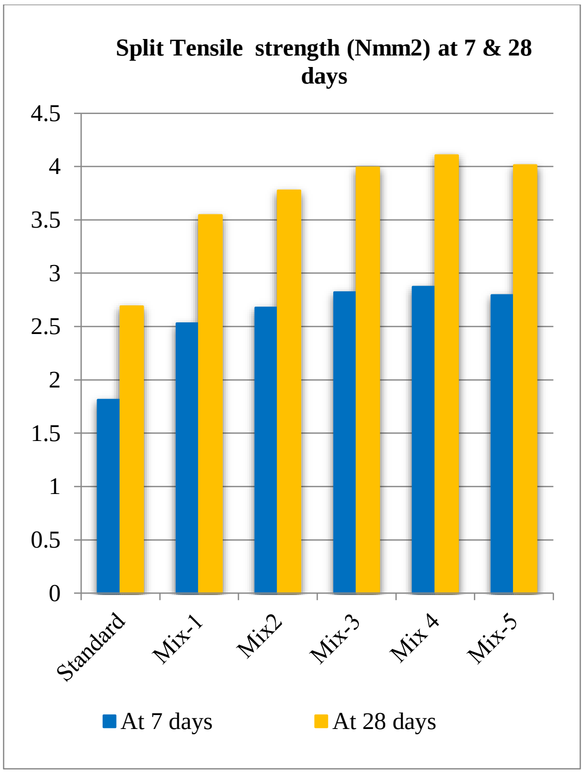

Fig. 21 Split Tensile Strength at 7 and 28 Days of Various Percentages of Combine Brick Dust in Place of Cement

VI. CONCLUSION

- The percentage of Brunt 1st class brick dust as replacement for cement linearly increases with the addition of Brunt 1st class brick dust, reaching its maximum value of 94mm at 32.00%.
- The percentage of concrete brick dust used to replace cement grows linearly as more concrete brick dust is added, reaching a maximum value of 102mm at 32.00%.
- The percentage of lime brick dust as cement replacement grows linearly with the addition of lime brick dust, reaching its maximum value of 90mm at 32.00%.
- The maximum value of the concrete slump, which is 96 mm, increases linearly with the percentage of fly ash brick dust used to replace cement.
- Maximum Concrete Slump Value 104mm at 32.00% percentage of combined dust used to replace cement increases linearly with the amount of brick dust.
- The concrete sample's compressive strength decreased after 7 days due to varying percentages of Brunt first-class brick dust added in place of cement. As a result of the addition of Brunt First Class Brick Dust, compressive strength reaches a maximum of 20.27N/mm2 at 0.00% and a minimum of 18.23N/mm2 at 40.00%.
- The concrete sample's compressive strength decreased after 28 days due to varying percentages of Brunt first-class brick dust added in place of cement. As a result of the inclusion of Brunt First Class Brick Dust, compressive strength reaches a maximum of 30.04N/mm2 at 0.00% and a minimum of 27.13N/mm2 at 40.00%.
- A concrete sample's compressive strength decreased after seven days due to varying percentages of concrete brick dust added in

place of cement. As a result of the addition of concrete brick dust, compressive strength reaches a maximum of 26.04N/mm2 at 40.00% and a minimum of 20.27N/mm2 at 0.00%.

- The concrete sample's compressive strength at 28 days decreased with the addition of concrete dust due to varying percentages of concrete brick dust replacing cement. As a result of the addition of Concrete Brick Dust, compressive strength reaches a maximum of 39.83N/mm2 at 40.00% and a minimum of 30.04N/mm2 at 0.00%.
- The compressive strength of the concrete sample at 7 days decreased with the addition of lime brick dust due to varying percentages of concrete brick dust replacing cement. As a result of the addition of lime brick dust, compressive strength reaches a maximum of 21.99N/mm2 at 24.00% and a minimum of 20.27N/mm2 at 0.00%.
- The concrete sample's compressive strength decreased after 28 days due to the inclusion of lime dust and varying percentages of concrete brick dust in place of cement. As a result of the addition of lime brick dust, compressive strength reaches a maximum of 33.78N/mm2 at 24.00% and a minimum of 30.04N/mm2 at 0.00%.
- Compressive strength of concrete sample at 7 days diminishes with the addition of fly ash brick dust due to varying percentages of concrete brick dust replacing cement. As a result of the addition of Fly ash Brick Dust, compressive strength reaches a maximum of 24.61N/mm2 at 40.00% and a minimum of 20.27N/mm2 at 0.00%.
- A 28-day concrete sample's compressive strength decreased as fly ash dust was added, with varying percentages of concrete brick dust replacing cement. As a result of the addition of Fly ash Brick Dust, compressive strength reaches a maximum of 37.87N/mm2 at 40.00% and a minimum of 30.04N/mm2 at 0.00%.
- The flexural strength of the concrete sample at 7 days has decreased as a result of varying percentages of Brunt first-class brick dust added in place of cement. As a result of the inclusion of Brunt First Class Brick Dust, the maximum value of flexural strength occurs at 0.00% and the minimum value at 40.00%, respectively.
- At 28 days, the flexural strength of the concrete sample decreased as Brunt first-class brick dust was added at varying percentages in place of cement. As a result of the inclusion of Brunt First Class Brick Dust, the maximum value of flexural strength occurs at 0.00% and the minimum value at 40.00%, respectively, at 3.198N/mm2.
- Flexural strength of concrete sample at 7 days diminishes with the addition of concrete brick dust due to varying percentages of concrete brick dust replacing cement. Flexural strength is added to concrete brick dust, which results in a maximum value of 3.133N/mm2 at 40.00% and a minimum value of 2.764N/mm2 at 0.00%.
- The flexural strength of the concrete sample after 28 days decreased with the addition of concrete dust due to varying percentages of concrete brick dust replacing cement. Flexural strength is added to concrete brick dust, which results in a maximum value of 3.875N/mm2 at 40.00% and a minimum value of 3.365N/mm2 at 0.00%.
- Flexural strength of concrete sample at 7 days decreased with addition of lime brick dust due to varying percentages of lime brick dust replacing cement. As a result of the addition of lime brick dust, flexural strength reaches a maximum of 2.879N/mm2 at 24.00% and a minimum of 2.764N/mm2 at 0.00%.
- Flexural strength of concrete sample after 28 days decreased with the addition of lime dust due to varying percentages of lime brick dust replacing cement. As a result of the addition of lime brick dust, flexural strength reaches a maximum of 3.569N/mm2 at 24.00% and a minimum of 3.365N/mm2 at 0.00%.
- The flexural strength of a concrete sample after seven days is decreased by the addition of fly ash brick dust at varying percentages in place of cement. As a result of the addition of fly ash brick dust, the maximum value of flexural strength—3.046N/mm2—occurs at 40.00% and the lowest value—2.764N/mm2—at 0.00%.
- The flexural strength of a concrete sample after 28 days is decreased by the addition of fly ash dust as cement is replaced, due to the varying percentages of fly ash brick dust. Flexural strength is added to fly ash brick dust, which results in a maximum value of 3.778N/mm2 at 40.00% and a minimum value of 3.365N/mm2 at 0.00%.
- The concrete sample's split tensile strength at day seven decreased as Brunt first-class brick dust was added in place of cement at varying percentages. As a result of the inclusion of Brunt First Class Brick Dust, split tensile strength values range from 1.632N/mm2 at 40.00% to 1.814N/mm2 at 100.00%.
- The split tensile strength of the concrete sample at day 28 decreased as Brunt first-class brick dust was added, replacing cement at varying percentages. As a result of the inclusion of Brunt First Class Brick Dust, Split Tensile Strength values range from 2.428N/mm2 at 40.00% to 2.689N/mm2 at 100.00%.
- The concrete sample's split tensile strength at 7 days decreased with the addition of concrete brick dust due to varying percentages of concrete brick dust replacing cement. As a result of the addition of concrete brick dust, split tensile strength reaches a maximum of 2.331N/mm2 at 40.00% and a minimum of 1.814N/mm2 at 0.00%.
- The concrete sample's split tensile strength at 28 days decreased with the addition of concrete dust due to varying percentages of concrete brick dust replacing cement. As a result of the addition of concrete brick dust, split tensile strength reaches a maximum of 3.565N/mm2 at 40.00% and a minimum of 2.689N/mm2 at 0.00%.
- The concrete sample's split tensile strength at 7 days decreased with the addition of lime brick dust due to varying percentages of lime brick dust replacing cement. As a result of the addition of lime brick dust, split tensile strength reaches a maximum of 1.968N/mm2 at 24.00% and a minimum of 1.814N/mm2 at 0.00%.
- The concrete sample's split tensile strength at 28 days decreased with the addition of lime dust due to varying percentages of lime brick dust replacing cement. As a result of the addition of lime brick dust, split tensile strength reaches a maximum of 3.023N/mm2 at 24.00% and a minimum of 2.689N/mm2 at 0.00%.
- Split tensile strength of concrete sample at 7 days diminishes with the addition of fly ash brick dust due to varying percentages of

fly ash brick dust replacing cement. As a result of the addition of Fly ash Brick Dust, Split Tensile Strength reaches a maximum of 2.203N/mm2 at 40.00% and a minimum of 1.814N/mm2 at 0.00%.

- The split tensile strength of the concrete sample after 28 days decreased with the addition of fly ash dust due to varying percentages of fly ash brick dust replacing cement. As a result of the addition of Fly ash Brick Dust, Split Tensile Strength reaches a maximum of 3.389N/mm2 at 40.00% and a minimum of 2.689N/mm2 at 0.00%.

VII. FUTURE SCOPE OF THE WORK

- To study this work in future use fiber in concrete with brick dust and perform test on samples.
- To study this work replacement material change with glass powder crushed PPE kit on behalf of brick dust.
- Foe M35, M40 and M50 same analysis also performed for these various grade of concrete.
- Non-destructive test like Ultra sonic pulse and rebound hammer tests are also carry forward for study this work.

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