International Journal of Scientific Research in Engineering & Technology
Volume 3, Issue 5 (September- October 2023), PP: 09-12.
www.ijsreat.com ISSN No: 2583-1240

The Interlocking Brick Design: A Sustainable Construction Paradigm

Poonam Ketan Patil[1], Anish Mohanan Pillai[2]
[1,2]Department of Civil Engineering, Indira College of engineering & Management, Maharashtra, India.

To Cite this Article: *Poonam Ketan Patil[1], Anish Mohanan Pillai[2] , "The Interlocking Brick Design: A Sustainable Construction Paradigm", International Journal of Scientific Research in Engineering & Technology Volume 03, Issue 05, September-October 2023 , PP: 09-12.*

Abstract: *Ongoing change in method of development industry can be make out with the rising interest of concrete , concrete blend item like cement and mud blocks. This expanded requests for material is aftereffect of development in total populace.Be that as it may, this development and urbanization is relentless yet the interest for such asset utilizations should be balance to adjust biological system and climate. This must be accomplished with the idea and execution of maintainability. The review done and displayed in this paper is one such worldview towards maintainability. The review is finished on the idea, displaying of interlocking block and its solidarity boundaries are checked by research facility testing and calculations strategy. At the point when the examination is finished for the model comprised of ordinary earth wall and interlocking block facade, the strength, solidness of later one ended up being substantially more when contrasted with starting one. Further review mirrored that the use of interlocking block indicated beneath increments strength as well as diminishes the amount of mortar expected for holding of wall units. Utilization of such blocks prompts decrease in material utilization, decrease in natural contamination, expansion in strength and sturdiness of design, making a model for supportable methodology towards development system.*

Keywords: *interlocking blocks, manageable, worldview, strength boundaries, biological system.*

I.INTRODUCTION

This immense interest supply hole for metropolitan lodging units expanded with time and this should be created with fitting innovation which is featured in their exploration work .Unit with fast development, disinfection, and green idea, strong, resistive against fire, impact and so on ought to be considered while consolidating these houses. Use of Ferro solidifying for walls, empty chunks and precast boards were embraced for case planned. This significant requirement for lodging units by implication requested for development materials like concrete, concrete, water, block and so on. Dr.N.Subramanian (3) introduced the measurable information of high asset utilization expressing that concrete is being utilized for something like 12 million years. Concrete is utilized generally than some other substance with the exception of water, around 10km3 consistently. The 10.5 billion tons a year substantial industry is hence the biggest client of regular assets on the planet. It is assessed that the interest for concrete is supposed to develop to 16 billion tons a year by 2050. Conventional cement regularly contains around 12% concrete, 8% of water and 80% total by mass. This intends that, notwithstanding 1.5 billion tons of concrete, the substantial business is drinking every year nine billion tones of totals along with one billion tones of blending water. T.Noguchi (4) concentrated on the current contamination impact of concrete being used and expressed that for assembling 1m of cement creates roughly 0.25 ton of CO2 from the concrete creation and also 0.1 to 0.2 ton of CO2 from the total creation, the transportation of materials and the substantial creation . 20 billion ton of cement is delivered yearly overall and thusly concrete-related enterprises produce roughly 7 to 10% of worldwide synthetic CO2 as per a White Paper on the Climate distributed by the Service of the Climate. Comparable shortage and contamination of other such exact asset is matter of high worry that is water. Dr. M. ArifShaikh ,S.B.Kolhe (5) has shown that 4000 billion cubic meter of water is acquired from sky out of which something like one fourth of this is really usable, the rest runs off into the stream. The typical accessibility of usable water has relating diminished from approx. 6000 cubic meter for each capita to 1500 cubic meter. Water emergencies are significant issue which might prompt water battle as in Africa expressed in US advancement report. Water avoidance against wastage family or because of overflow ought to be finished with arrangement of water shed administration. D.M.Patil (6) expressed that with change in human existence style the interest for new water is additionally expanding. Anyway only one area is getting to water and in excess of a billion group presently need access of clean drinking water and very nearly 3 billion miss the mark on sterilization administrations. The metropolitan area appreciating water accessibility dirties water and same water is scattered in streams making danger 20% of freshwater fish flavors. This redirection and equivalent dispersion of water assets is must for confronting the difficulties of impacting world. The extended utilization of water and its impact was contemplated (7) based on present water interest for different development exercises and assembling. The ecological impact because of water contamination is likewise guage for 2050 in this exploration work. Water request will be half more as though presently.

Idea and Suggestions FROM IT

The regular block which is being involved at mass level are having holding arrangement in the upward heading as frog. In any case, these blocks end up being feeble when followed up on by parallel powers as no horizontal interlocking is available. Alongside that to make holding between blocks, mortar is use as restricting material. Consequently, assuming mathematical plan of block is changed to such an extent that its interlocking property in vertical and even course increments, honesty between units, the wall will turn out to be more strong and resistive. With appropriate interlocking it might additionally lessen the need of

restricting material 'mortar' and simply concrete slurry can serve holding appropriately.

This will prompt accomplish four purposes towards maintainable development:-

A. Increase resistive property of wall against vertical and sidelong powers.
B. Reduce measure of plan of action utilization as mortar will be supplanted by concrete slurry.
C. Reduce cost of development.
D. Increase toughness of construction.

II.DESIGN AND Example Projecting

A. Design preliminary 1

The plan is made by the idea and it is displayed in the figure underneath. As it can seen that block has trapezoidal indents at sides for horizontal interlocking and square scores at top and base for longitudinal interlocking. It has bore at place for arrangement of bar for more prominent strength. It has a rectangular component of 19*9*9 cm and scores aspects are displayed in fig. This plan will be produced using same customary method of block. The crude combination of mud with 30% fly-debris is made. It is poured in the shape and a crude block is casted. It is saved for drying from that point onward, it is singed in block. For this another shape of this plan is gotten.

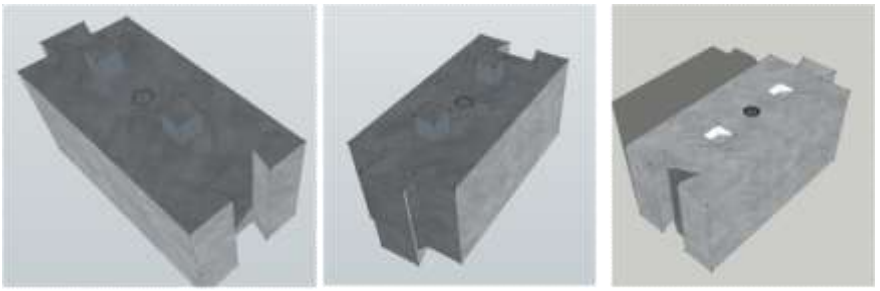


Fig. 1: Interlocking blocks 3D plan

For the above interlocking plan talked about above and displayed in fig. a shape is ready , made of steel sheet as displayed in fig beneath. The combination of mud and 30%fly debris is poured in form and it has top side open, which is dazzled on the poured material. Then, at that point, the top side is eliminated and shape is kept in rearranged position and material is permitted to fall on level surface. From this a crude example is made.

Disappointments with model 1:

1) The block isn't getting discharge when the form is kept in modified position. This is because of the little aspect that example get stuck in the shape
2) The earth additionally adheres to the shape and example acquired is fractional with edges sheared.
3) Notches disappointment: Shearing happens at the scores and it isn't acquired.

B. Design Preliminary

With the disappointment of model no.1, an overhauled model for certain progressions is planned. For this model another shape made of wood is planned. As the regular assembling process utilizes wooden shape we attempted something similar. A similar assembling process is utilized to project the block in which the shape is wetted and layer is filled along the edges of the shape which will be useful for arrival of block. The example cased is displayed in figure. It requires an excess of time for projecting a solitary block.

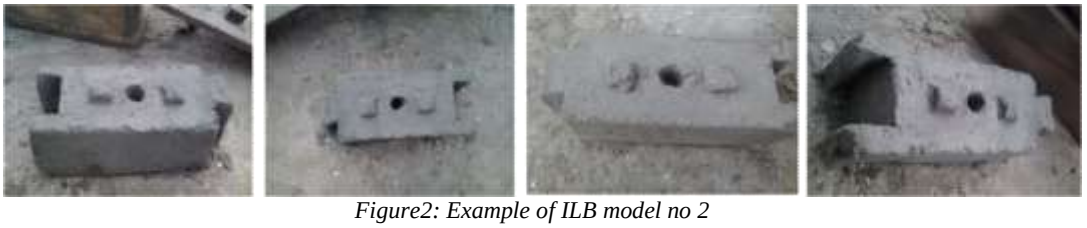


Figure2: Example of ILB model no 2

Disappointments with model:

1) The comparative issue of arrival of block happens with the form. The material sorts out in the score which permits it to deliver. For certain endeavors we prevail with regards to projecting some example.
2) The example got isn't in that frame of mind because of delivering issue of block.
3) The internal base square indents get broken because of reversal of form
4) Due to side opening of the shape it is exceptionally difficult to deal with and projected a block
5) The tendency of the trapezoidal indents is making a frail shear zone, which one more issue with the scores

C. Design Preliminary 3

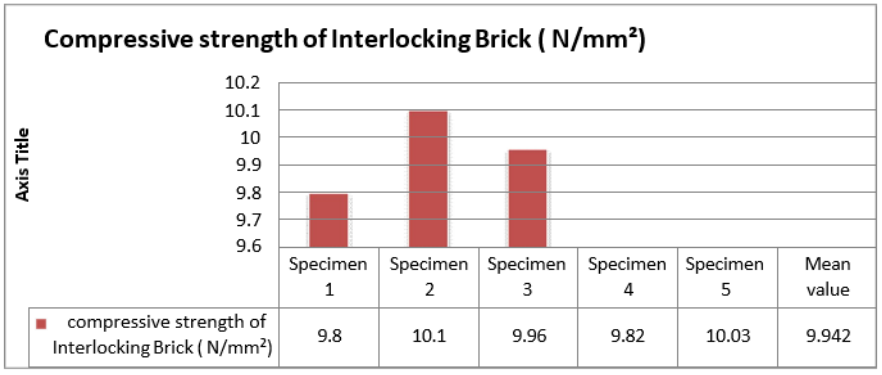
One more amended model is planned remembering all past issues by changing the aspects. New model has an element of rectangular block 20*10*10 cm. The square indents and bore is of same size. The point of tendency of trapezoidal indents is changed. The new shape is made of wood with side wall open and attached with the assistance of iron coupling as displayed.

Properties of interlocking block:

1) Dimension: 20*10*10
2) Density: 1252 Kg/m³
3) Molding material: Earth with 30% fly-debris
4) Burnt at temperature: approx. 400°C
5) Weight : 2.50 Kg

D. Various test led and results:

1) Nail test: This test is performed by making a scratch on the parallel surface of block with finger nail. No effect is had on the block, consequently the example is adequately hard
2) Structure Test: The example is broken into two pieces and is analyzed, it was viewed as homogeneous, conservative, and free from absconds for example bumps and openings, and so forth.



Calculation Displaying AND Investigation

To look at feasibilty for utilization of interlocking block planned, different case thought is finished. The comparison of typical wall comprised of customary dirt block conduct for different stacking condition is finished with the wall comprised of this interlocking block . The aspects, support condition, material property and loadings for the two walls are kept same. Investigation results feature the value of interlocking framework against ordinary block configuration considered.

The product used to do examination of walls is Staad.PRO. Essentially multiple times examination is finished for following cases:-

A. Case I :- wall comprised of regular dirt block exposed to vertical/gavity load.
B. Case II :- wall comprised of interlocking earth block exposed to vertical/gavity load.
C. Case III:- wall comprised of regular dirt block exposed to parallel nodal load.
D. Case IV:- wall comprised of interlocking mud block exposed to sidelong nodal load.
E. Case V :- wall comprised of customary dirt block exposed to both vertical and Sidelong burden.
F. Case VI :- wall comprised of interlocking dirt block exposed to both vertical and Horizontal burden.

III.CONCLUSIONS

The idea, plan and utilization of interlocking block configuration demonstrates to successful model for reasonable methodology towards development. It has been seen that when construction is exposed to gravity load just, the block facade ends up being steady . However, consumes enormous amount of restricting material that is mortar. Additionally, when the block brick work wall is exposed to parallel or even powers , it bombs because of shearing or upsetting as the holding is feeble in level bearings. This further prompts cut off human risk at the hour of catastrophes like seismic tremor. To conquer this inadequacies and constraints of customary dirt block facade , the idea of interlocking block demonstrated above ends up being extremely successful. From the research facility test and investigation accomplished for the plan indicated interlocking block facade, the steadiness and strength of wall is more when contrasted with customary walls. The holding because of scores in vertical as well as level bearing prompts high interlocking strength between block units. Further the material is dirt and size is like that of typical blocks, no decrease in compressive strength and change in wall thickness is gotten.

REFERENCES

1. *Dr.N.Subramanian,2014,'ConcreteTrends',TheIndianConcreteJournal,Future Concrete Special Issue ,Vol.88,No.4April.pp5-7.*
2. *T.Noguchi,2012' Sustainability In Concrete Recycling' ,Role Of Infrastructure For Sustainable Development ,IIT Roorkee National Convention Proceedings, pp46-63.*
3. *Dr. M.ArifShaikh ,S.B.Kolhe ,2013 , ' Water : An Ecological Perspective' , Water Shed Management For Sustainable Development WMSD , NationalConference Proceedings,pp97.*

4. *D.M.Patil,2013,'Changing World With Challenges Of Water Quality And Resource' ,Water Shed Management For Sustainable Development WMSD, National Conference Proceedings ,pp 68.*
5. *OECD,2012,'EnvironmentalOutlookTo2050 :The Consequences Of Inaction, Key Finding On Water'.*
6. *M.N Naugraiya ,et.al , 2012 , 'Management Of Soil- Water And Nutrients In Red Lateritic Wastelands Through Agro for estry' , International Journal Of Envi. Science, Vol1, Issue 3, pp249-258.*
7. *S.G.Joglekar, 2010,'New Generation Rationalized Code For Concrete Structure, International Approach And Indian Standards', New Building Material &Construction World, pp 134-145.*