

STUDY ON PERFORMANCE OF INFILL WALL MASONRY RCC FRAME USING ALTERNATIVE TYPES OF BRICKS – a review

Dhaval. H. Joravia^{1*}, Dr. Kaushal.B. Parikh²

***Corresponding Author: -**

OUTLINE

1. Introduction to interlocking bricks
- 2 Implication of SAP2000 for seismic analysis of infill walls masonry RCC frame
3. Polymer bricks as building material
4. The availability of the recyclable polymer

Abstract: -

The purpose of this literature review is to study the reduction of base shear and behavior of masonry in seismic loading and the evolution of interlocking brick methodologies and their different shapes. And also, study Arrangement of infill walls with RCC frame in plan and elevation and base shear analysis using SAP2000 software. The study includes use of polymer material as make of polymer brick and study of availability of recyclable polymer material.

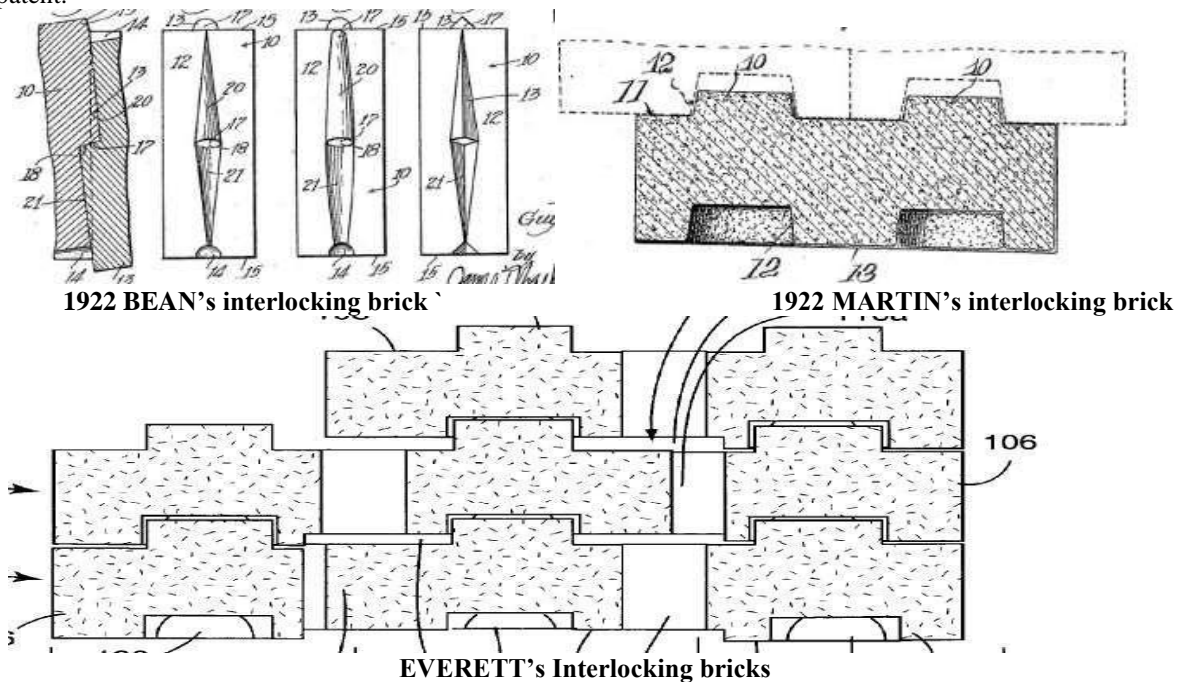
Keywords: - Interlocking bricks, base shear, SAP2000. Polymer bricks, PET bottles.



Distributed under Creative Commons CC BY-NC 4.0 OPEN ACCESS

INTRODUCTION TO INTERLOCKING BRICKS-

The interlocking brick technology is used from ancient era. However the first patent comes out in 1902 by H.Chaoquet and A.despature on US patent journal. The simple key arrangement used. Subsequently the different shapes and different methodologies lead to the interlocking bricks at every different level with their own advantages up to the 2010 patent of Everett of interlocking brick. So. The total 14 patents are reviewed and understand the basic concept of interlocking behind each patent.



Similarly, patent based on interlocking in this field US. Patent. Nos. 5379565 (Fabien Vienne) , 2185497 (Cilento) , 4314431 (Rabassa), 2145404 (Mueller), 1984393 (P.brown) are available . but for ideal and perfect interlocking brick, A number of requirements for systems of this type are as follows:

- The brick is simple to manufacture. And the material is easily ilable.
- The brick is not prone to damage by rough handling transporting and storing in extreme weather conditions.
- The brick can be assembled simply by placing one on top of another. No any keys or connecting parts.
- The system is Flexible in that walls at different places transfer quickly without loss of any bricks.
- The brick gives total elimination of pouring any binding material.
- The brick gives smooth and plaster less finishing of wall.
- Openings or spaces in the wall construction can be formed at any derived position without affecting the interlocking principle.
- The construction is safe the wall unit weight is lighter sufficient that not damage any human life in seismic failure of structure.

The prior patents above do not entirely satisfy the above requirements and have generally been found Unsatisfactory and have obtained little success in the Field.

So it is needs to rearrange and redesign the technology that meet above requirement as maximum advantages.

Implication Of SAP2000 For Seismic Analysis Of Infill Walls Masonry Rcc Frame-

SAP2000 software for seismic analysis of RCC frame is considerably convenient and perfect as per standard code of practice. The study of effect on RCC frame by Marius Mosoarca indicates that the different arrangement on infill wall in elevation change base shear significantly. Similarly the study by .V. Diware, and A.C.Saoji suggests different arrangement in plan .that also change the base shear of RCC frame. The study by Vikas P. Jadhao, Prakash S. Pajgade also suggests that the lighter unit weight masonry leads to lesser base shear of building.

Polymer Bricks As Building Material-

The technical report of Jonathan Taaffe etal published in 2014. Based on experimental study on PET plastic bottles (shown in below figure) and evolution of its compressive strength indicated that. it is possible to use this bottles as building material. The sound insulation is also significantly higher.



The Availability of The Recyclable Polymer

The availability of the recyclable polymer is in tremendous amount as per the data of waste plastics recycling good practices guide by and for local & regional authorities Europe. and these recyclable polymers can be used for bricks. And the availability is enough is given below table

Table 11: Waste plastics generation by resin type		
Polymer	Kg/inh/y	per cent
LLDPE	12.4	24.7
PP	9.1	18.2
HDPE	8.1	16.1
PVC	4.3	8.5
PS	3.7	7.5
PET	3.6	7.3
EPS ³¹	0.6	1.1
Other thermoplastics	3.7	7.3
Thermosets	4.7	9.3
Total	50.1	100

Conclusions From Literature Rivew

- The infill wall gives significant impact on seismic performance of building. It affects the base shear which is very important parameters for check seismic performance of building.
- Use of other lesser unit weight masonry gives lesser base shear and economical design.
- The different configuration of infill panel gives different amount of base shear. the different configuration of infill in elevation influences the seismic performance of building.
- The use of plastic bottle as brick is acceptable and innovative idea. The strength is also sufficient or can be improvable as compare to ordinary bricks

References

www.plasticnews.com

- [1] IPTS (institute for prospective technological studies) technical proposal, Spain.
- [2] Waste plastics recycling good practices guide by and for local & regional authorities Europe.
- [3] Plastics Europe Market Research Group (PEMRG)
- [4] ISO 15270 Plastics — Guidelines for the recovery and recycling of plastics waste
- [5] Resin codes by American chemistry council
- [6] Seismic evaluation of brick masonry infill By Mr. V. P. Jamnekar¹, Dr. P. V. Durge published in IJETET in 2013 8.
Influence of Masonry Infill Walls on Seismic Performance of RC Framed Structures a Comparison of AAC and
Conventional Brick Infill,” By Vikas P. Jadhao, Prakash S. Pajgade (published in International Journal of
Engineering and Advanced Technology 2013)
- [7] Effect of infill walls in structural response of RC buildings by .I. Idrizi & N. Idrizi ,Z. Idrizi , S. Idrizi ,I. Idrizi (published in Challenges, Opportunities and Solutions in Structural Engineering and Construction – Ghafoori (ed.) 2010)
- [8] Effect of Infill Walls on Structural Frames By M Harunur Rashid and Sobura Khatun published in ICMPAE'2011
- [9] Seismic assessment of symmetrical RC structure with brick masonry infills By V. V. Diware, A. C. Saoji published in International Journal of Engineering Research and Applications 2012
- [10] Earthquake Assessment of R/C Structures with Masonry Infill Walls
- [11] By Marius Mosoarca (published in International Journal of Science Technology 2007)
- [12] US patent no. US716865
- [13] US patent no. US1420810
- [14] US patent no US1431318 16. US patent no US1581574 17. US patent no US1984393 18. US patent no US2142404 19. US patent no US2185497 20. US patent no US2641921 21. US patent no US4314431
- [15] 22. US patent no S4597236
- [16] 23 US patent no US4854103
- [17] 24 US patent no US5379565
- [18] US patent no US5901520
- [19] US patent no US7669375