

Construction of Walls with Self Interlocking Bricks

Shubham Garad¹ Prathamesh Kadgi² Pratik Ahir³ Shivam Khillare⁴ Prof. Kiran Ghorpade⁵

^{1,2,3,4,5}Department of Civil Engineering

^{1,2,3,4,5}Trinity Academy of Engineering, Pune, India

Abstract— In the era, of Construction Industry the increase in material costs need to find more cost saving alternatives so as to maintain the cost of constructing houses at prices reasonable to clients. The worldwide housing shortage raise levels to search for appropriate, easy, fast and cost-effective new ways of wall construction. A structural component need to be developed in masonry buildings construction with the help of new interlocking mortar less concrete masonry blocks and a worldwide interest in the development of this type of bricks has taken place in recent years. The use of the mortarless interlocking block building system has not yet widely seen in India even though this system has been used in other countries.

Keywords: Self Interlocking Bricks

I. INTRODUCTION

The bricks which gets interlocked against each other without use of cement mortar to form a well structurally stable wall that reduces the economic cost and time of construction to almost half. At present there is a high demand for houses in India which is finding difficult to be fulfilled by builders and contractors adopting relatively slow construction practices leading to high construction cost. Thus there is demand for a product which can reduce construction cost and also increase the speed of construction without compromising quality and safety. Without compromising the quality and safety, the reduction in construction cost and speeding up the construction progress can be achieved by variety of ways, but we are concentrating on partitioning materials as partitioning of the space within the framed buildings is one of the major activity in the context of material requirement, speed & cost. Partitioning unit is costing around 40 to 45 % of the total construction cost. A fast & cost-effective alternative to conventional masonry used in partitioning work in buildings will be a great boon to the construction fraternity. So, through this project we are venture to develop a product named "Self-Interlocking Bricks". It will be used in partitioning the space in framed buildings. It will not demand mortar for construction & plastering to conventional extent. It will reduce the material & labor cost of partitioning of space and will speed up the construction. These are the bricks which will interlock themselves when the masonry is under construction and will either not require any mortar to interlock the bricks in adjoining layers or will require very less mortar for the said purpose and also for finishing of surface by the way of plastering. These bricks will have built-in projecting parts, which fit exactly precisely into depressions within the adjoin bricks placed aside, such that they are automatically aligned horizontally and vertically - thus bricklaying is feasible without special masonry skills. Since the bricks can be laid dry, no mortar is required and a substantial quantity of cement is saved.

II. LITERATURE REVIEW

A. Development of an Innovative Interlock Blocks

T. Praveen Kumar, R. Vigneshvar^[5]

Engineering college, Chennai, India Department of civil engineering panimalar

Almost any style of building can be created with interlocking blocks, the most design constraints being that the plan should set up ought to be rectangular and all wall dimensions and openings must be multiples of the breadth of the block sort used. All other principles of design and 38 constructions such as dimensioning of foundations, protection against rain and ground moisture, construction of ceilings and roofs, and the like, are the same as for other standard building types. The blocks are shaped with projecting components, which fit exactly into depressions in the blocks placed above, such that they are automatically aligned horizontally and vertically thus brick laying is feasible without special masonry skills.



B. Design Procedure for Semi Interlocking Masonry
^[4](Journal of Civil Engineering and Architecture 9 (2015) 517-525 doi: 10.17265/1934-7359/2015.05.003)

SIM (semi interlocking masonry) may be a quite innovative building system for mortar-less walls. It utilizes a special technique of interlocking SIM bricks that enables relative slippage of brick courses in-plane of a wall and prevents out-of-plane relative movement of bricks. It has increased capability to dissipate earthquake energy through friction between bricks compared with ancient masonry. It employed in earthquake resistant frame structures as infill panels, which also act as EDD (energy dissipation devices). However, as a mortar-less system, it is not coated by masonry style standards. The purpose of this paper is to introduce SIM panels for earthquake resistant multi-storey frame structures.

C. Sustainable Dry Interlocking Block Masonry Construction

BANSAL DEEPAK^[10] (Dy General Manager (Projects), HUDCO, Hudco Bhawan, Delhi 110003, INDIA). There is a desire to spot new innovative technologies to supplement old concrete and burnt clay brick mortar-based construction for masonry work. These days we want technologies which are sustainable in terms of one or more area unit of the subsequent parameters i.e. use of regionally on the market resources –

material & workforce, cost effectiveness, eco-friendly, easy to adopt in construction apply, are often forged –to place back transportation faster to build and energy efficient.

- Dry-stacked masonry results in speedier construction.
- Blocks will be created with reinforcement / conduit /passage option features facilitating earthquake resistant construction.
- Blocks created area ecofriendly as no burning is concerned.

D. Development of Lightweight Cement Blocks

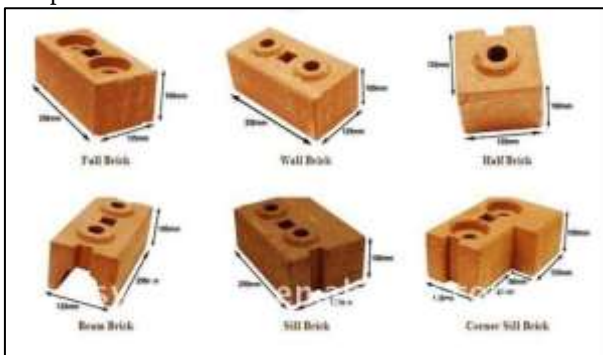
Saya Ramakrishnan^[6]

Swinburne University of Technology A wide variety of materials are used in the construction industry. When considering their application in wall elements, cement blocks are the most commonly used. Conventional cement blocks are made from a cement-sand mortar mix, which is heavy (density: 1800-2000kg/m³) and adds greatly to the self-weight of the structure. The self-weight of the structure represents aawfully massive portion of the planning load (Zaher Kuhail, 2001). Thus by reducing the burden of the blocks, the self-weight of the structure are often reduced. This in turn would aid in the reduction of the size of structural members and the resulting use of materials.

E. Overview of Concrete Block Wall Construction without Mortar

Abhijitsinh Parmar^{[7]a}

(Assistant Professor, Department of Civil Engineering, Shankersinh Vaghela Bapu Institute of Technology, Gujarat).In this research they have tried to make a concrete having possible lesser density and higher compressive strength using waste and eco-friendly material like EPS beads, Rice Husk Ash, Fly Ash. These three materials are easily available in local market and easy to use. EPS beads is been replaced by coarse aggregates and fine aggregate is been replaced with fly ash and rice husk ash. When in concrete mixes with EPS beads square measure sound and thermal insulation. With the assistance of those material the overall price of the development is reduced.

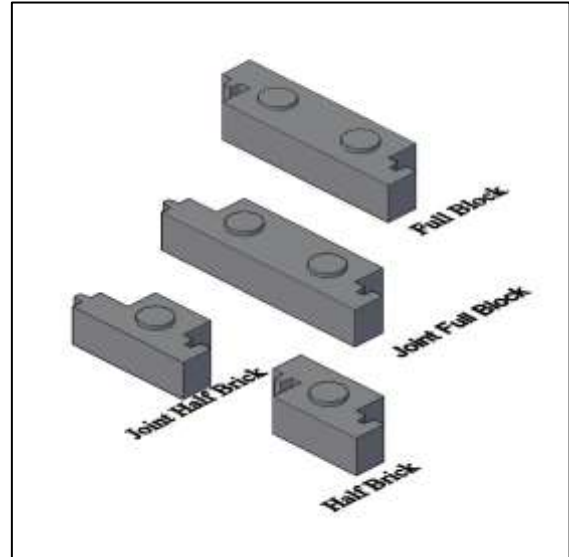


F. Study of a New Interlocking Stabilised Compressed Earth Masonry Block

Prof.RuteEires, Prof.Thomas Sturm, Prof.AiresCamões, Prof.Luís F. Ramos^[8]

With an answer of compressed earth blocks(CEBs) planned among the HiLoTec project, a venture between the University of Minho and Mota-Engil SA, a straightforward masonry soution is being proposed for seismal countries wherever stuff

material is exuberant and labour is unskilled. The intention is to form a masonry system which compromises between mechanical and practical requirements, in terms of economic and construction and in terms of energy savings and durability. A major premise of the project relates to conception of block with interlocking with vertical holes, in order to make it lighter and allow the application of structural reinforcement.



G. Behaviour of Interlocking mortarless block masonry M. S. Jaafar, A. H. Alwathaf, W. A. Thanoon, J. Noorzai^[1]

(Proceedings of Institution of Civil Engineers Aug2016 issue CM-3 Pages 111-117)

This paper presents an experimental investigation into the dry-joint contact behaviour of masonry and the behaviour of interlocking mortar less hollow blocks for grouted and ungrouted prisms under compression. Two experimental take a look at set-ups area unit projected gauge the contact behaviour of dry joints, considering the geometric imperfections within the contacting faces. The results show that the contact behaviour of a dry joint is very full by geometric imperfections in the block bed. Different patterns of deformation are distinguished in mortar less hollow (unrouted) and grouted prisms.

H. Design Procedure for Semi Interlocking Masonry

Yuri Totoev^[3]

Centre for Infrastructure Performance and Reliability, the University of Newcastle, Callaghan 2308, Australia

SIM (semi interlocking masonry) may be regionally innovative building system for mortar-less walls. It utilizes a special methodology of interlocking SIM bricks that permits relative slippyof brick courses in-plane of a wall and prevents out-of-plane relative movement of bricks. It magnified capability to dissipate earthquake energy through friction between bricks comparedwith ancient masonry. It will be utilized in earthquake resistant frame structures as infill panels that conjointly act as EDD (energy dissipation devices). However, as a mortar-less system, it is not coated by masonry design standards. The purpose of this paper is to introduce SIM and associated conjointly develop an analytical design procedure for this innovative masonry system.

III. CONCLUSION

- 1) Building cost is lower than the standard masonry construction without high skilled masons need, cement is saved.
- 2) load bearing walls are built instead of structural frameworks infill walls, and it also saves the additional cost
- 3) There is great structural stability and durability of interlocking block constructions in compare to timber constructions.
- 4) To increased wind and earthquake resistance grout holes and channel blocks are provided to steel reinforcement insertion in buildings
- 5) In centralized production units interlocking blocks are produced on large scale but it can also be produced on small scale on site.
- 6) Interlocking block techniques are suitable for multi-storied buildings, and also for standard masonry constructions.

The dry assembly of interlocking blocks saves time to construction and a huge amount of mortar, which is required for horizontal and vertical joints in Compared with conventional masonry.

REFERENCES

- [1] Development of an Innovative Interlock Blocks T. Praveen Kumar, R. Vigneshvar Journal of Civil Engineering and Environmental Technology Print ISSN: 2349-8404; Online ISSN: 2349-879X; Volume 1, Number 5; August, 2014 pp. 114 – 118
- [2] Design Procedure for Semi Interlocking Masonry (Journal of Civil Engineering and Architecture 9 (2015) 517-525 doi: 10.17265/1934-7359/2015.05.003)
- [3] Sustainable Dry Interlocking Block Masonry Construction BANSAL DEEPAK (Dy General Manager (Projects), HUDCO, Hudco Bhawan, Delhi 110003, INDIA), 15th International Brick and Block Masonry Conference, Florianópolis – Brazil – 2012
- [4] Development of Lightweight Cement Blocks Saya Ramakrishnan, Swinburne University of Technology, 4th International Conference on Structural Engineering and Construction Management 2013, Kandy, Sri Lanka
- [5] Overview of Concrete Block Wall Construction without Mortar Abhijitsinh Parmar, International Journal for Innovative Research in Science & Technology| Volume 3 | Issue 10 | March 2017 ISSN (online): 2349-6010
- [6] Study of a new Interlocking Stabilised Compressed earth masonry block Prof.RuteEires, Prof.Thomas Sturm, Prof.AiresCamões ,Prof.Luís F. Ramos
- [7] Behaviour of Interlocking mortarless block masonry M. S. Jaafar, A. H. Alwathaf, W. A. Thanoon, J. Noorzaei Proceedings of Institution of Civil Engineers Aug2016 issue CM-3 Pages 111-117)
- [8] Design Procedure for Semi Interlocking Masonry Yuri Totoev Journal of Civil Engineering and Architecture 9 (2015) 517-525 doi: 10.17265/1934-7359/2015.05.003