Journal of Theoretical and Applied Lego® Mathematics

Volume II, 2004, pages 4-7

A new and innovative SNOT approach for decorative applications. Mathematical calculation on 45° LEGO® parts geometries for further SNIR application.

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Received 2 September 2004; accepted 15 September 2004

Abstract

Calculation on LEGO® parts placed at 45° angle and SNOT building technique leads to new SNIR and stud less application.

Keywords: SNOT, SNIR, 45° angle

1. Introduction

Elementary LEGO® parts geometry and dimensional discussion. Conventionally, a LEGO® Unit (L) equal the 1x1 parts width: 1L=8mm=5/16 inch. The L is commonly avoided.

Studying the 1x1 bricks, we see the ratio between height and width (The 1x1 brick's base is squared) is 1.2 (6/5). The plate height is a third brick height (0.4L) **[3, 4, 5]**. Both have a stud on their top. This stud is slightly thicker than a sixth part of the eight of a brick, or a half of a plate's height (0.2L). The stud diameter is 0.6L. Tiles are stud less plates.

Plates and bricks exist in a wide variety of size from 1x1 to 8x16. Base plates are thinner but larger than plates (up to 48x48). Plates and bricks can be stacked on themselves or on a base plate. Base plate have regularly spaced studs on their up side, shaping an orthogonal matrix. The space between the studs is 1L. Two 1x1 parts placed side by side on a base plate just leave a very small margin between them: the 1x1 parts placed side by side are prevent from being non-orthogonally placed.

2. Results and discussion

Assuming the dimension of 1x1 parts, studs diameter, base plate stud-matrix size and margins, 1x1 parts in this matrix can be non-orthogonally placed, in any angle.

- The distance between two studs is 1L
- The gap between two studs is 0.4L
- The diagonal dimension of a 1x1 parts is 1.414L (square root of 2L)

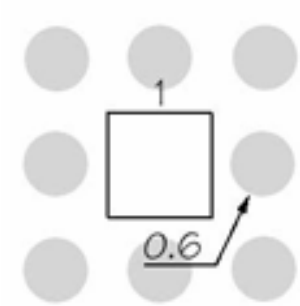


fig.1 Orthogonally placed 1x1 part

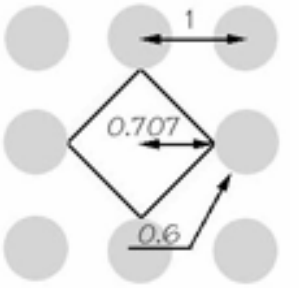


fig.2 45° angle placed 1x1 part

So we can assume a 45° angle (0.007L=5.6µ margin). The four nearest studs can't be used to stack another 1x1 part. The four next are distant of 1.414L. Let's see what can be done:

A) Orthogonally placed 1x1 parts: the gap between the two 1x1 part is 0.207L (fig.3)

B) 45° angle placed. The parts are parallel. The gap between the two parts is 0.414L (fig.4)

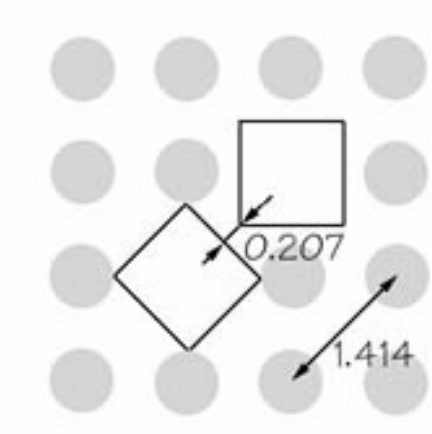


fig. 3 SNIR A Shape

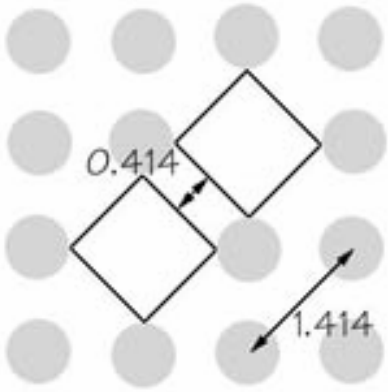
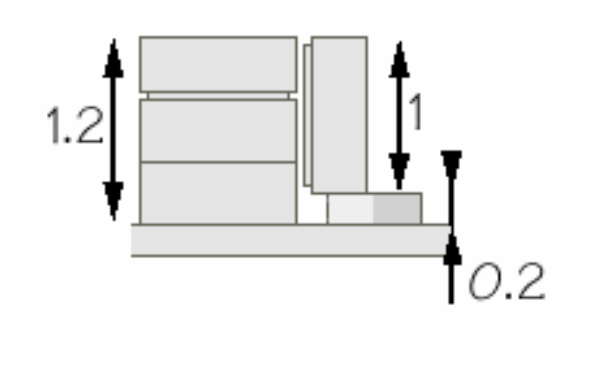


fig. 4 SNIR B Shape

The B shape (fig.4) is a new and innovative Studs Not In a Row (SNIR) building technique. A short bibliography work allow us to find a first one by Reinhardt "Ben" Beneke**[6]** using jumper plates. The gap of 0.414L is perfectly filled with snotted tiles (0.4L thickness). For more SNOT studies go through **[7, 8]**.

3. Conclusion

Some perfect vertically fitting and stud less upward side is possible using a 1x1 tile stacked on two 1x1 plates.



The three plates (two plates and one stud less plate - tile) are 3x0.4=1.2L high. It equal the tile width (1L) added with a stud height (0.2L).

fig. 5 Perfect dimensionally vertical fitting

Acknowledgments

This work was supported by the department for research on LEGO® of the FreeLUG University, France
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Experimental

Here are two illustrations of our experiments: