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## Development of Easy Tiling Trowel Box

(Pembangunan Kotak Kulir Memudah Kerja Pemasangan Jubin)

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### ARTICLE INFO

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### **Abstract**

An easy tiling trowel box was developed to facilitate the installation of the tile. This tool is also used for finishing work in the building. Besides that, an educator can use this innovative product to teach finishing work because it is easy to show the real practice to the student. Typically, using this product, tile installation is done quickly without taking into precision using spirit level in every view. The safety aspect can be harmful to the occupants of every building that is built. Additionally, the use of mortar between insufficient tile pieces makes the distance between these tile pieces to be too close. This is because tile craftsmen usually take easy steps for fast work and want to save costs. This project presents a time frame of comparison between the conventional and the modern method. Usually, the floor tile installation process is a finishing work done manually and described in detail including floor tile flow installation, mortar thickness, pattern tile installation, equipment, installation defects, cost, and the labour rate. Floor tile installation cost analysis is based on data obtained in a construction project. As a result, the performance of the Easy Tiling Trowel box in applying the adhesives on the floor effectively and evenly this product was successfully examined to facilitate tile installation work in a shorter time than conventional methods.

**Keywords:** Easy tiling trowel box, conventional, innovation, installation, modern method

## **INTRODUCTION**

Tile trowels are essential tools for applying tile mortar to wall or floor surfaces. But they do more than move the mortar from your mixing bucket to the installation site. A trowel also acts as a metered dispensing system, delivering just the right amount of mortar for the tile (Chung, 2006).

A tile trowel is like other types of masonry trowels in that it has a handle and a flat metal plate and is designed for scooping up and spreading mortar onto a relatively smooth surface. It's the notches in tile trowels that make them different. The notches do two important things. First, they make applying only a specific amount of mortar easy. No matter how much mortar you pile onto the trowel, the notches apply it in nice, even lines of identical thickness. Second, the trowel creates spaces between the lines of mortar. These allow air to escape when the tile is pressed into the mortar. Without the spaces, you could get air pockets that prevent the tile from lying flat or adhering properly (Chung, 2006).

An easy-tiling trowel box with adjustable notches is an upgraded product from a notched trowel which is produced to ensure that the product is placed on the floor uniformly and easily controlled. Thus, the notched trowels are rectangular-shaped tools with regularly spaced notches along one or more sides used to apply adhesive when adhering to tile or laying synthetic floor surfaces. Also, among the tools that not only tile installers carry using the conventional method, but it is a tool that will be very useful for other contractors as well (Kamarul Anuar et al., 2010)

They are specifically designed for scooping, spreading, levelling, combing, and finishing adhesives and mortars during the floor, wall, or ceiling installations. In addition, the product is recreated to save time because it is very capable to spread the adhesive paste more than once at a time. To test the capability of this tool, the period test will be done using conventional methods and modern methods such as an easy tiling trowel box with an adjustable handler (Mian, 2006).

## **PROBLEM STATEMENT**

The problem with installing tiles is new construction workers or unskilled workers use equipment as the construction process is quite complicated and requires a long period to complete the tile installation process (Mohd Hanizun, 2008). Next, uneven and tedious installation can result in defects and cracks in the floor. Finally, the Lack of product development to facilitate tile installation work has caused construction workers to use conventional methods.

## **OBJECTIVES**

A study has a specific purpose, and several goals or objectives need to be achieved to ensure that the research is successful. In this research context, the research objectives are (1) To design an Easy Tiling Trowel Box and (2) To identify the effectiveness in terms of time installation between conventional and non-conventional methods.

## **LITERATURE REVIEW**

Tile Installation Tool is used to facilitate the installation of tiles. This tool is also used for finishing work in the building. Besides that, an educator can use the Tile Installation Tool to teach finishing work because it is easy to show real practice to the students. Typically, using this product, tile installation is done quickly without taking into precision using spirit level in every view. The safety aspect can be harmful to the occupants of every building that is built. Additionally, the use of mortar between insufficient tile pieces makes the

distance between these tile pieces to be too close. This is because tile craftsmen usually take easy steps for fast work and want to save costs (Kamarul Anuar et al., 2010).

Every year, the conventional tile installation employed by skilled workers in the construction industry is seen to be some other problem in which producing neat, clean and accurate installation is difficult. For the conventional method, tile installation uses tools and materials such as float (for grouting), cutting tool (either a wet saw or scoring snap cutter), and spacers: depending on your space, choose from wedges, T spacers, or levelling spacers, buckets, sponges, tape, utility knife, and trowels, selecting the right trowel is an important consideration and depends on the size of the tile (Mian, 2006).

A margin trowel is a very useful tool to have. It can be used for mixing, cleaning squeeze out from grout lines, and popping a tile out of the thin-set to check coverage. The manual work rate varies from one researcher to another researcher (Mohd Hanizun, 2008). This may be because of the different sizes of tiles, different pattern arrangements, and labour fitness. If the manual work rate was used as an indication, the machine is slower and can be considered as not competitive (Abdul Rashid et. al, 2006).

## METHODOLOGY

The purpose of this study is to design a new product of tiling trowel that will consume low energy compared with the conventional method of tiles installation, which consumes more energy. Researchers came out with the idea of designing the Easy Tiling Trowel Box regarding the input given by construction workers, contractors, new construction workers, and other consumers. Fig. 1 shows the side view of the product design while Fig. 2 shows the back view of the product design. Fig.3 shows the side of the product outcome while Fig. 4 shows the back view of the product outcome. Finally, the performances between the Easy Tiling Trowel Box and conventional methods were done by testers in terms of time installation.

## RESULTS & ANALYSIS

For time comparison data, researchers have collected the data from our product tester which consists of 2 people. The first set of data comes from Tester 1, while the second set comes from Tester 2. For tile installation, researchers only took 4 tiles to be recorded as data for time comparison between the use of the Conventional Method and Easy Tiling Trowel Box.

Table 1. The performances between Easy Tiling Trowel Box and conventional methods by tester 1

No. of tiles	Conventional method	Easy tiling trowel box
Tile 1	1 minute 55 seconds	1 minute 50 seconds
Tile 2	2 minutes 30 seconds	1 minute 17 seconds
Tile 3	3 minutes 55 seconds	1 minute 11 seconds
Tile 4	3 minutes 23 seconds	1 minute 42 seconds
<b>RESULTS</b>	<b>11 minutes 43 seconds</b>	<b>6 minutes</b>

Table 1 shows it took 1 minute 55 seconds to lay tile 1 using the conventional method, but only 1 minute 50 seconds using the Easy Tiling Trowel Box. The usual approach took 2 minutes 30 seconds for tile 2, but the Easy Tiling Trowel Box method took only 1 minute 17 seconds. For tile 3, the conventional method took 3 minutes 55 seconds, whereas the Easy Tiling Trowel Box took 1 minute 11 seconds. For tile 4, the conventional technique took 3 minutes 232 seconds, whereas the Easy Tiling Trowel Box took 1 minute 42 seconds. The total time for the conventional method was 11 minutes and 43 seconds, but the Easy Tiling Trowel Box took only 6 minutes.

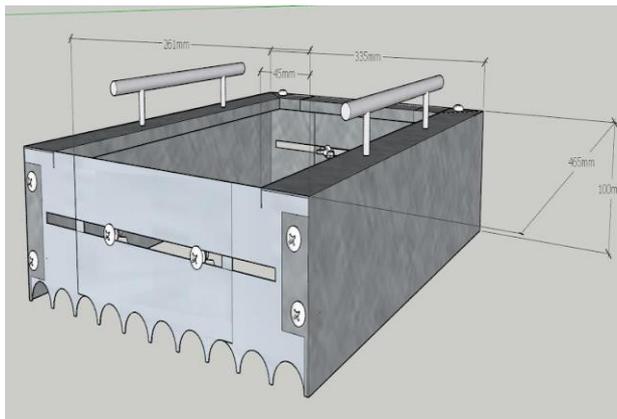


Figure 1. Side view of product design

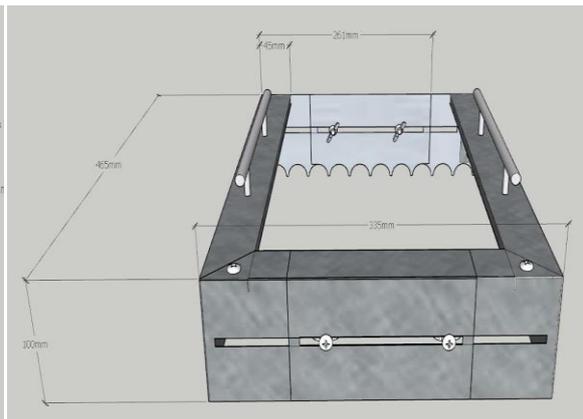


Figure 2. Back view of product design



Figure 3. Side view of product outcome



Figure 4. Back view of product outcome

Table 2. The performances between Easy Tiling Trowel Box and conventional methods by tester 2

No. of tiles	Conventional method	Easy tiling trowel box
Tile 1	1 minute 48 seconds	1 minute 50 seconds
Tile 2	2 minutes 37 seconds	1 minute 05 seconds
Tile 3	1 minute 40 seconds	1 minute 08 seconds
Tile 4	2 minutes 19 seconds	1 minute 25 seconds
<b>RESULTS</b>	<b>8 minutes 04 seconds</b>	<b>5 minutes 25 seconds</b>

Table 2 shows it was determined that the conventional method took 1 minute 43 seconds for tile 1, whereas the Easy Tile Trowel Box took 1 minute 50 seconds. The conventional method took 2 minutes 37 seconds for tile 2, whereas the Easy Tiling Trowel Box took 1 minute 5 seconds. The conventional method took 1 minute 40 seconds for tile 3, whereas the Easy Tiling Trowel Box method took 1 minute 8 seconds. The last tile, tile 4, took 2 minutes 19 seconds using the traditional method and 1 minute 25 seconds using the Easy Tiling Trowel Box. The overall time taken for the conventional method was 8 minutes and 4 seconds. And lastly, the overall time taken for the Easy Tiling Trowel Box was 5 minutes 25 seconds.

Figure 5 shows there were differences in time taken by Tester 1 and Tester 2 while using the Easy Tiling Trowel Box vs the Conventional method. The light blue on the bar indicates the Easy Tiling Trowel Box, while the dark blue represents the Conventional Method. The conventional method took the most time, as shown in the graph, while the Easy Tiling Trowel Box took the least time, as shown in the graph. As can be seen from the Tester 1 bar, the time required for the Conventional Method is the longest when compared to the

Easy Tiling Trowel Box. The time consumed by the Conventional Method from the Tester 2 bar is the longest when compared to the Easy Tiling Trowel Box. The performance of the Easy Tiling Trowel Box in applying the adhesives on the floor effectively and evenly as this product is designed to facilitate tile installation work in a shorter time than conventional methods such as the contractors.

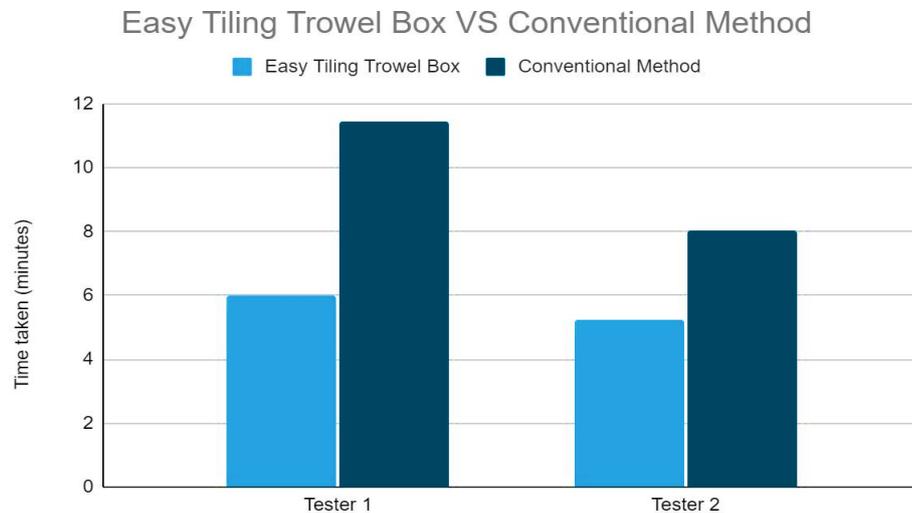


Figure 5. The performances between the Easy Tiling Trowel Box and the conventional method.

## CONCLUSION

In conclusion, the Easy Tiling Trowel Box was successfully developed and the performance of this product in applying the adhesives on the floor was successfully examined to facilitate tile installation work in a shorter time than conventional methods. In general, this innovation has an impact on the construction industry, especially in terms of labour costs, material costs and repairs.

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