

Foldable furniture - design selection for foldable table

Shafizal Mat^{1,2}, Mohd Azman Abdullah^{1,2,*}, Shamsul Anuar Shamsudin^{1,2}, Muhd Ridzuan Mansor^{1,2}, Faiz Redza Ramli^{1,2}

¹Fakulti Kejuruteraan Mekanikal, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia

²Centre for Advanced Research on Energy, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia

*Corresponding e-mail: mohdazman@utem.edu.my

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ABSTRACT – Foldable furniture has become the choice for consumers due to the constraint of space in urban area. The practical application of foldable furniture can be seen in trains and buses where the chairs can be folded. Many designs and concepts of foldable furniture have been introduced in the market including foldable tables. In this paper, method to select suitable design of foldable table is developed. Few criteria such as complexity of folding mechanism, strength of structure, material selection, type of joint, time consumed to fabricate and overall cost of the table are evaluated. Based on these criteria, a weighted decision matrix is used to rate the best foldable table design.

1. INTRODUCTION

The table is one of the important furniture everyone should have in their house. There was a time when a table only consists of a wooden plank and four supported legs at the bottom. Nowadays, the traditional table has been improved. Instead of being supported on the ground, it is supported by 2 legs and also mounted on the wall. In terms of spacing, it is also has been improved. The normal table can be put anywhere as it is not being fixed to anything but of course it uses a lot of space. The bigger the size of the table, the more space it is occupied. Some of the advantages of having this foldable table are allowed the user to sit comfortably on all sides of the table [1]. Next advantage is wall-mounted table allows saving some space area as it is closer to the wall and can be folded when not in use. Several articles support the simplicity of the foldable table. The portions of the picnic table have two legs hinged attached thereto to be foldable against the undersides of the portions and to fit within the space between these portions when folded. The foldable table is the most feasible and convenient design of all the time. Therefore, the analysis of the foldable table needs to be precise by using the analysis of the bolt and nut and the factor of the safety of the foldable table which of the allowable stresses and yield stresses [2]. For the wall mounted folding table, it need to have its own design characteristics to make them unique. So each of the folding tables actually have its own specific strength and compactness. The movement for the table to be open and close also have its own minimum effort [3]. The best type for this kind of wall mounted folding table

is that you only need least effort to open and close it and also it can withstand the most force onto it [4]. In this paper, a weighted decision matrix is develop to evaluate the design criteria to select the best and optimized foldable table based on the folding mechanism, strength of structure, material, type of joint and time consumed to fabricate the table.

2. METHODOLOGY

The basic requirement in the common table design is the ability of the table to support a load of at least 2000 N. Additional criteria evaluated in the design of foldable table are the complexity of the folding mechanism, material selection, assembly and manufacturing constraints, ergonomic index and envelope volume when the table is folded.

3. RESULTS AND DISCUSSION

The foldable criterion achieved by reducing the envelope size of the table from original condition when it is function as a table to support load and the folding condition when it is folded on the wall or floor and the envelope size is reduced. This kind of table will actually useful at any kind of space that are limited and so narrow. Figure 1 to 7 shows the designs of the foldable tables. Table 1 tabulates the design criteria of the tables. The envelope size here is the size of the table when folded in millimetres. The number of joint is the total joints installed on the table to make it fold. The design index is a subjective artistic value of the table based on the authors' perspective. Based on the total score of the table, Design 3 is selected as the best design among others.

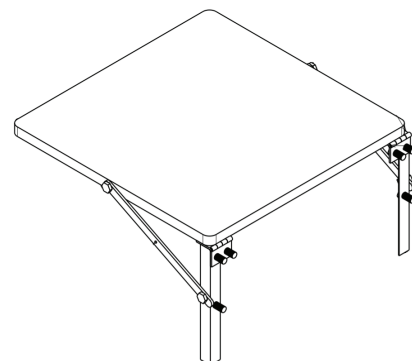


Figure 1 Table Design 1

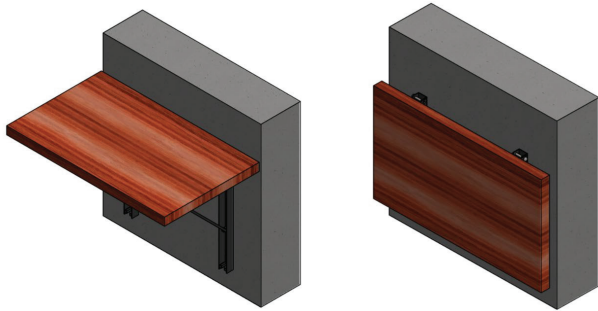


Figure 2 Table Design 2

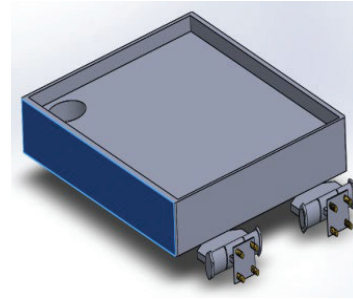


Figure 7 Table Design 7



Figure 3 Table Design 3

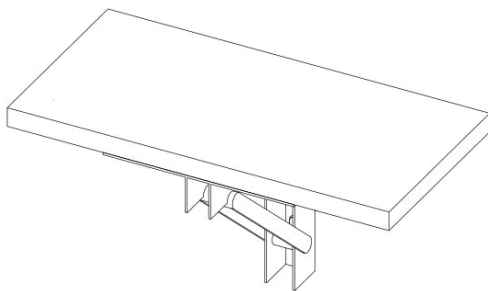


Figure 4 Table Design 4

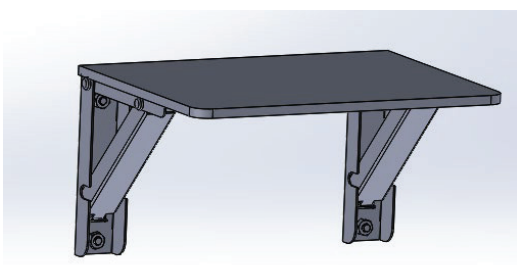


Figure 5 Table Design 5

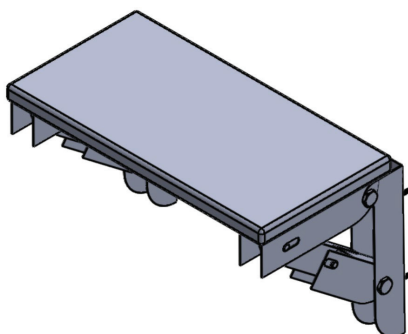


Figure 6 Table Design 6

Table 1 Design criteria

Design	Envelope size (mm)	Number of joints	Design index	Score
1	600x600x40	4	5	6.0
2	600x900x45	4	5	5.5
3	3300x1740x270	4	7	8.5
4	500x250x50	2	4	6.0
5	700x500x50	4	5	6.5
6	1000x500x50	6	5	6.5
7	1480x1000x130	2	4	6.0

4. CONCLUSION

The overall objective of the foldable table design is achieved when the tables can be folded and the envelope size is reduced significantly. The foldable criterion of each table is shown by the value of the envelope size. The artistic criterion of the table is subjective and based on the authors' point of view. Since the tables are relatively reliable in supporting the load, regardless the materials, the score can be used to select the best design and further fabricated. The minimal design criteria for foldable tables can be used for other foldable furniture such as foldable racks, shelves and beds.

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