GE106 Report

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Modern Folding Table

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Abstract:

This report addresses the disadvantages of traditional folding tables and offers an innovative alternative that is safe, durable, aesthetically pleasing, light, portable, and cost-effective. The report contains the objectives, criteria, and constraints for the new design, and provides a literature review and human factors analysis. Based on comparisons of all three concepts for durability, aesthetics, and cost-effectiveness, the aluminum table concept comes out on top. The design attempts to address the weaknesses of traditional folding tables and offer a practical and simple folding table appropriate for a range of indoor and outdoor settings. Overall, this report offers a thorough and in-depth examination of the issue and suggests a workable solution that satisfies the specified criteria and constraints.

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Problem Statement:

Many people who live in small apartments or homes struggle with the limitations of space where regular tables take up a lot of room and might be difficult to shift when not in use.

One option is to use traditional folding tables, but they frequently have several drawbacks that make them less useful for daily usage.

First off, traditional folding tables can be challenging to set up and store. They take a lot of work to fold and unfold, and some individuals could find them difficult to lift or move around. Furthermore, the size makes them difficult to store while not in use.

Regular folding tables might also be dangerous for kids. Such tables' legs and hinges can snag fingers, and the weight of the tabletop could force it to topple over if it were to be bumped upon. Regular folding tables are a risky alternative for households with young kids because this can result in serious injuries.

Traditional folding tables lack the stability and durability necessary for frequent usage, in addition to being unsafe. Under excessive weight, their legs could tremble or give way, resulting in spills and damage. These tables may need to be changed regularly because the materials used to make them are frequently fragile and lightweight.

Last but not least, many people may find the cost of traditional folding tables to be unaffordable. These tables can cost more than regular tables because they are sometimes advertised as specialised items, making them an unattainable luxury for individuals on a limited budget.

Traditional folding tables are a less-than-ideal option for people who want to save space in their living areas while still functioning because of all of these disadvantages put together. We want to create a folding table that overcomes these problems by offering a convenient, safe, and cost-effective replacement for conventional folding tables.

Need analysis:

Objectives:

Primary objectives:

To design a folding table mechanism that can be operated with a simple mechanism, which increases convenience and ease of use while maintaining stability and durability when using the table.

Secondary Objectives:

To ensure that the folding mechanism is safe for users by incorporating safety features such as locking mechanisms to prevent accidental folding.

To create a design that is aesthetically pleasing and adaptable to various indoor and outdoor environments.

To make the table lightweight and easy to transport without compromising its sturdiness when in use.

To determine the optimal materials for the table's top and legs, taking into consideration factors such as cost, weight, and durability.

criteria:

- Convenience and ease of use: The folding mechanism should be simple and straightforward.
- Stability and durability: When in use, the table should be durable and stable, with a design that makes it able to stand to normal wear and tear
- Safety: The folding mechanism should include safety features such as locking mechanisms to prevent accidental folding.
- Aesthetics: The design should be visually appealing and adaptable to various indoor and outdoor environments.
- Transportability: The table should be lightweight and easy to transport, without compromising on its sturdiness when in use.
- Cost-effectiveness: The manufacturing process should be cost-effective without sacrificing the quality and functionality of the product.

Constraints:

- Size and weight: The size and weight of the table should be compact and manageable, making it easy to transport and store. Height=75 cm, width=140 cm, depth=75cm, weight< 40kg.
- Safety regulations: The design must comply with safety regulations for folding tables, including stability, weight capacity, and locking mechanisms.
- Cost: The cost of manufacturing the table should be reasonable, taking into consideration the materials, manufacturing process, and market demand, Cost< 500 SR.

- Durability: The table should be able to withstand heavy weights without breaking down or losing its structural integrity.
- Aesthetics: The design should be visually appealing and adaptable to various indoor and outdoor environments.

Problem Formulation:

The problem to be solved is the need for a folding table which offers convenience while maintaining stability and durability when in use, while also being safe and aesthetically pleasing. Our primary objective is to create a mechanism (folding brackets) that can make the use of table easier and more convenient for users to fold and unfold the table as needed. Additionally, we aim to ensure that the folding mechanism is safe for users. We also aim to create a design that is visually appealing, and lightweight. Our design criteria include convenience and ease of use, stability and durability, safety, aesthetics, transportability, cost-effectiveness, to meet these criteria, we will need to consider constraints such as size and weight, safety regulations, cost, durability, aesthetics.

literature review:

Disadvantages of current designs:

1) As we can see in figure 1 below, hinges or joints can pose a pinching hazard when fold unfold.
2) Low durability in figure 2, table it can break easily.
3) Both designs are difficult to set up.
4) And hard to transport.

figure 1: current table

figure 2: current table

The solutions offered by our design:

1) the folding brackets create a more Stability and durability rigid structure that can withstand heavier loads.
2) The wheels make it easy to transport.
3) Easy to set up.
4) Folding brackets It does not pose a danger during the fold or unfold the table.

Human factors:

Anthropometric:

Anthropometric human factors are the measurements and proportions of the human body, which need to be considered when designing products that will be used by people. In the case of a folding table, the design should consider the average height, weight, and size of users, as well as their range of motion and comfort levels.

Ergonomic:

Ergonomic human factors are another important consideration when designing a folding table, as it focusses on how the design will impact user comfort and productivity. Here are some key ergonomic human factors to consider:

Comfort: The design should be comfortable for users to interact with for extended periods of time. This can include features such as rounded edges or soft surfaces that reduce pressure points and minimize discomfort.

Mobility: The design should enable users to move freely and easily around the table while using it.

Physiological:

Physiological human factors refer to how the design of the folding table mechanism can impact the physiological responses of users. In our case excessive noise levels from the wheels can disrupt concentration and increase stress levels for users.

Psychological:

Psychological Factors are concerned with the mental activity of the human during the use of the product. The design of the table should be attractive and match the user's preferences.

Morphological analysis:

Options table:

Table 1: Options table

features	Concept 1	concept 2	concept 3
Base Design	Metal base	Plastic base	Wooden base
Tabletop Material	Aluminium with textured finish	Plastic with wood grain pattern	Wooden
Aesthetic Design	Blue colour scheme with rounded edges	Minimalist design with neutral colours	Dark brown

Rating table:

Table 2: First scenario (Durability):

	Cost	Safety	Durability	Aesthetics	Transportability	Score
Weight	**15**	**20**	**30**	**15**	**20**	**100**
Concept 1 Aluminim Table	**5** **75**	**6** **120**	**10** **300**	**8** **120**	**8** **160**	**775***
Concept 2 plastic Table	**10** **150**	**9** **180**	**5** **150**	**5** **75**	**10** **200**	**755**
Concept 3 wooden Table	**6** **90**	**7** **140**	**8** **270**	**10** **160**	**5** **100**	**760**

Table 3:Second scenario (Aesthetics):

	Cost	Safety	Durability	Aesthetics	Transportability	Score
Weight	**15**	**20**	**20**	**30**	**15**	**100**
Concept 1 Aluminium Table	**5** **75**	**6** **120**	**10** **200**	**8** **240**	**8** **160**	**795***
Concept 2 plastic Table	**10** **150**	**9** **180**	**5** **100**	**5** **150**	**10** **200**	**780**
Concept 3 wooden Table	**6** **90**	**7** **140**	**8** **160**	**10** **300**	**5** **100**	**790**

Table 4: Third scenario (Cost):

	Cost	Safety	Durability	Aesthetics	Transportability	Score
Weight	**30**	**20**	**20**	**15**	**15**	**100**
Concept 1 Aluminium Table	**5** **150**	**6** **120**	**10** **200**	**8** **120**	**8** **160**	**750**
Concept 2 plastic Table	**10** **300**	**9** **180**	**5** **100**	**5** **75**	**10** **150**	**805***
Concept 3 wooden Table	**6** **180**	**7** **140**	**8** **160**	**10** **150**	**5** **75**	**705**

It appears that the aluminium table concept is the overall winner. It performed the best in two out of the three scenarios (durability and aesthetics)، while still being competitive in the third scenario (cost-effectiveness). Overall, this suggests that the aluminium table concept offers a combination of strength, visual appeal, making it a strong choice for those looking for a folding table.

Sketch:

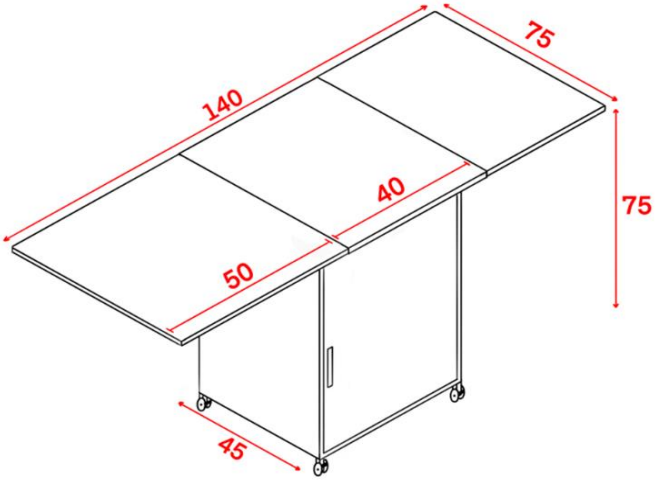

Figure 3: sketch for table when it's unfold, dimensions in cm.

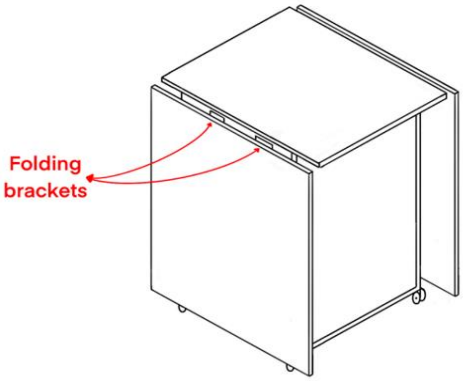

figure 4: sketch for table when it's fold

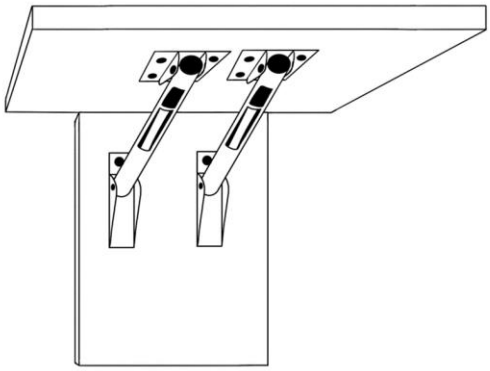

figure 5:Sketch for folding brackets

Folding mechanism:

How does the folding bracket work? Through a simple and easy process, all that you must do to fold the table is to raise the end of the table slightly to the top and at the same time press the folding brackets and it will go down slowly until it folds. In fact, the step of pressing the bracket is to increase safety, and it does not require much force. You can press Each bracket with just one finger. And to open the table, just lift the end of the table up.

Conclusion:

In conclusion, the report highlights the disadvantages of traditional folding tables and the requirement for an innovative design that is convenient, safe, durable, aesthetically pleasing, lightweight, simple to move, and reasonably priced. The report outlines the objectives, criteria, constraints, literature review, and human factors that must be considered during the design process. The new design attempts to produce a folding table that provides convenience and ease of use while retaining stability and durability when the table is being used by taking these considerations into account. The aluminum table proposal is the overall winner, giving a combination of strength, aesthetics, and cost effectiveness, according to the report, which analyzes three concepts based on scenarios of durability, aesthetics, and cost-effectiveness. The new design aims to overcome the drawbacks of traditional folding tables and provide a safe, visually appealing, and easy-to-use folding table suitable for various indoor and outdoor environments.