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RESEARCH ARTICLE OPEN ACCESS

Design Studios ft. The Perfect Drafting Table

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ABSTRACT
The aim of the research is to determine the design for the most feasibledrafting tables in design studios.The objective of this paper is to analyze the evolution of drafting tables, to analyze the different options of drafting tables available in the market, to understand the concept behind the design of drafting tables through various online sources and to suggest the best possible drafting table for a design studio. The research is conducted through literature studies done majorly through online sources. A market survey is also done to understand all possible options available in the market.Another survey is done among the user groups to understand their requirements and activity pattern. The research paper aspires to provide the most comfortable option of a drafting table according to user preferences based on the surveys conducted.
Keywords: Product Design, Drafting Tables, Ergonomics, User Compatibility

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I. INTRODUCTION

Drafting tables in the studios are one of the prized possessions of any designer. They are designed to be explicitly used by artists, engineers, and architects. They use drafting tables to make drawings and modify them on paper with pencil or ink. Manual drafting is unimaginable without this wonderful invention. It not only serves the purpose of drafting, but also can be used for various other purposes similar to the conventional tables.

II. BACKGROUND

The origin of drafting tables goes back to the 17th century. They were more commonly known as drawing boards at that time. They were (like most fine furniture at the time) considered luxury items for the upper classes. You would find drafting boards in a private gentleman's study or library, where they would serve as an accessory work surface for reading large folio documents or for sketching technical illustrations.

In 1905, George Ring was granted the patent for drafting table. This invention provides a flat-topped table of any required size, and upon the table there is a mounted rectangular frame, the frame surrounding the table and carrying hinged sliding rules, one of which is adapted to be used in ruling vertical lines and the other in ruling horizontal lines, and at each end of the frame a bar is mounted which is arranged parallel to the end of the frame and which carries a laterally-extending sliding rod upon which is mounted an adjustable head, and upon the head at each end of the table a ruler or rod is pivotally mounted, these rulers or rods serving, respectively, to facilitate in the making of the two sets of lines converging to vanishing points which are necessary in making perspective views.These early drawing boards (and the 18th-century architect's tables that followed) often had elaborate, yet delicate, wood supports that allowed the board to open up to a tilted angle yet fold away for tidy storage-much like today's portable artist easels.They were popularized with the growth of architecture.

As they are the prized possession of any architect, it is very essential to have it the right way, such that it is user specific and user friendly. The commonly faced problems include the of board inclination as preferred by the users, lack of storage spaces alongside them, absence of in-built cutting mats, to name a few.

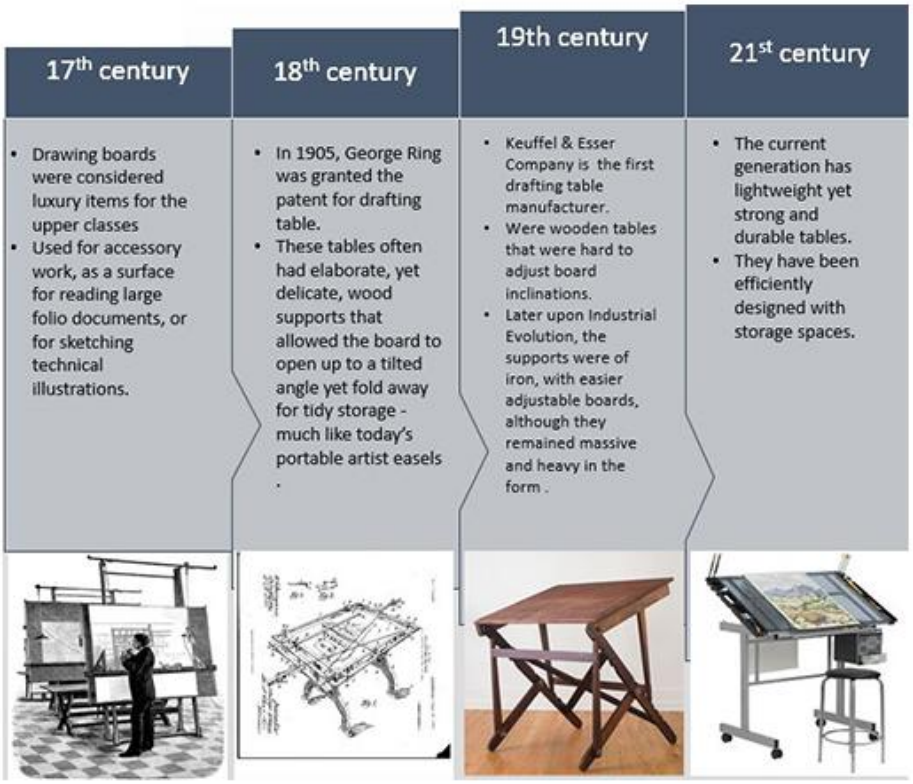
The reason drafting tables are tilted is mainly due to their evolution in furniture history which was mainly due to the limits of humans' physical reach (ergonomics) and also his ability to see (visual perception).The tilt is necessary to allow for closer inspection of detailed areas that would otherwise be far away from our eyes and hands if located on a flat surface.

Tilting the drawing board's work surface was also necessary to accommodate our eye's

visual perception of perspective and foreshortening.

The subtle disadvantages of drawing on a flat, horizontal surface are that, drawings created this way will have a tendency towards incorrect, exaggerated perspective in the vertical direction.

Drawings, paintings, or sketching on a tilted work surface helps eliminate this visual perception problem, which is why artists have worked from easels for centuries- even before the development of the early drawing board and drafting table furniture.



Source - https://www.core77.com/posts/28908/vintage-drafting-table-designs-a-19th-century-company-working-

Need for study

The study is done out of our own experience due to the various problems encountered during working on the drafting tables. Through the surveys conducted online, we are able to understand other problems associated with drafting tables that are undergone by a similar user group. The research paper aspires to provide the most preferred option of a drafting table according to the user analysis.

Aim

The aim of the research is to determine the design for the most feasible drafting tables in design studios.

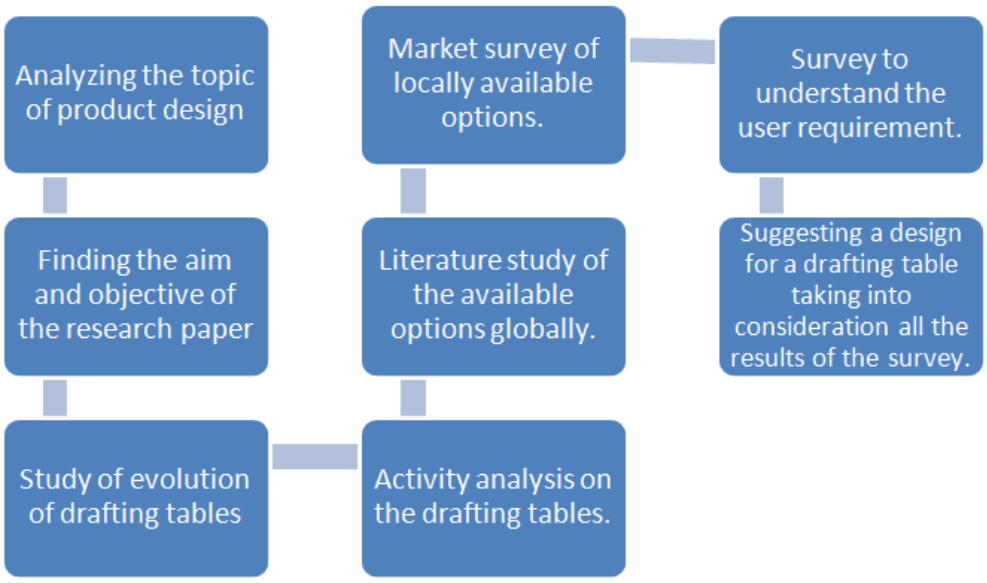
Objectives

- To analyze the evolution of drafting tables.
- To understand the concept behind the design of drafting tables through various online sources.
- To analyze the different options of drafting tables available in the market.
- To conduct a survey on the easefulness of drafting tables among students of architecture.
- Suggest a design for a drafting table taking into consideration all the results of the survey.

Scope of Study

The study focuses on conducting a survey among users to understand their working pattern and to know about their comfort zone while using a drafting table. This paper does not talk about the manufacturing of the table, but will suggest the most preferred option for a drafting table according to user analysis. The study was carried out through an online survey to similar user groups which helped us further in our study.

III. METHODOLOGY



Evolution of the Drafting Table

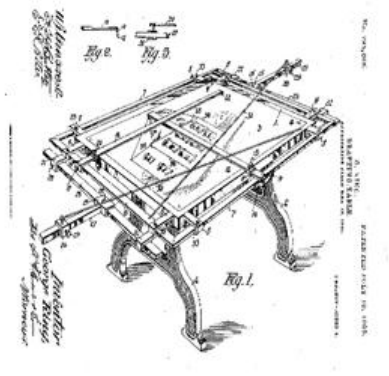


Figure 1: A flat-topped table of any required size, and upon the table there is a mounted rectangular frame, hinged sliding rules, a laterally-extending sliding rod upon which is mounted an adjustable head is provided.
Source –References

Figure 2:The angled top was achieved by the use of wooden teeth on the legs of the board which supported the board to be at an angle.
Source - References

Figure 3: The adjustability was accomplished by adding dowels that could be placed into a series of drilled holes.
Source - References

Figure 5: iron legs with a raise-lower mechanism.Source - References

Figure 4 Adjustability was provided by a semicircular, protractor-like mechanism that could be locked at an angle of the user's choice.Source - References

Figure 6: Adjustability with protractor-like mechanism along with storage units.Source - References

Activity Analysis on the Drafting Table

There are various activities that can be performed using a drafting table. These activities include drafting or technical drawing, impromptu sketching, drafting of fashion patterns, general reading and writing, reading blueprints and other large documents, painting, drawing maps, theater design, storyboarding, sewing, among others.

Architects, engineers, and draftsmen use drawing boards to make and modify drawings on paper with pencil or ink. Various drawing instruments such as protractors and set squares are used to draw parallel, oblique, or perpendicular lines, to draft precise technical illustrations, etc.

Market Survey

Figure 7: Fixed angle with metal supports.Source - References

Figure 8: 0degree inclination with angled supports.Source - References

Figure 9: 0degree inclination with one side having cutting mat with metal supports.Source - References

Figure 10: tempered glass board with easily adjustable screws and metal support.Source - References

Figure 11: 0degree inclination with storage tray and metal supports.Source -

Figure 12: Adjustable angle board with 3 varieties of storage and metal supports.Source - References

Figure 13: Adjustable angle board with metal supports. Source - References

Figure 14: Adjustable angle board with 2 varieties of storage space and wooden supports. Source - References

Secondary Study [Literature Study]

Table 1 The Different Types of Drafting Tables in the market with their specifications.

Product name	Height (inches)	Weight (pounds)	Adjustable angle	Foldable	Transport-able	Table mounted /freestanding	Equipment storage	Adjustable ruler	Sitting or standing
Alvin Portable Drafting Board	3	12	Yes	Yes	Yes	Requires desk space	No	Yes	Both
Martin Adjustable Angle Drawing Board	3	8.45	Yes	Yes	Yes	Requires desk space	No	Yes	Both
Zeny Height Adjustable Drafting Table	35.8	59.8	Yes	No	No	Freestanding	Yes	No	Sitting
SD studio Designs Drafting Table	30	46	Yes	No	No	Freestanding	Yes	No	Sitting
Stand-up Adjustable Standing Drafting Table	38.5	53	Yes	No	No	Freestanding	Yes	Yes	Both

Table 2: The Different Types of Drafting Tables mentioned above, with the product description, advantages and disadvantages.

Product name	Description	Advantages	Disadvantages
Alvin Portable Drafting Board 	It has an aluminum straightedge with rubber edges that are soft to enhance grip, control and comfort. The drafting board also has a cross-wire and pulley system that ensures the board is maintained parallel in any position as the straightedge glides up and down the board. The drawing surface is smooth, white melamine. The board also has folding metal legs that have rubber-dipped ends to prevent scratching. These legs are also set at an angle to prevent the board from collapsing accidentally. The board can be used in a flat or an elevated position. The drafting board is allowed to hang over the table edge up to 8 inches, bringing the surface close to the user and increasing the working angle.	It is foldable; thus, it is suitable for small work areas. It is portable comfortable to use. Has an adjustable ruler.	Not as sturdy as other products. It has a smaller work surface compared to other drafting tables

Martin Adjustable Angle Drawing Board 	It is an adjustable angle drawing board with parallel straightedge that utilizes an anti-warp aluminium straightedge for stability and strength. There are large knobs on each side of the unit for adjusting the straight-edge to stay parallel and align with the drawing. The surface is backed by the exclusive martin adjustor-stand which has rubber feet for enhanced stability. The locking mechanism enables it to be locked in the preferred angle, making it more comfortable.	High stability and strength. Easily to adjust and set. Portable (handle) Has a nonporous melamine surface.	It has a smaller work surface than other drafting tables
Zeny Height Adjustable Drafting Table 	It features adjustable angle board, non-woven drawers and powder coated iron legs. The board has a sheet stopper that prevents the drawing sheets from slipping. When the main workstation is not in use, the top of the desktop can be put down flat and be used as a conventional desk area. The legs of the drafting table have rubber pads which aim to enhance the stability of the table and also protect the floor from scratches. It comes with a premium stool, and is ideal for drawing, painting, and crafting.	The board is light in weight making it easily portable. Adjustable height (28 -35.8 inches). Has a high-quality p2 mdf table top. It's easy to assemble.	It is not portable
SD Studio Designs Drafting Table 	The table features 38 x 27 inches of main work surface. It has wheels making it easy to be moved from one place to another. The powder-coated heavy-gauge steel frame, makes it durable. It also includes three plastic drawers attached for storage, along with inbuilt pen and pencil grooves on the main work surface. It is also accompanied by a premium stool.	Strong, clear, and durable. Tempered safety glass top. Work surface can be adjusted from 0-70 degrees. Durable Built-in pencil groove	It is not portable Some users may prefer an opaque working platform
Stand Up Adjustable Standing Drafting Table 	This drafting table has a durable powder coat finish ensuring that the table can be used for a long time.it also features oversized thumb screws which make it easier to adjust the angles and height of the table. The sturdy steel frame along with extra-large rubber feet enhances the durability and stability of the table, while at the same time protects the floor from scratching.	Wide range of height adjustment Can be used either when standing or seating Easily adjustable Adjustable angles Durable	Not portable Requires space

Inferences from Literature Study

From the studies conducted so far, we analyse that certain characters (i.e.) protractor like mechanism for adjusting, parallel bar mechanism for t scale, cutting mat merged with drafting tale along with sufficient storage options and strong supports is really essential for a drafting table. Since this study is not enough to provide the apt drafting table hence, we have to understand the user requirement through a survey of the user group.

Primary study

The survey was carried out online through a Google form. Similar user groups who have better understanding of the product were the participants of the survey. It was aimed for about 40 responses. The survey contained 10 objective type questions related to drafting tables. Space was provided wherever necessary for the participants to share their opinions if any. The responses of participants who were regular users of the product, helped us to understand the preferred comfort level of the product.

According to the survey responses from the user group, we analyze that the user group spends maximum of 3 to 4 hours on the drafting table. They prefer detachable/ portable drafting table over fixed ones with metal frame for support, wood [ply wood] for the surface [board] along with smooth/ glossy finish. The comfortable posture to work is from 0 to 30 degrees, which provides a relaxing posture to work, but the user group also prefers varied angles when necessary. Hence, adjustable board angles are preferred. The height of the drafting table they use is apt for the user group but not comfortable. For drafting purposes, portable T-squares are preferred. The storage spaces also play a vital role for the user group among the given options [roll pack holder, bag storage, stationery space, vertical sheet storage, horizontal sheet storage, T–square holder, cutting mat]. The most essential among these, is the storage for stationery and the least preferred is the storage for bags.

Questions used for conducting the survey

1) How often do you use drafting table?
1. 1 to 2 hours
2. 3 to 4 hours
3. 5 hoursand above

2)Rate the comfort of using your drafting table on a scale of 1-5.
(1 being least and 5 being the most)

3)Choose among the following the category of your drafting table.
1. Detachable/Portable
2. Fixed

4)What is the material of the frame and board of your drafting table?
1. Wood, Wood
2. Wood, Glass
3. Metal, Glass
4. Metal, Metal

5)What is the surface material of your drafting table?
1. Slightly grained
2. Smooth/ Glossy
3. Matt

6)Which according to you is the most comfortable posture to work?
1. 0 to 30 degrees
2. 30 to 60 degrees
3. 60 to 90 degrees

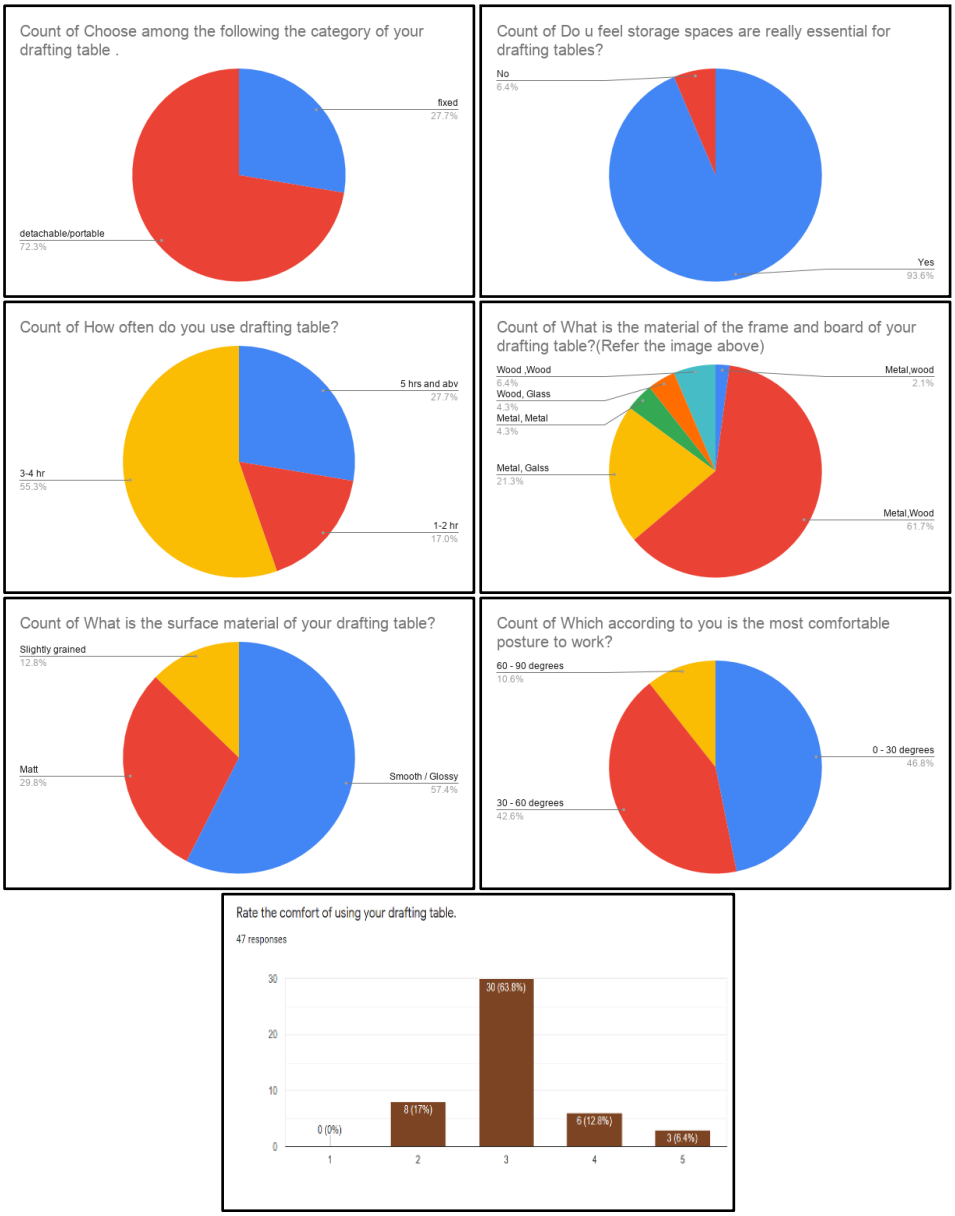
7)Which option for T- scale is preferred?
1. Fixed (parallel bar) T - scale
2. Movable/Portable T - scale

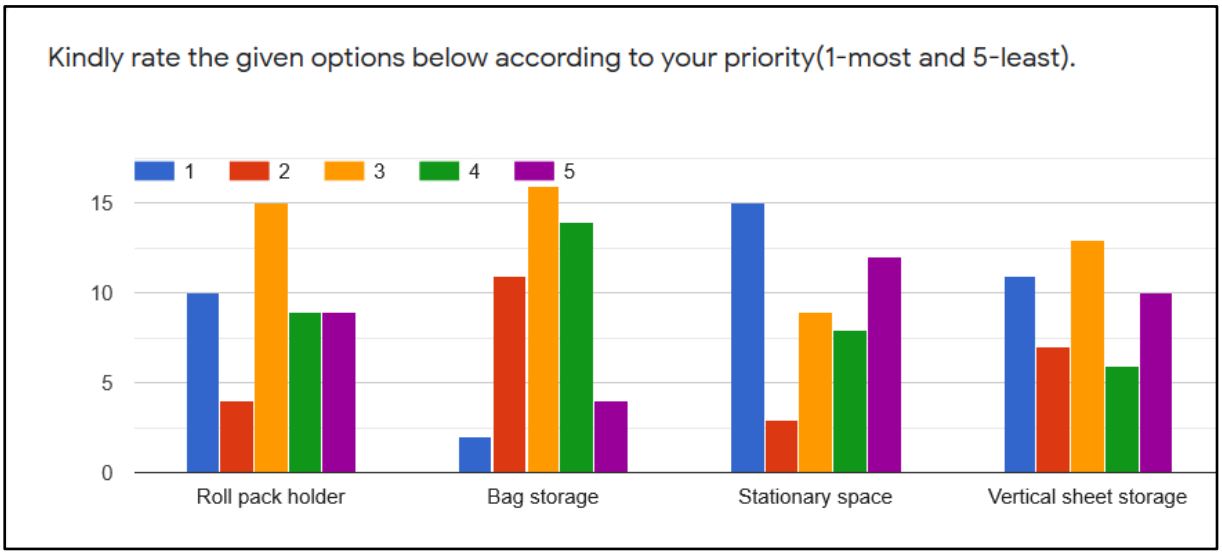
8)Do u feel storage spaces are really essential for drafting tables?
1. Yes
2. No

9)Kindly rate the given options below according to your priority (1-most and 5-least).
1. Roll pack holder
2. Bag storage
3. Stationary space
4. Vertical sheet storage
5. Horizontal sheet storage
6. T – scale holder
7. Cutting mat

10)Is the height of your drafting table apt for drafting? Kindly mention the height in the space provided.
1. Yes
2. No

SHOWN BELOW ARE THE RESULTS OF THE STUDY:





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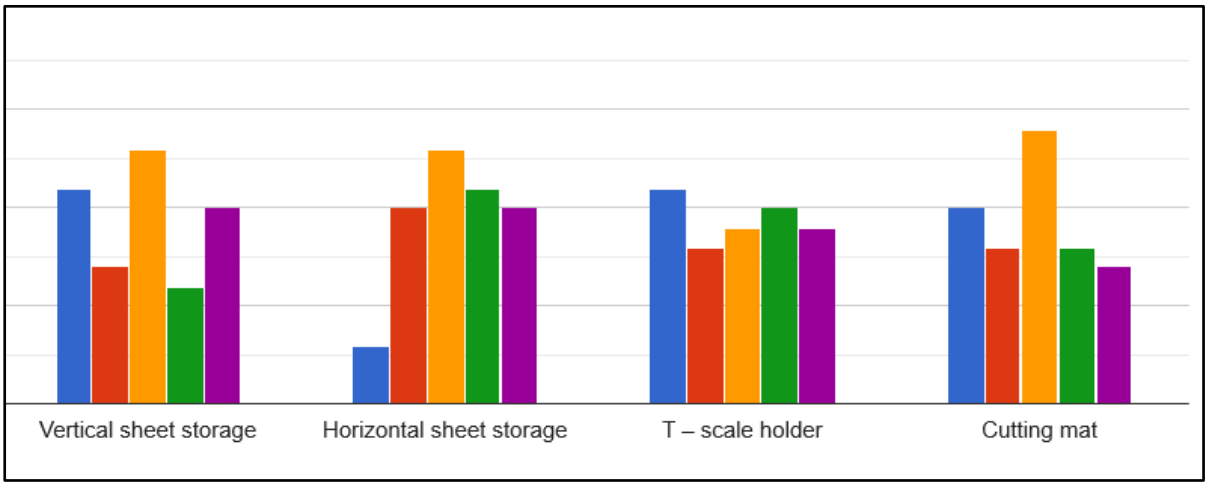

Inferences from the Online Survey:

1. Number of hours spent on the table:

According to the survey responses from the user group, we analyse that the user group spends maximum of 3 to 4 hours on the drafting table.

2. Preferred mode:

They prefer detachable/ portable drafting table over fixed ones.

3. Materials and texture:

The materials preferred are metal framed for support, wood [ply wood] for the surface of the board along with smooth/ glossy finish.

4. Comfortable working postures:

The comfortable posture to work is from 0 to 30 degrees, which provides a relaxing posture to work, but the user group also prefers varied angles when necessary. Hence, adjustable board angles are preferred.

5. Preferred height:

The height of the drafting table they use is apt for the user group but not comfortable. For drafting purposes, portable T-squares are preferred.

6. Additional spaces:

The storage spaces also play a vital role for the user group among the given options [roll pack holder, bag storage, stationery space, vertical sheet storage, horizontal sheet storage, T–square holder, cutting mat]. The most essential among these, is the storage for stationery and the least preferred is the storage for bags

The Proposal

Analysing the learnings from the research conducted so far, we learn that user comfort for the design of a drafting table depends on, the materials used, storage spaces along with the varied heights it can provide. Accordingly,the best preferred materials are wood along with metal. Optimised storage spaces provide for better user comfort.

Driving factors of the design would be portability, detachability,easy assembly and smooth functioning.

Figure 15: Exploded view of the proposed drafting table.**Source -** References

The features of the proposed drafting table are

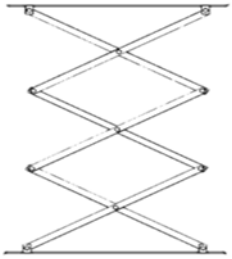

Figure 16: SHEET STORAGE Utilization of the form of supports for sheet storage**Source -** References

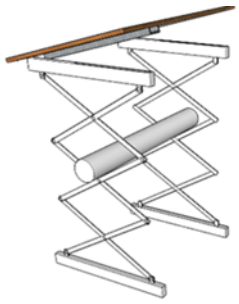

Figure 17: HEIGHT ADJUSTMENT The design offers 2 convenient heights one comfortable to use while standing or sitting and the other to use when sitting on floor.**Source -** References

Figure 18: PORTABILITY

The drafting table should be designed in such a way that, it can be easily detached and carried around.**Source -** References

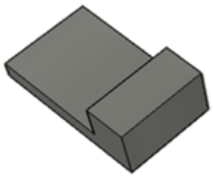

Figure 19: ROLLPACK HOLDERA small projected hook on one side of the table to hold the roll pack.**Source -** References

Figure 20:STATIONARY STORAGE The provision of a stationary tray below the board will comfort the user to store the stationary while drafting.**Source -** References

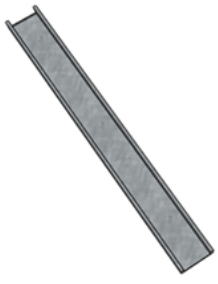

Figure 21:T-SCALE HOLDERU channel below the board to hold the t scale.**Source -** References

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