ANALYSIS AND COMPARATIVE STUDY OF USE OF CARDBOARD AS A MATERIAL FOR DESIGNING FURNITURE

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ABSTRACT

Cardboard is a major material in the form of paper used as a material for packaging. The whole packaging industry is dependent on the cardboard. It is available in various forms and shapes like sheets, rolls, and tubes. It is basically manufactured from recycled paper. In the growing need of environmental consciousness and awareness, the paper covers the alternative use of the same cardboard in the same form without changing the manufacture process as a material for making and designing furniture, with the comparative analysis of the contemporary materials that are already used for designing furniture. Also during the phase the comparative analysis of cost effectiveness would also be looked upon.

KEYWORDS: Cardboard, furniture, cost effectiveness, design.

Introduction:
The topic of study is the use of cardboard as material for designing furniture. The paper will be dealing with the existing use of cardboard, the limitations, and the drawbacks and then finally the methodology adopted to overcome the drawbacks from the material thereby using it as a material for making furniture.

During the course of study, the main emphasis would be given to the different known techniques of use of cardboard for making furniture and the innovations carried out and above all the testing of strength of the material and then finding out the optimum solutions for rectifying the loop holes.

“Cardboard chairs and tables may be the answer for people who do not want to spend a lot of money on traditional furniture, whether because they move a lot or because they will out grow it in a few years. Though it may be gaining popularity with the recent push for more environmentally-friendly living, the idea of cardboard furniture has been around for several decades. Designers are now using it to stylistically accentuate homes and more people are learning about its many uses.”

As an architect and a designer, to analyze and find out different options and solutions is a part of the task because of growing trends, population, and change in the thought process of users, so cardboard is thought of an option to be used as a material for making and designing furniture.

Various research works and design options and alterations in the process have been made by many designers, so to continue with the same this topic for study is being adopted. There is a great future of cardboard furniture in the coming time with the increase in number of users.

Cardboard has been used as a material for making furniture by Ar. Frank O Gehry in 1972, so there are many researches done for the use of cardboard as a material for making furniture, the thesis will be dealing with a type of extension and some innovations that can be made in the techniques so as to achieve more strength and durability.

Advantages of cardboard as a material to be used for designing furniture:

1. As per the topic taken for study that is use of cardboard for making furniture, the major advantage is easy to use and portable, so the interiors can be changed frequently.
2. Secondly the material is light weight and cost effective also, so after a span of time replacements and changes in design can be easily made.
3. Flexibility in designing can be achieved as there is no specific joinery or nailing or screwing required as in timber or metal furniture.
4. The total assembly can be erected without any help of large machinery and factory.
5. The overall cost of the final product is comparatively very less as compared to the contemporary materials used for making furniture as the raw material itself is a recycled one, and can be taken directly from the used boxes or packaging material.
6. There is no need for trained laborers to assemble the whole furniture it can be a do it yourself exercise also.
7. Last but not the least cardboard is a material made from recycled paper so the aspect of environment and environment friendly design is also considered, which is a major issue of concern all over the world.

Comparative study of various contemporary materials used for making furniture in the form of SWOT analysis.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Strength</th>
<th>Weakness</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber/wood</td>
<td>Can be finished</td>
<td>Susceptible to termite attack</td>
<td>If the wood is seasoned properly</td>
<td>Many new materials and low cost also</td>
</tr>
<tr>
<td></td>
<td>Durable</td>
<td>Not resistant to moisture</td>
<td>these weaknesses can be avoided</td>
<td>are available such as plastic and cane</td>
</tr>
<tr>
<td></td>
<td>Aesthetically pleasing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can be molded in desired forms</td>
<td>Not 100% moisture resistant</td>
<td>Since the metal furniture is lower</td>
<td>Many new materials and low cost also</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td>At times the welding joints don’t look</td>
<td>in cost than wood, minor changes can</td>
<td>are available such as plastic and cane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pleasing</td>
<td>make it more usable</td>
<td></td>
</tr>
<tr>
<td>Plastic</td>
<td>Durable</td>
<td>Not resistant to heat</td>
<td>Since the furniture is light weight</td>
<td>Not at all environmental friendly</td>
</tr>
<tr>
<td></td>
<td>Aesthetically pleasing</td>
<td></td>
<td>so there is always an opportunity</td>
<td>can cause great harm to nature, cannot</td>
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<tr>
<td></td>
<td>Can be molded in desired forms</td>
<td></td>
<td></td>
<td>be disposed</td>
</tr>
<tr>
<td>Cane</td>
<td>Vernacular and aesthetically pleasing</td>
<td>Not resistant to fire and moisture</td>
<td>Since the furniture is light weight</td>
<td>Doesn’t come under the category of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>so there is always an opportunity</td>
<td>luxurious furniture, mostly used outdoors</td>
</tr>
<tr>
<td>Bamboo</td>
<td>Vernacular and aesthetically pleasing</td>
<td>Doesn’t catch fire easily if</td>
<td>As compared to cane it is more stable</td>
<td>Bamboo cutting is not allowed in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>treated with chemicals and same goes</td>
<td>and workable</td>
<td>large number so there is a threat.</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Environment friendly and is light weight</td>
<td>Not resistant to moisture and fire</td>
<td>Cardboard is nowadays being used as</td>
<td>Since the mentality and thinking of users</td>
</tr>
<tr>
<td></td>
<td>also trendy furniture can be made using</td>
<td></td>
<td>an alternative material, and many</td>
<td>is biased and also other materials</td>
</tr>
<tr>
<td></td>
<td>this material</td>
<td></td>
<td>firms and designers are into</td>
<td>are there so it can be a threat</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>making such furniture</td>
<td></td>
</tr>
</tbody>
</table>

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Material and Methods:
Now that the paper is emphasizing mainly on cardboard so the material is cardboard and the methods that are listed down are based on the case studies and literature studies done through various medium. Here the manufacturing process is not taken into consideration as the furniture assembly is not dependent on the process of manufacture. The sheets that are used for packaging are directly used a material for making the furniture.

1. Folding sheets
2. Fixing/interlocking sheets
3. Gluing sheets
4. Use of cardboard tubes

On the basis of the above mentioned division the type of furniture and the comparative analysis along with the fixing details are listed one by one. During the comparative study the parameters that are studied are the appearance fixing and basic method of assembling the whole system and the observations done and at last a table explaining the analysis of the various types of assembly and the various parameters that a designer consider while designing are covered, like aesthetics, maintenance workability durability etc.

1. Folding sheets

Image 1 is showing a chair made from folding technique where a single piece is being used to form a chair with the help of folds.

Image 2 is again showing a simple folding technique used in making of cardboard boxes again with a single piece.

Image 3 is again showing folding and fixing technique where the whole assembly comprises of two or three pieces.

Image 4 is showing another example of folding technique.

2. Fixing/Interlocking sheets:

Image 1 is showing the arrangement and fixing of sheets to form a small table. Since the fixing itself looks so nice that there is no need of any surface treatment.

Image 2 is again showing the same arrangement to form a chair.

Image 3 is having some curvilinear shapes.

Image 4 is showing small circular shapes thereby forming tables.

3. Gluing sheets:

Image 1 is showing the arrangement of sheets of cardboard by gluing them together and then cutting in desired shape.

Image 2 is showing similar arrangement and then gluing them together in the required manner.

Image 3 is showing a chair or seating.

Image 4 is again showing a very aesthetically arranged to have a seating.

4. Cardboard tubes

Image 1 is showing a simple vertical assembly of rolls of different sizes to form a chair and in the similar way a table with glass top.

Image 2 is showing a horizontal assembly of rolls and use of metal to give strength to the structure.

Image 3 is showing again the vertical arrangement of different sizes of rolls and then forming a shape out of it.

Image 4 is showing the arrangement in horizontal direction with a abstract shape.
Comparative analysis of different fixing methods and techniques studied

**Conclusion:**
To conclude it can be said that cardboard can pose as a very good alternative for making furniture if properly used. Also the material is a produce of recycled paper which adds to more advantage of the material. Many architects and designers are already working on the same, but it is not being done at a grass root level. In the days where the threat to environment is increasing day by day, such innovative and interesting design ideas need to be advertised and worked upon more and more. Cardboard should not be just become a material foe making craft assignments but it should be more and more experimented and tested to shift the excessive use of timber in furniture industry which can thereby result in less cutting of trees and can help conserve the natural resources to some extent.

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