The New Alternative Raw Materials for Forest Products

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Abstract:

The world’s forests are one of the most significant natural resources and provide a vast variety of benefits to the quality of life on this planet and a wide range of products to society. Therefore, it is becoming increasingly difficult to ignore the importance of recovery of forest products in terms of the protection of forests. The aim of this investigation shows that it is possible to obtain new materials by using wasted forest products as an alternative raw material (such as paper products). This study will serve as a base for future studies about producing furniture by utilizing wasted paper and show some related works which were done.

Key Terms: waste paper, furniture, forest products

Introduction:

Forests are one of the most rewarding sources this world has to give. Total forest area on earth today is approximately 4 billion hectares (46 million km² out of 148 million total km² of land on earth) (Global Forest Resources Assessment, 2005). Forests generate income and provide multiple benefits to environment and economy.

According to the Food and Agriculture Organization of The United Nations, forests provide renewable raw materials and energy, maintain biological diversity, mitigate climate change, protect land and water resources, provide recreation facilities, improve air quality and help alleviate poverty, shelter (M. Hosny El-Lakany, 2013).

At the same time, forests are affected by fire, air pollution, pests and invasive species, and are often the primary targets of agricultural and urban expansion. For these reasons, we must continue to seek improvements in forest protection, maintenance and management.

In this circumstances, recycling of forest products become an important affair in the point of the economy, management of natural resources and environment. It probably true to say that one of the main recyclable forest products is paper.

Literature Review

Recycling of Paper: Over the centuries, paper has been made from a wide variety of materials such as cotton, wheat straw, sugar cane waste, flax, bamboo, wood, linen rags, and hemp. Regardless of the source, it is known that need fiber to make paper. Today, fiber comes mainly from two sources — wood and recycled paper products (URL-1).

Recovered paper using in order to obtain recycled fiber is collected from paper converters, printers, and distributors. Obtaining recycled fiber is not based on forests resources. It also comes from used paper products from consumers in private homes, offices, and institutional settings. Recycling is the most common way to help save energy and trees compared to the method of cutting down trees. According to the American Forest & Paper Association in 2010, 63.5 percent of the paper used in the United States was recovered for recycling, an average of 334 pounds for every man, woman and child nationwide and an 89 percent increase in the recovery rate since 1990 (L. West. 2013).

When the global consumption of paper per capita is investigated, it can be explicitly seen that the value reaches 371 million tonnes in the worldwide at Figure 1 (Swedish Forest Industries Federation, 2013).
In recent years, there has been an increasing interest in paper recycling in many countries. It probably true to say that one of the main recyclable forest products is paper.

Recovering paper has been used in order to obtain recycled fiber which can be collected from paper converters, printers, and distributors. Obtaining recycled fiber is not based on forests resources. It also comes from used paper products from consumers in private homes, offices, and institutional settings. Recycling is the most common way to help save energy and trees compared to the method of cutting down trees. Recycling paper uses 60% less energy than manufacturing virgin timber paper in accordance with the American Forest and Paper Association (1996). The recovery of paper products shows varieties from country to country (Figure 2).

With the information obtained from the American Forest and Paper Association, paper and paperboard recycling was at 63.4% in 2010. The majority of the paper and paperboard being recycled is paperboard, or paper of a cardboard-like stock. However, valuable high-grade office paper is recycled at extremely low levels. Recent approaches by purchasers, governments, and producers would create the market demand necessary to recover the valuable high-grade office paper that would be quality furnish for magazine paper. These actions will thereby help to create a reliable supply of eco-papers.

**New Product:** Increasing interest for lightweight panels in the field of furniture industry all round the world. Lightweight panels can be used as alternative products to the conventional wood-based panels (particleboard, medium density fiberboard, plywood, etc.) with a density of about 0.650-0.750 g/cm³ at relevant furniture and joinery applications (K. Busch., 2004).

Honeycomb paper is a good example of forest products which are made of 100% recycled material and as a consequence, environmental friendly. It has been identified as major a proper, low-cost, strong core or filling for furniture sandwich panels. Honeycomb contributes to a lightweight but robust or solid looking piece of furniture and offers a high strength-to-weight and a high strength-to-thickness ratio. Also it provides many advantages for transportation in terms of costs and handling (Honiel, 2013).

Paper honeycomb are produced traditionally by the conventional expansion process and corrugation process (Figures 3&4) (Barboutis, I., Vassiliou, V.).
It is remarkable that in the rapidly growing Asian furniture industry a majority of all furniture panels are already paper honeycomb core panels.

The main advantages of the lightweight paper honeycomb sandwich panels for the furniture industry are, lighter and easier to transport and handle products, cheaper transportation costs and good load bearing capacity with high strength to weight ratio (Figure 5) (Barboutis and Vassiliou 2010).

Development in new materials in furniture industries can be seen in specific combinations of existing materials, e.g., Grünholz (2000) describes research on new materials in the furniture industry and he also mentions lightweight panels with a paper honeycomb core as a material with potential. Developments and concepts relating to the use of lightweight panels for furniture are shown by Wagenführ (2003), Bau und Möbelschreiner (2003), Zuliefermesse Ost Westfalen and Michanikel (2005). Also, it seems that paper and paperboard (Shigero and Ghery, 2002) are like bamboo (compare Deithier et al. 2000) or wood (Renzo Piano, 2000) materials of a modern movement in architecture and design.
In some studies, conventional lightweight paper panels and paper tubes can be analyzed with respect to their suitability as furniture materials (Figure 6). Joints between the two materials were developed and evaluated. As a result, it shown that specific adaptations are necessary in order to use paper materials for producing furniture (P. Alexander Johannes, E. Michael, 2007).

Bob Falk (1997), he says that there are two major problems associated with recycling treated wood. First, the exposure of workers to preservative chemicals during the recycling process is of concern and must be investigated. Second, products made from recycled treated wood may not have the same resistance to decay and insect as the original treated wood product.

In the engineered wood products industry, primary and secondary wood residues are directed to the particleboard production rather than MDF. When using recycled wood materials the MDF process requires a higher degree of contaminant removal control as any impurity can affect the binding process. The types of raw materials recycled into particleboard production are; clean pallets, crates, offcuts, saw dust (particle greater than 1mm), shavings, particleboard offcuts (not MDF). Solid or chemical contaminants require segregation and cleaning technologies (Daian and Ozarska 2009).

Moveable furniture that adapts to different situations that can appear and disappear according to needs that has economy as its strong point. This is some of the input that has led several designers worldwide to produce chairs, tables, bookcases, armchairs using a very well known material-corrugated cardboard - in an unusual way (URL-2).

Result and Conclusion

- To sum up recycling process brings a great deal of advantages in terms of environment and economy. This process promotes the sustainable use of natural resources. Working together, recycling activities around the country promote community development while reducing the need for new landfills, preventing pollution, saving energy and reducing greenhouse gas emissions (URL-3, 2013).
- Over the past 30 years paper and cardboard have grown as important renewable materials. The experts of processing of environmentally friendly materials for furniture making and furniture designers have interested in paper.
- Ecological considerations will make using paper increasingly important issue.
- Due to innovations in the paper industry the materials can be used in much more diverse way.
- As long as recycled paper is converted, the fiber becomes shorter, weaker and more brittle. In general, paper can be recycled up to seven times before it must be discarded.
- Furniture designers have been made of different planning on the design of recycled paper and paper products. Many modern and contemporary recycled furniture designs are now made using reclaimed or recycled wood, paper or metal. The concept of making furniture pieces from waste paper (recycled wood) is quite cool actually.

In addition to all these, different furniture is producible and desirable designs are applicable regard to the requirements of usage area of products.

References

Global Forest Resources Assessment 2005, Progress towards sustainable forest management.