

## **Applying High Technology in Reusing Wood Industrial Process Waste Based on Sustainability Principles**

**Assist. Prof. Dr. Ahmed Mohamed Safi El-Din**

**Assistant Professor, Faculty of Applied Arts, Beni Suf University**

[ahsafy@yahoo.com](mailto:ahsafy@yahoo.com)

### **Abstract :**

The several stages in the operation of wood and furniture manufacture, from cutting and shaping to finishing and polishing, result in a lot of wood waste of varying degrees in size, shape and type, and dealing with these violations in developing African countries, especially Egypt, is done in random ways that lack planning, whether from In terms of storage, transportation or reuse, due to the lack of a clear mechanism for industrial establishments that adopt the principle of sustainability to deal with these wastes, these wastes remain a source of increasing concern, and often constitute environmental challenges, and this research has addressed the presentation of a sustainable model for managing this waste , Is to create a production unit that works to run those wood waste that comes out of the industry periodically, and turn it into precise sawdust produced according to studied standards through experiments to determine special specifications such as, for molding it afterwards with reused plastic, to produce artistic products that can be used once Other, which represents a new economic dimension for these waste and in a sustainable way, based on modern molding techniques to deal with waste in a sustainable and economic way, and thus the waste turns into a source of income to the company and represents an added value to the actual product, and the disposal of waste to project generates income after covering the costs of its establishment.

### **Keywords:**

Wood reuse - sustainable manufacturing - wood waste management - compound materials - economic value added.

### **Research problem :**

The majority of the woodworking and wood industries operating units in Egypt and Africa lack an effective scientific method for managing industrial waste that achieves the principle of sustainability.

### **The current situation in Egypt:**

Research has revealed that a medium-sized plant produces an average of 367 kg of wood waste per month, Factories have great difficulty in getting rid of these wastes in the absence of a successful system for disposal, so only half of this quantity is what can be transferred to the panels from the wood manufactured or reused in a safe environmental way, while the other half is disposed of either by burning or through the traditional garbage system Which constitutes great harm to the environment, even if exhibited The factories to the merchants buy these waste at a cheap price or provide it for free, so the cost of transportation will remain an obstacle for the merchant to know that his profit, in the end, will not be rewarded for the hardship of the reuse operations and the transportation costs, so the only solution for the companies is to transfer that waste to public garbage dumps (to become a big challenge) In

front of the state's waste disposal system) which is a major waste of economic value that can be invested.

### **How some European countries deal with wood waste:**

through analyzing the policy of these countries in dealing with wood waste, it shows the following:

- 1- These wastes must be well classified and sorted based on the size from large and small pieces to flakes and fine sawdust, and based on the classification the optimum use is determined for each of these categories.
- 2- The preference is to recycle and use as much as possible, and the choice of power generation is the last option to reduce carbon emissions.
- 3- Spreading awareness of the danger of indiscriminate burning of wood waste or burying it, while seeking to pass strict legislative laws criminalizing these acts.
- 4- The use of innovative technology, whether in the manufacture of wood or in the separation of waste, recycling or burning it to generate energy helps maximize the benefit from it and reduce its damage to the environment.
- 5- Applying industrial quality systems to ensure the quality of the recycled product as well as the quality of industrial inputs involved in the wood waste recycling industry

### **Composite Materials:**

Composites began in the field of aeronautics and space engineering because of their light weight, and these materials are made of natural fibers fibers such as sawdust or synthetic like glass fibers, immersed in a lightweight plastic spandex, such as polyester and epoxy (composing the mold or the bond between the fibers) .

### **Green composite materials :**

They are composite materials that have two main advantages, the first is that they are recyclable, usable, and operational, and the second is that they are environmentally degradable, and the trend to use such materials has become essential for two reasons: the first is to preserve the natural resources of the materials so that they remain for generations, and the second is to protect the environment by limiting the damages caused by burying or The burning of these materials, even if the realization of the second advantage still meets a major challenge, which is the high production costs of the necessity of finding a biodegradable biopolymer.

### **Flexible plastic wood:**

At the beginning of the development in the field of plastics reinforced with natural fibers, sawdust or wood fibers resulting from wood products such as old furniture, wooden packing boxes, or wood residues used in construction were used, as a filling of the polypropylene PP or PVC. With plastic wood, the proportion of wood in this material is between 30-70%, and it can be used in door and window solutions, and furniture parts, as these products are not able to be clearly procedural during use, which facilitates the use of recycled spandex materials, it is an easy material to manufacture. The market of this compound material has grown strongly in the recent colors, especially for it, with the advantage of being highly resistant to water and weather conditions, and used as floors for swimming pools and outdoor fillings of buildings that support weather factors.

## Application

The idea of application depends on the production of a composite material (plastic wood) that is cheap and has good operational properties and can be recycled several times without losing its operational specifications in a large percentage, provided that the waste of furniture factories and plastic containers used in manufacturing is used.

Where we use: Wood waste from furniture manufacturing, empty plastic containers.

Both materials are an environmentally difficult challenge to get rid of, but by mixing both materials together in calculated proportions, they produce an inexpensive compound material with high mechanical properties that can be reconstituted into molds to form beneficial products.

The synthetic material is called plastic wood (WPCs) and is a composite material that contains sawdust and thermoplastic materials. Where the sawdust is mixed with thermoplastic materials such as polyethylene (PE) and polypropylene (PP), poly (vinyl chloride) (PVC), with rates ranging from 30-70%. The mixing process produces a material characterized by:

Flexibility and ease of formation, Lightweight and shock resistance, Its good insulation of heat, sound, and electricity, Its resistance to water and weather conditions, Cheap price and ease of production, Its ability to be recycled and used,

## Conclusion :

Through the study, a researcher found that the resulting material, even if it was installed from reused materials, but it has high operational specifications compared to the costs of its production and enjoyed high flexibility in the methods of use because of the specifications that combine the advantages of wood and plastic at the same time, and were presented in At the same time, a solution for the waste of wood factories and plastic consumables, as it is characterized by the possibility of recycling them multiple times, which represents a sustainable dimension, the production unit that installs this raw material, even if it is expensive in the beginning, but it covers its cost and begins to generate profit in a short time with the quality of the product Pain Design and marketing skill, sometimes the material may need a PVC film to cover the final surface and give it a distinctive natural shape such as wood (for example in doors and dolphins), and the material can also be given this shape through simple additional manufacturing processes that give this The shape is stable and homogeneous with the steel material to form parquet fingers, for example or the floors of swimming pools. The bottom line is that this project has full flexibility where the investor can estimate for himself the size of the investments he wants to pump according to the type of product to be manufactured according to the determined capital.



**Some models for using the material in garden products due to its high water resistance, erosion, ease of cleaning and high operational capacity**

**Results :**

- 1 - The use of primitive manufacturing methods in the manufacture of furniture increases the volume of waste from that industry while using the means modern technology reduces it.
- 2 - Using the technology developed, whether in the manufacture of wood or in the separation of waste, recycling or burning it to generate energy, helps to maximize the benefit from it and reduce its damage to the environment.
- 3- Compound materials represent an added value for each of the materials involved in their composition.
- 4- Compound materials can be used as a sustainability feature through the fulfillment of one of the two factors, either the possibility of reuse or the ability to decompose environmentally or both.

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