



Abstract

The Use of Composite Materials in Constructional Design of Furniture Products, and Metal Constructions

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Introduction

Raw materials represent an important role in the design, as it is considered to be a means of physical embodiment of different ideas of the design in the mind of the designer materially. The raw materials are related to all functional, aesthetic, constructional and usability aspects. The realistic profile of the structural work is defined by the nature of the performance of the raw materials, and their suitability for usage. The process of the selection of raw material is subject to several references, the most important of them is recognition of the information related to the physical characteristics of the materials, such as visual appearance, weight, and density, as well as in terms of the construction perspective, like the strength, rigidity and flexibility considerations, in addition to the nature of the materials performance to their partial functions in the entire system, such as interoperability and configuration, and economic and environmental dimensions. The wider of the designer's knowledge of the materials potentials and methods of treatment, the highly breadth of imaginative ideas and his ability on innovation. As a result of the great industrial development witnessed worldwide in all fields, the need to find alternatives to the materials of several industrial uses becomes urgent, that these alternatives should be highly qualified in terms of the cost, light weight and characteristics that serve the design in general, to be used in various



industrial applications, such as means of transport, constructions, etc. Therefore, the composite materials have been innovated to include a wide number of alternatives and compositions that achieve high rates of durability, rigidity, flexibility, light weight, and surface value, the matter that makes them represent of crucial importance in constructive design of furniture products, and metal constructions as a material integral to metal materials.

Search Terms :- Composite Materials – glass fiber – carbon fiber - carbon nano tubes - Laminated Composite Materials - Materials Particulate Composite

The Research Issue

the advanced materials, including the composite materials represent one of the most important modern applied sciences meeting the concern to industrialized countries. Although the composite material used as basic materials in many uses, such as several means of transport, space, military, sports industries, and constructions in several advanced countries and authorities. In return, the composite materials do not enjoy sufficient attention at local level in terms of study and application, particularly in the field of furniture and metal constructions, which often rely on natural materials, such as wood, marble, glass and some synthetic materials, such as acrylic as a complementary material with metal products failed to meet the evolving requirements of the design. While composite materials with their mechanical, physical, and operational characteristics as a complementary material with metal materials, such as iron, aluminum, and copper, they are able to achieve many values added to the constructive design of furniture products and metal constructions.



Research Goal

It aims to clarify the components and characteristics of composite materials, and the added value for being used as complementary materials with traditional metal materials in the constructive design of furniture products and metal constructions.

Importance of the Research

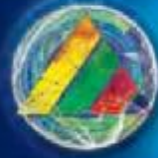
Raw materials are means of physical incarnation to ideas of design on the ground, which must be consistent with the functional, aesthetic constructional, operational and economic requirements for design. Composite materials are a good alternative to various physical materials as a supplement with mineral ores in meeting these requirements successfully in the constructive design of furniture products, and metal construction.

Research Methodology

The research follows the descriptive analytical method in the study of composite materials and use them in certain constructive design of furniture products, and metal construction.

What is composite material?

can be defined as a combination of two or more materials that results in better properties than those of the individual components used alone. In contrast to metallic alloys, each material retains its separate chemical, physical, and mechanical properties. The two constituents are a reinforcement and a matrix. The main advantages of composite materials are their high strength and stiffness, combined with low density, when compared with bulk materials, allowing for a weight reduction in the finished part. The reinforcing phase provides the strength



and stiffness. In most cases, the reinforcement is harder, stronger, and stiffer than the matrix. The reinforcement is usually a fiber or a particulate.

Research Results:

- 1- Composite materials represent an added value to the raw materials that make them up, because it has the properties not owned by the foundation material or supporting material separately. Thus, this opened broad prospects for the exploitation of many of the raw materials in this renewed field.
- 2- The most visible and important properties of composite materials is the rigidity, light weight, high flexibility, and good appearance of the surface. These properties are rarely met in one material of conventional metals or natural materials.
- 3- Rigidity of composite material qualifies them to be used in industrial and constructive applications, which are exposed to harsh conditions of stress. Property of light weight represents a great economic importance, especially during transportation, handling, and storage of furniture products, and metal constructions.
- 4- - The scope of composite materials includes a very large alternatives and compositions in blending operations between the supporting materials and basis materials, as well as manufacturing methods. The continuous development of these materials carries a lot of surprises and features that were not anticipated.
- 5- Nanotechnology represents an addition to composite materials field, because they adjust and develop impressively in the properties of the raw materials that make up this material to achieve the enormous and rapid



leaps in the properties of complexes and positioned to lead in industrial and construction applications.

Discussion of Results

One of the greatest dilemmas facing the designer is the limits and possibilities of the raw material of which furniture products and metal construction are made. Innovative and bold designs on paper are often made in a large scope of freedom and embark on the lines and spaces in order to express their design ideas, which are often strange and illogical. Several questions are always raised: How this design will be manufactured of and turned into a tangible product?, What are the raw materials able successfully to achieve a realistic during the use thereof?, Will is bear the stresses and incident during use it?, Will it be lightweight, flexible and solid?, What is the quality and value of visual appearance and elegance?,

Through the review of the composite materials by the research and findings, we can say that the use of composite materials in the constructive design of furniture products, and metal constructions fully or basically to some extent, to achieved the positive answer to these questions currently and in the future. Furthermore, composite materials add to the thought of creative designer a lot of visions and prospects, and alternatives and solutions that were not on the table on the scene under the traditional raw materials that have certain limits in the application, and requires a lot of operational and aggregate to get to innovative design forms characterized by freedom in shape, but the big challenge for the designer of furniture products and metal constructions is the availability of these raw materials with their multi- alternatives and to be of high quality at the local market level, and at the right price, Can we own a database and industrial information reported in Egypt so easily through which value-added to furniture products and metal constructions can be achieved at local and regional level.



There are some local companies which import little of composite materials, especially granular complexes branded (Korean), and some metal composite panels, such as (Alicompund), and the others, but in a limited scope in terms of shape, characteristics, potentials and species. Many of these overlapped imported materials are of low quality due to low prices when imported from abroad.

Thus, the chances of the use of composite materials in the constructive design of the products are limited. Here comes the role of academic and industrial bodies specialized in these areas, in order to strive for the development and manufacture of these raw materials so this development is reflected in the innovation and quality of products usability in all fields that can use composite materials in Egypt, such as means of transportation, usability equipment, furniture and metal construction and others.

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