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The knock down system of rattan furniture for global market

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Abstract. The characteristics of furniture design for the global market are very universal and uniform by following international standards. The ease of use, delivery, storage and assembly of rattan furniture products are necessary in the global furniture market. One of the problems in the design of rattan furniture construction is a joint system between components. This study aims to develop knock-down construction systems used in rattan furniture. Joint bolts (JCB) connector is designed to refer to the strength of rattan in receiving compressive loads. The references used in this study are knock-down construction systems for wood panel furniture products and solid wood furniture. Based on the results of the study, a construction system consisting of joint connector bolts for rattan furniture connections was used. This result is one of the references for further development. Keywords: knock-down furniture, connector nuts, rattan.

1. Introduction

Although rattan is a category of wild plants that are considered not useful, it has been the material of main Indonesian furniture export products. Rattan raw material is still one of the potential for furniture in Indonesia. Janumirno [1] states that 80% of world rattan is supplied from Indonesia. On the other hand, the potential for rattan raw materials has not been optimally utilized for furniture. There is a tendency for rattan to only be used to meet the needs of domestic handicrafts and furniture products, so that the absorption capacity is not optimal. In addition, in terms of competition in the global market, Indonesian furniture is still unable to compete with Vietnam, China and the Philippines. Observations in the field indicate that rattan furniture products still follow a conventional construction system, which incorporates the nailing, wrapping, binding and the weaving of the rattan. Conventional production patterns will result in production capacity which is not large and not standardized, so that production lines cannot be made and therefore cannot be massly produced. Hence, design thinking is needed related to construction technology and production technology of the rattan furniture. The phenomenon which has existed for decades is rattan furniture's large, fixed, and not dismantled construction so that it consumes quite a lot of storage space, including in the contents of containers for the delivery of exported goods to other countries. Consequently, the knock-down construction system in the furniture industry is very well known as it saves storage space in the delivery containers.



The knock-down construction system is used for wood panel and solid furniture products; therefore, the standard joint connector bolts (JCB) follows the pattern of plywood or solid wood. Not many have tried the installation systems to be used on rattan furniture. In fact, it is connoted that the construction of rattan furniture with a knock-down system is not feasible to apply, because rattan is considered more fragile than wood or wood panels. In this context, research has been conducted on the use of knock-down construction systems by re-engineering the joint connector bolts suitable for rattan furniture, especially for the needs of the global export market.

Based on the research results of Supriyatna-Marizar, Irawan, and Chairy [2] in the context of rattan furniture design for the global market, very specific design characteristics were found. Literature and field studies found that the demands of furniture products of global markets rely on some characteristics as follows: (1). having universal tastes; (2). easy to pack; (3). easy to use; (4). easy to be massly produced; (5). having good aesthetics; (6). following the design trends; and (7). offered with low price [3]. Furniture products tend to use functional and systematic construction with the following characteristics: easy to disassemble or knocked down, easy to fold, easy to stack, easy to move, easy to carry, easy to store, ready to be installed, and ready to wear. In the book *Designing Furniture*, Seth Stem [4] discusses that furniture's characteristics become a part of a design that can reveal visual elements or visual language in the furniture. Construction is part of the characteristics of furniture design. The characteristic which is still rarely performed in rattan furniture design is using a knock down system which is the main target of this study. The main advantages of the knock down system are practical, compact in terms of packaging, easy to lift and transport, easy to dismantle, and efficient in the use of space. This has an impact on added economical value. Besides that, what has become the rattan furniture trend in the global market is the stacking furniture system. In this study, knock down became a system that would be applied to rattan furniture. Knock down fittings are assembly mechanical devices that use various metal or nylon connections to replace the connecting procedure in furniture construction [5], [6], [7], [8]. In product design such as rattan furniture products, another important thing to consider is safety and comfort when the product is used. In this case, the knock down design applied to rattan furniture using conector nuts must produce rattan furniture products that are strong, safe and comfortable when used by consumers. Therefore, it is necessary to design knock down that can meet consumer needs related to the above [9], [10].

2. Method

In this study, the rattan furniture design developed was a knock-down system. This is because the design of rattan furniture which has a knock-down system is still rarely made by the Indonesian, even international, market producers. Therefore, in the process of rattan furniture design for the global market, it will be prioritized on rattan furniture designs which have a knock-down system. Rattan is a natural material that has a certain diameter and is naturally porous [11]. Therefore, a joint connector bolts (JCB) design which fits the rattan shape pattern was developed [12]. The bolts joint connector design is carried out by adopting the joint connector in the market. It is adjusted to the needs and strength of the rattan, so that it is not easily detached from the rattan and does not easily damage the rattan. The technology of making knock-down furniture uses production machines, especially multi boring machines. The material used can be brass or steel material. The study conducted to obtain the forms and

methods of the production process is a literature study and field study of various furnitures which are designed with knock-down assembly systems.

The work steps taken in the joint connector bolts design are: making a design concept according to the needs of the rattan furniture (Figure 1) in terms of strength, shape and safety; planning the production process; selecting materials according to strength requirements; carrying out the production process; testing the installation in rattan furniture; making repairs as needed; carrying out mass production and assembling rattan furniture.

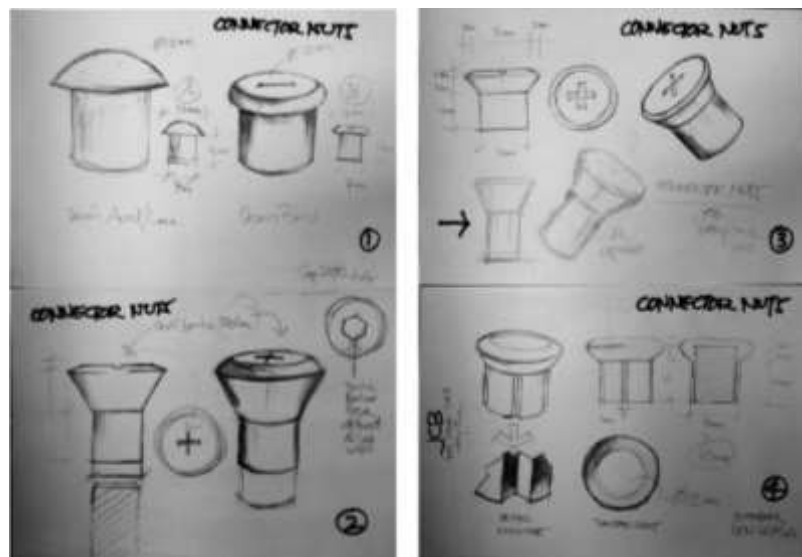


Figure 1. Design concept of nuts connector product on bolts joint connector (JCB)

3. Results and Discussion

In this study, a knock-down construction system which matches the characteristics of rattan material has been found. Engineering on the bolt locking system connected to the nut is the construction finding developed. The engineered nut is made of brass, given a groove on the inside. This nut functions as a lock that is connected to the bolts joint connector. Joint connector bolts consist of cylindrical tubular rods that have a head at one end and cylindrical rod grooves up to three quarters of the stem. The bolt serves as a fastener to hold two components using the L key. The nuts function to hold and bind components to the end of the bolt. The design of joint connector bolts available in the market has been redesigned in different shapes and patterns on the nut part. Engineering connector nuts is the solution to overcome the rattan furniture construction connection. Various designs are engineered and technically tested. Three alternative connector nuts designs are processed using an automatic machine. One of the connector nuts is most suitable for rattan furniture construction systems as in the picture.



Figure 2. Manufacturing process of nuts connector product on bolts joint connector (JCB) for knock down systems on rattan furniture.



Figure 3. Application of nuts connector on bolts joint connector (JCB) in rattan chairs.



Figure 4. The final result of the knock down rattan furniture construction system for the global market

Thus it can be concluded that the knock-down construction system is one solution to overcome assembly, storage, and delivery of rattan furnitures. The knock-down construction system has practical value and efficiency, so that the capacity of the room for delivery and storage can be

more optimally utilized, because it is able to load more furniture. Consequently, the delivery of furniture for the export market is capable of loading a larger volume, compared to the delivery of furniture which is not knocked down.

4. Conclusion

Joint bolts connector is a tool for knock-down system which is suitable to be applied to rattan furniture connections. The design is needed to simplify the delivery, storage and assembly of export furniture. Therefore, the construction system design using joint connector bolts is one of the solutions to overcome the problem of rattan furniture assembly. This simple construction technology can overcome aesthetics, safety and comfort in the creation of rattan furniture designs for the global market.

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