Finishing Properties of Japanese Table by Using Kelempayan (*Neolamarckia cadamba*)

Suraya Yusof [1]*, Junaiza Ahmad Zaki[2]

Faculty of Applied Sciences, Universiti Teknologi MARA Jengka, Pahang, Malaysia1,2
suraya.saygs@yahoo.com*

Abstract

Finishing refers to the final process of furniture manufacturing. The advantage of finishing is to embellishing and protecting the product surface. Finishing consists of two stages that are pre-finish and fully finish. Pre-finish is preparation product surface before applying finishes material by using sandpaper. This process is needed to protect the product from dust, dirt or any unwanted particle and also give smoothness to the product surface. Fully finish is a process of applying finishes material to the product. In this study, two type of system to applying finishes material are used to compare the effect of finishing properties of a Japanese table from Kelempayan wood by using PU Varnish. For system A, the process of sanding and sealer were used two times repeated. While, for system B the process of sanding and sealer were used four times repeatedly. The test had been done for finishing testing are pencil hardness test, tape adhesion test, heat resistant test and household test. The results show that, system B gives better result than system A for finishing properties.

Keywords: Finishing, Japanese Table

1. INTRODUCTION

Finishing is defined not so much on how its appearances, but by what it does. Wood finishing refers to the process of embellishing and protecting the surface of a wooden material (Graystone, 2009).

Wood finishing can protect the wood from scratches, dirt, stains, and wear and can also enhances the natural beauty, colour, figure patterns, grains, and depth of the wood. Wood finishes not only preserve the wood from water, oxidation and the ultraviolet rays of the sun but also colour and hide the defects.

Nowadays, the tropical timbers demand in Malaysia is always increasing due to the factor of high demand in the furniture industry. However, the natural forest species are becoming scarce. Thus, plantation grown species are considerable for the supply raw materials.

The classification of wood is based on the botanical characteristic or mother tree itself (Menon, 1967). Type of wood that was used in the manufacture of Japanese table is kelempayan. The tree of this species is known by a variety of vernacular names in accordance to its region of occurrence. It is known as Kelempayan in Peninsular Malaysia (Jusoh, 1993). Kelempayan is a fast growing species with a tall and straight bole. Manufacturing the Japanese table by using this wood is the way to decrease the dependency on commercial species such as Nyatoh, Chengal, Merbau and other heavy hardwood.

To maintain the characteristics of wood, a suitable finishing are used to make the colour of wood become brighter and make the surface ever more smooth and to protect the surface of a wooden material. It will make the product surface from ordinary looking to the extraordinary one. To protect the appearance of Japanese table, polyurethane is selected for finish the wood surface. According to Dresdner M., 1999, Polyurethane is resists to heat, wear, solvents, acids, and alkalis, and it's also acts as a barrier against water and water vapour penetration. In addition to protecting the wood, it also provides natural ultraviolet light protection (Dresdner, 1999).

2. METHODOLOGY

2.1 Preparation for Raw Materials

The raw material in this research was kelempayan (Neolamarckia cadamba) that was obtained from Hutan Simpan UiTM (Pahang). A chainsaw was used to fell the kelempayan in the forest and brought to Wood Industry workshop. The log bark was then removed. Afterwards, it was cut into rough sizes before placing it in the kiln drying for drying process. The sawn had been kept in the kiln drying around two weeks to get 12% of MC. Then, the wood had conditioning for five hours in kiln drying and three days with environment condition. The sawn was cut to actual size of the sample with dimension of 200mm x 75mm x 20 mm by using the radial arm saw. The requirement of test samples is 40 replicates. Figure 1 shows the flow chart for preparing the raw material.
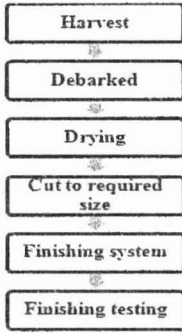
Figure 1: A flowchart for preparation of raw material

2.2 Finishing Process

After completed of sample preparation, the work of finishing the sample was initiated. Figure 2 illustrates the flow chart in a finishing process. First, one of the most important steps in wood finishing is wood putty or fillers for the wood samples. Fillers are materials that do not react with the finishing coats, but it is used to fill or level porous surfaces. Moreover, wood filler is used to achieve a smooth-textured wood finish by filling pores in the wood grain.

Then, the samples surface was sanded. Sanding is tedious. Therefore, to get the surface smooth enough to finish as quickly as possible. The types of sandpaper used are Aluminum Oxide. Started with a medium grade of sandpaper grit 120 and gradually work to a finer grade 220. Sanded in the direction of the grain for a smooth, uniform finish and all sanding dust were removed using a spray air gun, cloth or vacuum.

After that, sealer was applied to close the cavities. Then the samples should be dry it under sunlight about 30 to 45 minutes to make sure it is completely dry. Lastly, the top coat was applied to the sample and it also dried up dry. Sealer and topcoat were applied by using brush to the sample.
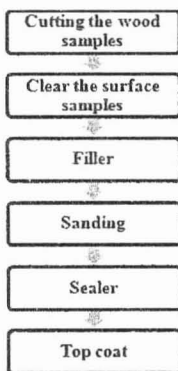

Figure 2: Flowchart for a finishing process

2.3 Experimental Design

There were two systems used for the finishing process which are system A and system B. System A has 2 layers of process sanding and sealer. While, system B has 4 layer processes of sanding and sealer. Figure 3 further shows the experimental design of finishing testing samples.
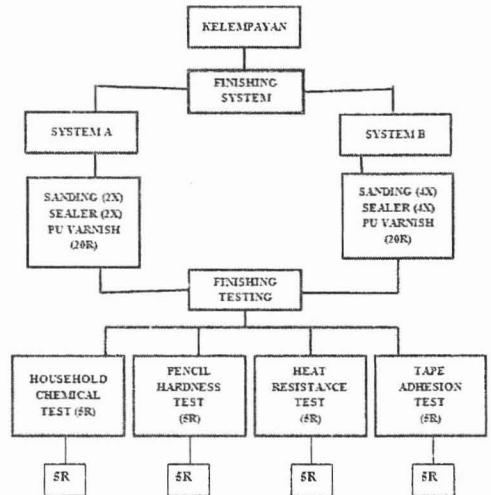

Figure 3: Experimental design of finishing testing samples

3. RESULTS

3.1 Effect of Different System of Finishing on Finishing Properties by Using Kelempayan (Neolamarckia cadamba)
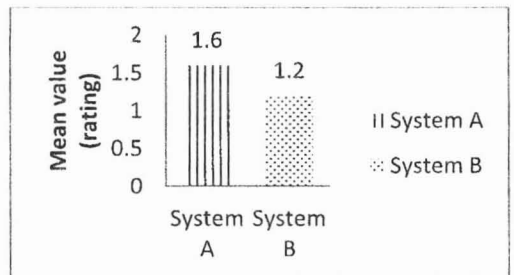

Figure 4: Relationship between Heat Resistance Test

The test shows the mean value for heat resistant test based on rating. Where, 1 is no change, 2 is stain easily removed and 3 is burnt for the result on sample test. The mean value for the system A is 1.6, while for system B is 1.2. System A shows higher mean value than system B because the readings of cigarettes test put on the sample test gave the lower effect. This is because the system A consists of 2 layers while system B consists of 4 layers of sanding sealer process. Its shows that System B gave a better result, which shows no burnt occurred on the

sample test because of the strength and better protection of the surface coating. By increasing the number of finishing layers also enhances the product strength. According to (Dresdner M. , 1999), stated that the polyurethane is excellent of durability, stain resistance and heat resistance. It's also non-flammable of this finishes material. However, for this testing are not significant. Maybe when the process of finishing, factor of human skill such as sanding was not consistent and accidently remove sealer.
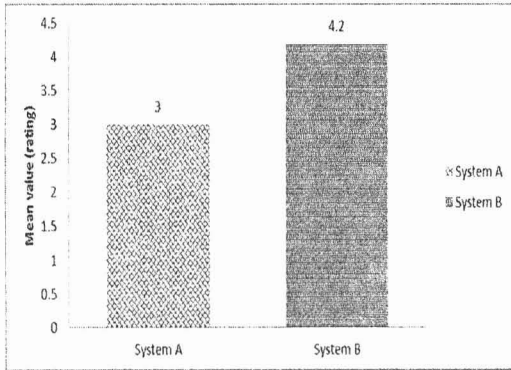

Figure 5: Relationship between tape adhesion tests

Figure 5 shows that system A has lower mean value compared to system B, where system A is 3, while system B is 4.2. System A was indicated just 2 layers of sanding and sealer, while in system B was 4 layers of sanding and sealer process of finishing system. The higher the reading of mean values indicated the higher of properties of finishes material. According to the ASTM D3359 stated that, the highest percentage of area removed is 0% (5B), less than 5% (4B), 5-15% (3B), 15-35% (2B), 35-65% (1B) and greater than 65% (0B). Thus, 5B this is meant no area removed from the samples after done this testing. However, if the samples had more area removed from the surfaces finishes material, it was showed that the greater than 65% was left from the surface. In this test showed that system B was the higher value obtained the lower effect when the tape pulls off, which mean better. This is because finishes material was function as to protect the surface of furniture, that prevent finishes material from tear off. Each layer finishes material gives different holding strength, which is thicker finishes layer will increase strength finishes on the surface of samples. Therefore, system B that consists of 4 layers was the best finishing system for tape adhesion test. Thus, for this tape adhesion testing are significant.
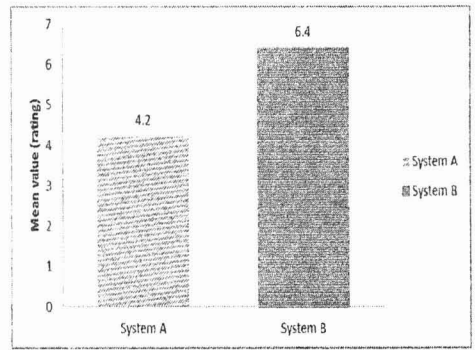

Figure 6: Relationship between pencil hardness test

Figure 6 shows that the relationship between pencil hardness by using different types of system. The test shows significant between both of the systems in finishing system. Based on the results, the graph shows that system B has the highest mean value compared to system A. The mean value for the system A is 4.2 while for the system B is 6.4. From the result shows that highly significant for the pencil hardness test. For the system A it was showed that, the ranking of pencil hardness was scratched at 4H but for the system B was at 6H. From this test, the higher value obtained the higher hardness and better results. This is because each layer of coating gives thickness on the wood surface, does not matter either applied for undercoat or topcoat (Mark, 2006). For each thickness finishes, material gives certain hardness on the wood surface. Therefore, 4 layers of system B was the best of finishing system for pencil hardness test.
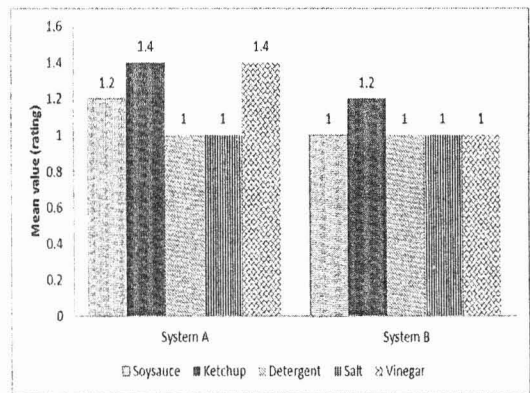

Figure 7: Relationship between household test

Figure 7 shows the result obtained from household test by using different types of system. Household test that used only five types of household chemicals such as soy sauce, ketchup, detergent, salt solution and vinegar. Based on the result, the test shows the mean value for household test based on rating. Where, 1 is no change, 2 color change and 3 is swelling. The results show that the vinegar and ketchup are same result of mean value in system A is higher compared system B. This is because system A consists of 2 layers, while system B has 4 layers of sanding and sealer. In addition, vinegar and ketchup are from acid grouping which has corrosive

properties, that would reacts and change color on finished material. Otherwise, for system B, detergent, soy sauce, salt solution and vinegar give the same results of the mean value, which has no change occur during testing. This shows that, system B is quite hard because of the thicker layers of finishing material.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the result obtained, overall system B consists of 4 layers give the good result than system A because of thicker finishes layer will increase strength finishes on the wood surface. Polyurethane is the most durable of the commonly available finishes. It resists heat, wear, solvents, acids, and alkalis, and it's also a barrier against water and water vapour penetration. Even though, system A consists of 2 layers does not mean has a lower resistant but it depends on how it used. Usually, two or three layer of coats are quite enough, and at times it can get only just one (Dresdner, 1999).2

In conclusion, system B that had 4 layers coats are selected to the Japanese table are made from kelempayan. From all testing that were run are to choose the best finishing system to the product. Japanese table can use in many ways such as for eating, drinking, studying, or put something on the table top. Furthermore, polyurethane varnish also acts as to prevent the wood; it also supports natural ultraviolet light protection (Hill, n.d). Hence, this product were available either for indoor or outdoor used.

As a recommendation, for the further study it should be added more variables of finishing testing and different types of finishes material. This is because more variables used will know about more results and knowledge of finishing properties. Other than that, process of sanding sealer must be sanded with consistently, where it will fills the pores and hardens the fine ends of the grain.

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