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THE CREATION OF THREE-DIMENSIONAL THAI LACQUER WORK
FROM EPOXY RESIN WITH DRAWING TECHNIQUES

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ABSTRACT

The creation of three-dimensional Thai lacquer works from epoxy resin with drawing techniques article is a part of the study of the use of epoxy resin with a pointed tool drawing technique to create a three-dimensional Thai lacquer work. The study aims to explore the creation of three-dimensional Thai lacquer work from epoxy resin with drawing techniques and to compare the characteristics of the three-dimensional and the traditional Thai lacquer works. This research is creative research in Thai arts with the following procedures: Surface preparation, perforated preparation, realgar solution preparation, drawing with realgar solution, gilding, lacquering, shading with drawing techniques, and coating the surface with epoxy resin. The research results showed that the use of epoxy resin in drawing made three-dimensional Thai lacquer work looked different from traditional work. In other words, the three-dimensional Thai lacquer work could clearly express the close, medium, and far perspectives. There was an overlap of each layer of the pattern and the three-dimensional picture. Moreover, work that was coated with epoxy resin was shinier and more durable than traditional work.

INTRODUCTION

Rational and Background of the Study

Thai lacquer work is one of the national artisan works of Thailand with a long history. There is a piece of evidence confirming that it is the oldest art that was predicted to be first created in the late Ayutthaya period. For example, Thai lacquer works on the walls of the Golden Palace, Wat Sai, Bangkok, were assumed to have been created in the reign of King Suriyenthathibodi. Another example is Thai lacquer works decorating on the Tripitaka scripture cabinet

called dharma book chest from Wat Choengwai Temple that was known to be created in the late Ayutthaya period (No Na Paknam, 2001). The pattern of the Thai lacquer works previously mentioned were golden patterns adorned on the exterior of a black lacquered material. The patterns and the pictures were two-dimensional, which were the same as the gold leaf lacquer decorations in Luang Prabang (Vadhanabhu, 2019). However, the creation processes were completely different. Thai lacquer works used a special liquid (realgar) to prevent the gold from sticking to some parts of the surface, then gilded and poured clean water on the workpiece until the realgar liquid came off, creating a pattern and a golden picture on the black surface (Fine Arts Department, 2002). On the other hand, the gold leaf lacquer decorations in Luang Prabang were not made with realgar liquid but with stencils (Dumrikul, 2001). Although the creation processes were different, the characteristics of the finished work were very similar, meaning that both of them were two-dimensional works or golden pattern painting, as some people called them (Saisingha, 2012). This type of work used lacquer as the main material to coat the surface before creating different patterns similar to the lacquer work in many places, such as the creation of the lacquer drawings in Vietnam, which is the uniqueness of Vietnam. There was also art research where the knowledge was used to develop the work to have a quality similar to the use of oil paintings by western artists (Bettina Ebert & Michael R. Schilling, 2016). The lacquer has similar properties to a modern material called epoxy resin since this material can create shininess, and most importantly, improve durability. Many pieces of research affirm that epoxy resin is durable and fireproof (Elaheh Rohani Rad, Henri Vahabi, Agustin Rios de Anda, Mohammad Reza Saeb, Sabu Thomas, 2019).

The creation process of traditional Thai lacquer works where the patterns were created by using realgar solution to prevent the gold from sticking to some part before the gold was gilded on the surface clean with water makes a two-dimensional picture showing only the shiny golden patterns on black surfaces. These two-dimensional patterns give the Thai lacquer works a flat view that is unable to show the depth of the pattern and the picture. As a result, the Thai lacquer works can not be created to look much different from the traditional, except for the designs, patterns, and the overall picture and composition. Therefore, Thai lacquer works are not yet contemporary and cannot be deviated from the traditional patterns. Since the work is two-dimensional, the researcher was inspired to study the use of epoxy resin as well as the drawing technique that uses pointed tools to create the dimension to the patterns and the painting to make them different from the traditional flat ones. Making the patterns multidimensional shows the different distances of the patterns or the paintings in each layer shows that different layers of the objects helped the Thai art look contemporary and can be further developed into various forms.

Research Objectives

To study the process of creating a three-dimensional Thai lacquer works with epoxy resin with a drawing technique.

To compare the characteristics of the artworks between the three-dimensional and the traditional works.

Definitions of Terms

The creation process refers to the methods, processes, and techniques for producing the three-dimensional Thai lacquer works with epoxy resin with a drawing technique using a sharp edge tool.

The three-dimensional Thai lacquer works refer to Thai artworks that have golden patterns and pictures decorated on flat black surfaces with close, medium, and far perspectives, showing depth and overlapping patterns. Epoxy resin refers to modern liquid material consisting of two components: A (Epoxy resin) and B (hardener) in portions of 2:1, respectively. Drawing techniques refer to shadowing techniques and adding weight to lines with a pointed tool.

Scope of the Study

This research article elaborates a specific application of modern materials, namely epoxy resins, for a drawing technique with a sharp tool to create three-dimensional Thai lacquer works. The artwork was 40 centimeters in width and 45 centimeters in length and depicted Ganesh sitting on rocky ground in the middle of the picture and towards the bottom. The empty space was designed with flora mixed with Kanok pattern. The work had five layers of coating to create overlapping patterns.

Significance of the Study

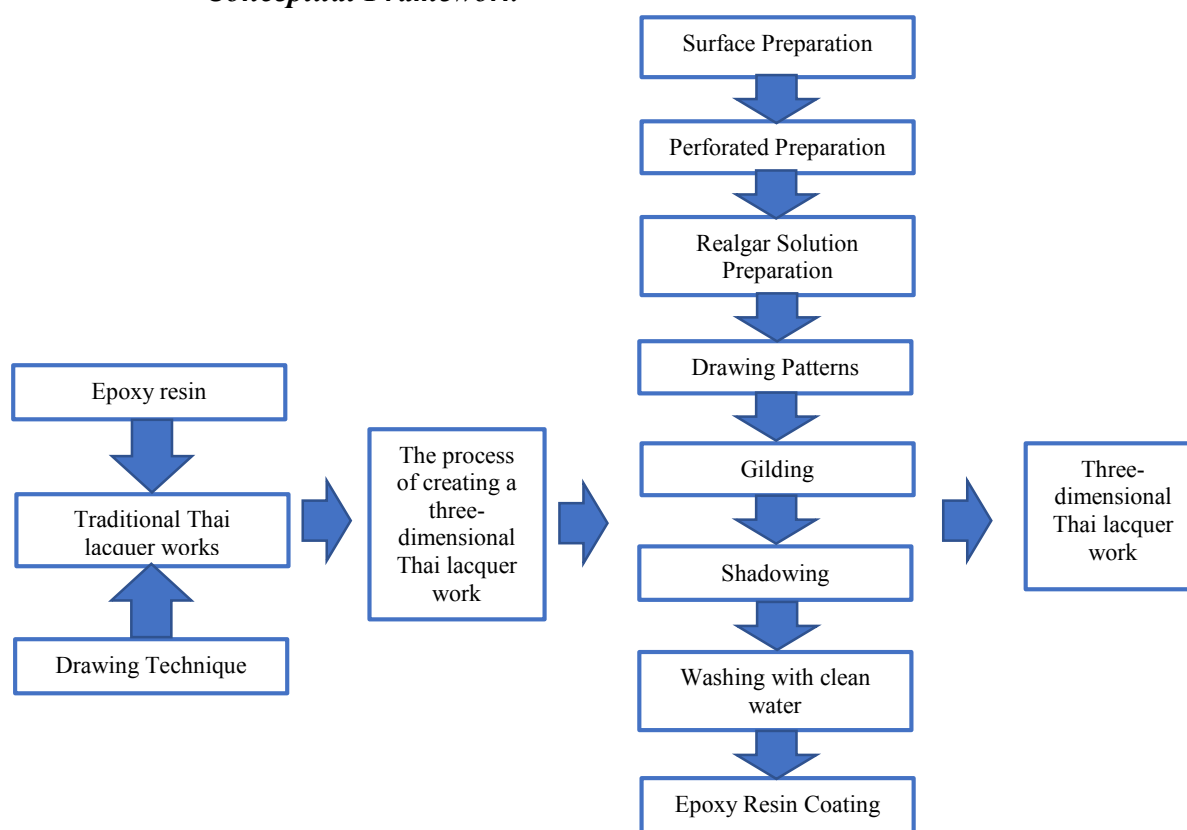
Creating a new approach to the three-dimensional Thai lacquer works process, which is different from the traditional pictures.

RELATED LITERATURE AND STUDIES

Thai Lacquer Works

Thai lacquer works are the national art of Thailand with a long history. The evidence of the artworks still remains until the present. They are predicted to be in the late Ayutthaya period where similar works can be found, such as Thai lacquer works adorned on the wall of the Golden Palace, Wat Sai, Bangkok, or the Thai lacquer works decorated on the dharma book chest from Wat Choengwai Temple (No Na Paknam, 2001). This kind of art has complex creation processes consisting of material surface preparation for the decorating patterns, most of which are wood. The process starts from applying black lacquer varnish, followed by polishing in order to make it smooth. Then draw the outlines of the patterns and pictures with a special liquid called realgar, which contains three substances: realgar rock powder, gum arabic solution, and soap pod solution. The combination of these three ingredients is used to draw the outer lines as bumpers to separate the part that does not have to be covered with gold. Then, the black lacquer varnish was applied to coat all the drawn patterns before covering it with real gold leaf and rinse it with clean water. When the realgar solution comes into contact with water, it swells and peels off, showing the golden patterns and pictures on the surface of the material that is not drawn with the realgar (Fine Arts Department, 2002).

Conceptual Framework



Based on the characteristics of the Thai lacquer works, some artists, such as Noppasiri (2015), created contemporary patterns for a creative research project. Noppasiri (2015) studied the influence of modern cartoon characters in Thai traditional painting using the Thai lacquer work techniques with the audiences' perception. However, the nature of the work created was still a two-dimensional picture with golden patterns on the flat surface. It did not represent close, medium, far perspective, or the depth of the picture. The only difference from the traditional Thai lacquer works was the new design, pattern, and composition. Apart from the creation process mentioned earlier, lacquer was used as the main material for the coating before creating the gold pattern. This technique is similar to the arts in many countries. Such as in Vietnam, where the lacquer was used for coating prior to painting and had been developed to have similar properties to the oil paintings art of the west (Bettina Ebert & Michael R. Schilling, 2016).

Epoxy Resin

Epoxy resin or resin epoxy, as some people call it, is a modern material that has been popularly used in industrial production for many things, such as electronic device or circuit coating (Somwangthanaroj, 2018, pp 20) or flooring material coating since the material is durable, strong, and have a fireproof property (Elaheh Rohani Rad, Henri Vahabi, Agustin Rios de Anda, Mohammad Reza Saeb, Sabu Thomas, 2019), et cetera. In Thailand, it has not been widely utilized. It has been mostly used as a material to make furniture that is made of wood to create patterns with special colors. In other countries, artists have been

using this material to coat the painting surface to create layers and make the paintings dimensional and have lifelike depths, such as acrylic painted in the shape of a goldfish, each layer of which is coated with a clear epoxy resin, giving the goldfish a naturally round body (Art Insider, 2020). However, the foreign artists coat epoxy resin on top of acrylic paint, which has a bright color feature. Therefore, when the color is completely dry, it will not peel off. On the other hand, coating the artworks using real gold leaf to create patterns with epoxy resin may adversely affect the golden pattern. Therefore, an experiment on coating the golden patterns with epoxy resin was conducted to test the properties and possible side effects.

Drawing

Drawing is one of the ways to create artworks that has broad and varied meanings depending on the opinions of each scholar or artist. For example, Ua-Anant (2002, pp 164) defined drawing as drawing lines on a flat surface to form various shapes, which may involve painting or simply hatching. Soonbhongsri (2013, pp 216) stated that drawing was a theory, method, and basic technique for creating all kinds of artworks. According to the two mentioned definitions, Jornrutn (2017, page 12) concluded that drawing refers to drawing lines on a flat surface to create different pictures and shapes with different materials, equipment, and tools that create different lines.

Jornrutn (2017)'s definition of drawing is consistent with the drawing technique the researcher used in the present study to create three-dimensional Thai lacquer works, including the use of multiple lines and a variety of drawing tools rather than just a typical pencil. The use of sharp tools in drawing to scribble or scrape off the gold pattern appeared in Thai Lanna art. This technique was called "Hai Dok Hai Lai" (Dumrikul, 2001). The entire surface would be covered with gold leaf. Then a sharp tool was used to write patterns, and the gold leaf in the background area would be scraped off, leaving the color of the background that contrasted with the bright golden patterns.

RESEARCH METHODOLOGY

The researcher tested the properties and the application of the epoxy resin to coat different surfaces, such as wood and gold leaves with detailed patterns, to study the changes to the surfaces before creating the artwork. The process started from preparing the surface by coating them with epoxy resin. After the epoxy resin was dried, the patterns were created using the gold-gilded technique, which consisted of applying the realgar liquid in different areas to prevent gold from sticking, covering the patterns using the gold-gilded technique, and pour water all over the art piece to dissolve the realgar, leaving only the patterns coated by lacquer. Pointed tools were then used to create different tones to the gold color and final coating using epoxy resin, which completed the process.

RESEARCH METHOD AND PROCESS

1. Study the characteristics of epoxy resin and drawing techniques.
2. Design a creative pattern for the artwork.

3. Create a three-dimensional Thai lacquer work according to each process.
4. Create a Thai lacquer work following the traditional method and pattern to compare the different characteristics of both styles.
5. Take pictures and take notes for all the creation processes.
6. Analyze the data.
7. Write the research paper.

Data Analysis

In this research, the researcher analyzed the creation processes of the three-dimensional Thai lacquer works. The data is elaborated as follows.

Materials and Equipment

Materials used for the creative process of the three-dimensional Thai lacquer works include:

1. Two sheets of 42 centimeters with and 45 centimeters length plywood with 0.5 millimeters thickness (for creating three-dimensional and traditional artworks).
2. Realgar liquid consisting of 3 ingredients: 1. The realgar stone powder has been grounded and soaked in water to remove its saltiness. 2. Gum arabic liquid made by soaking gum arabic beads in hot water with a tight lid until they melt and are well-mixed with the water. Soap pod juice is made by brewing soap pods in hot water until the water turns brown, like tea.
3. Perforated pattern used as a blueprint for the realgar drawing. A wax paper was placed on the designed blueprint, then use a sharp needle to pierce the pattern in a dotted line.
4. Mortar for mixing realgar.
5. A special brush for drawing patterns with realgar.
6. Lacquer varnish for covering the gold leaf and act as an adhesive to stick the gold leaf to the surface.
7. 800 sheets of real 4X4 centimeters gold leaf (calculated from the size of 2 plywood and the number of layering patterns).
8. 1080 grams of epoxy resin was divided into two portions: A = 720 grams and B = 360 grams.
9. A pointed tool for drawing strokes on gold patterns to create shadows.

The Creation Processes of a Three-Dimensional Thai Lacquer Work

The creation processes of a three-dimensional Thai lacquer work had some details that were similar to the traditional style. However, some steps to create more dimensions were added as follows.

Step 1: Surface preparation

Coat the surface of plywood that has been cut and polished with epoxy resin. Use two portions of the epoxy resin A and one portion of epoxy resin B (according to the size of the plywood, 120 grams of epoxy resin A and 60 grams of epoxy resin B were used). Pour epoxy resin A into a container, mix with approximately one tablespoon of the black oil color, stir well, and add the

epoxy resin B into the container and stir until homogeneous. The mixing takes about 5 minutes. After that, pour all the mixture onto the surface of the plywood, spread it to cover the entire surface evenly. When the surface is all covered with the mixture, use a fire nozzle to blow the solution out to eliminate air bubbles. Leave it in a dust-free area for approximately 16 hours until it dries completely. Wipe clean with a cloth moistened with acetone to remove epoxy resin stains before drawing the pattern with the realgar.

Step 2: Perforated preparation

Cut a smooth white paper according to the specified size. Sketch and design the pattern and picture and define each layer with a different color. Then, place the wax paper on the designed prototype and use a sharp needle to pierce the pattern in a dotted line to guide the drawing on the black surface coated with epoxy resin in step 1.

Step 3: Realgar preparation

Mix three ingredients, which include realgar rock powder, gum arabic liquid, and soap pod juice, in a strong mortar, and stir well.

Step 4: Drawing the pattern with realgar.

Place the perforated pattern from step 2 on the surface that is coated with epoxy resin in step 1 and sprinkle some powder on it. The powder will go through the small holes that have been pierced and stick to the surface in a dotted line. Guidelines for the realgar drawing will appear when the perforated pattern is taken out. Use a special brush (No. 0, special) and dip it in the realgar prepared in the third step, then draw the pattern in each layer. Add some details to the pattern, then paint the background of the pattern with the realgar solution to prevent the gold leaf from sticking to the unwanted parts.

Step 5: Gilding

Paint the lacquer varnish on the surface that has been painted in step 4. Use cotton pads to wipe clean the pattern and cover the whole pattern with real gold leaf from the left side to the right side and from the bottom to top. Then, use a clean finger to tap and stick the gold leaf on the surface.

Step 6: Rinsing

Rinse the artwork from step 5 with clean water. When the realgar comes into contact with water, it will slowly inflate and peel off, showing the golden pattern on the black surface. Then, gently use clean cotton pads to remove all the realgar stains (the creation process of traditional Thai lacquer works ends at this process).

Step 7: Hatching

Shadow the golden pattern from step 6 with a pointed tool, based on the principle of line drawing, to make shadows and dimensions from different weights of lines.

Step 8: Coating the surface with epoxy resin.

Pour 120 grams of epoxy resin A in a container and mix it with 60 grams of epoxy resin B, stir well for 5 minutes. After that, pour it over the gold pattern

made in 7th step and spread it all over the surface. Use a fire nozzle to blow away air bubbles. Then, leave it on a flat and dust-free space for approximately 16 hours.

The details of the eight steps mentioned are just the first level of the work. Determining the number of layers of the pattern depends on the creator (as for the work used in this research, there were a total of 5 levels). The creation of the patterns in other layers starts from steps 4, 5, 6, 7 and 8 respectively. In the 8th step, the epoxy resin should cover the whole golden pattern. Therefore the works will be more durable than traditional Thai lacquer works.

The Comparison between the Characteristics of Traditional and Three-Dimensional Thai Lacquer Works

The three-dimensional Thai lacquer works created according to the eight steps previously mentioned had some characteristics that were different from the traditional works as in the following table.

CONCLUSIONS

The application of epoxy resin in drawing to create a three-dimensional Thai lacquer work was a study on new kind of materials and the lacquer work technique to create an artwork that was different from the process of creating a traditional Thai lacquer works by using the special shininess and durable properties of epoxy resin to coat the surface of the object and create a multidimensional and continuous various layers. The three-dimensional Thai lacquer work represented the pattern's close, medium, and far perspective, which were the additional dimension from the traditional work. The three-dimensional work was also more durable than the traditional ones. The finished work was more contemporary and helped create a new kind of creative Thai art that can be further continued in various ways.

Characteristics	Traditional Thai lacquer work	Three-dimensional Thai lacquer work
Dimensions	Two-dimensional picture that was at the same level as the surface.	Three-dimensional picture with depth and clear overlapping patterns.
Perspectives	Front perspective	More diverse perspectives
Highlights of the picture	Not as clear as it should be because the gold color was the same all over the picture and was at the same level.	The highlight of the picture can be seen better than the traditional work because the picture can be designed at a specific level depending on the artist.
Gentleness	The details of the pattern and the picture were harmonized, resulting in the clarity of the details.	The details of the pattern and the picture were outstanding. The details did not assimilated to the surrounding pattern. Therefore, all details could be seen clearly.

Durability	Less resistant to contact conditions because pure gold leaf used was fragile and did not have any protections.	Extremely durable because it was coated with epoxy resin that could reduce scratches and various traces.
Thickness	The work had a similar thickness to the plywood. The artist could control the thickness of the work easily.	Thicker because of the layers. The more layer there are, the more heavier the work gets.
Weight	The weight was close to the weight of the plywood board. Therefore, it was suitable for decorating a wide variety of areas.	Corresponds to the thickness of the workpiece. The thicker the work is, the heavier the work gets. This was the result of epoxy resin coated over each layer.

DISCUSSION

The use of epoxy resin with drawing techniques to create a three-dimensional Thai lacquer work demonstrated a great result as they created a Thai lacquer work with different dimensions, and they clearly showed the close, medium, and far perspectives of the pattern and the picture. This was a result of the properties of the clear epoxy resin, which could coat the surface in many layers and did not react with the golden pattern. Coating the multi-layer surface with an epoxy resin resulted in the overlapping of the duplicated pattern and picture. This was beneficial for creating dimensions and perspectives of the picture. Moreover, the drawing techniques that created different weights of the lines and made clearer shadows also added the dimensions and perspectives of the picture, resulting in a more prominent and realistic picture. Epoxy resin was also applied to the creation of paintings in other countries. For example, a fish painting was created by dividing colors into many overlapping layers to make the picture looked like a three-dimensional fish which was more natural and able to capture the perspective of the real fish swimming in clear water in various shapes of vessels. The use of epoxy resin in the creation of art, especially paintings, was, therefore, able to create more realistic dimensions. The use of pointed tools to draw patterns on gold leaf with a shading technique also gave weight to the gold pattern, which created shadows. As a result, the golden pattern and the picture looked more similar to the natural dimensions. Moreover, it transformed the perspective from a two-dimensional shape to a three-dimensional shape with close, medium, and far perspectives of the pattern. In addition, it enhanced the overlap of multiple layers of epoxy resin to make it more complete and efficient. If the artwork was only coated with epoxy resin in each layer but did not involve the shadowing techniques in the creation, the work might still show the depth of the pattern resulting from the overlapping, but the line weights or shadows might not be as clear as it should. Therefore, the combination of drawing techniques and multi-layer coating with epoxy resin was a great process to create a three-dimensional Thai lacquer works.

SUGGESTIONS

Epoxy resin has the ability to coat many surfaces. Therefore, if it is used for other types of painting, such as gilding, stencil, or a stylized pattern that involves coloring and gilding, it can create new styles of works that are different from traditional styles and make the artworks more contemporary.

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Figures



Figure 1: Drawing with realgar.



Figure 2: Coating with epoxy resin.

Figure 3: Drawing with realgar

Figure 4: Gilding. on the second layer.



Figure 5: Some patterns.
Figure 6: Finished work