Epoxy Is the New Material for Making Wooden Crafts in The Field of Art Education at The State of Kuwait

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Abstract

Many artists still use resin as a creative and productive medium in their artwork. The resin material is a liquid plastic that can solidify once exposed to air. This research shows some of those typical artists with their artwork. It also shows the importance of using resin in various fields. The research shows the importance of using resin in various fields, the role of resin art in some small projects, and the functional and aesthetic values of this material, as many artists still use resin as a creative and productive medium in their artwork.

The present research finds that epoxy resin and its functional aesthetic values are used in arts and crafts and highlights the significance of incorporating resin in educational fields, demonstrating the role of resin art in some small projects. At the same time, experimental work has been carried out with this versatile material.

Introduction

Epoxy resin is commonly used because of its safety, high transparency, low foaming, less abrasion, good toughness, and hardness. When solvents support this liquid, it hardens to form a sturdy block. Using the fluid state to adhere Epoxy resin to wood until it freezes will form a protective layer around it. The external layer of epoxy resin covers and protects the natural wood inside.

Epoxy resin is known for its high transparency, and when it hardens, it looks like glass, revealing the beautiful wood inside. Furthermore, mixing different colours with epoxy makes it possible to create colourful, sparkling crystal blocks (VN, 2024) [1].

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Previous work

Al Saadi et al. (2023). [2]. reported that resin describes synthetic materials commonly used for decoration. Although the term 'resin' is defined in the dictionary as rosin, in practical use, it refers to a type of liquid plastic known as epoxy resin. When this liquid comes into contact with air, it solidifies into a complex, glassy material. To harden the resin, however, a hardener is added to it. The hardener, made up of mainly carbon, is a chemical derived from oil. When it reacts with the resin, it produces vapours and gases due to the different proportions between the two materials. Once the resin is fully hardened, it forms a transparent, unbreakable, glass-like material.

Two-part epoxy glue is known for high performance, strength, and durability (Loctite, 2024) [3]. When applied to wood, it acts as a sealant or filler that hardens to create a lasting bond. Its waterproof seal makes it easy to clean and ideal for wooden tables or furniture. After the full cure time, it can be sanded or drilled—epoxy for woodworking: A guide on using epoxy adhesive for wood projects.

Coatings have various applications and purposes. They can serve decorative and functional roles, offering reflective or gloss, satin, and matte appearances. (Howarth 1997) [4].

Resin Transfer Moulding (RTM) is the most appropriate method for producing many products with a superior finished surface. It is a cost-effective process for manufacturing composites. In this process, dry reinforcement fibres are placed into a mould and closed before injecting resin. (Cairns et al. 1999)[5], (Laurenzi et al 2014)[6],

Incorporating sensors in the Resin Transfer Moulding (RTM) process will facilitate liquid filling strategies, technique development, and numerical modelling approaches (Torres,2019) [7].

Epoxy resin is a material that consists of two components: a resin and a hardener. When these two components are combined, they react to form a robust, transparent, and durable polymer. Due to its high strength and resistance to impact, heat, and chemicals, epoxy resin is widely used in

various projects such as jewellery making, woodworking, model building, sculpting, artwork, and art education. (epoxy-resin 2024)[8].

Kishi and his colleague (2008) [9] reported that Inlaying is an ancient technique used to enhance the beauty of woodwork. This method has been used for centuries and involves different materials, from those used in Islamic and Coptic Egypt to modern materials like polyester, which have been widely used in the last century. Inlaying has been applied to enhance many different crafts and arts and is part of artistic education. Tutankhamun's chair is one of the oldest examples of inlaying, while Ra Hotep and his wife, Neferet, are famous examples of inlaying used in education.

At the Egyptian Museum in Cairo, Egypt, there are the statues of Prince Ra Hotep and his wife, Nofret (the ancient Egyptian deity of the Sun, By the Fifth Dynasty, in the 25th and 24th centuries BC). These statues were created during the transition between Egypt's Third and Fourth Dynasties. They showcase the strict artistic rules of the era and are frontal and idealised. Ra Hotep is coated reddish-brown, representing the colour for men who spend much time in the sun. Nofret is depicted in a pale yellowish colour, typical for women in ancient Egypt. The statues' pose and colours are well-preserved, and their inlaid rock-crystal, calcite, and copper-outlined eyes make them one of the most impressive pieces in the Egyptian Museum (Ra Hotep) [10]. Fig (1,2).

Fig (1)

Fig (2).

Statues of Prince Rahotep and his wife, Nofret. Egyptian Museum. Cairo. Egypt.

In 1997, Howarth and his colleague [11] reported that back in the 1970s, there was an expectation that the coatings industry would shift to water-borne coatings. However, this shift did not happen due to the traditional nature of the industry. Nevertheless, with the current environmental regulations, more coatings systems are required to use water-borne or high solids. This presents an opportunity for resin suppliers, particularly small and medium-sized ones, to customise water-borne resin systems such as PUDs and hybrids to meet individual customer demands.

The Egyptian Revival" by Curl (2013) [12], in his book, explores the influence of Ancient Egyptian culture on Western architecture, art, design, and religion. With engaging prose, he analysed the persistence of Egyptian heritage, especially ancient Egyptian art and the Art Deco style. This book is invaluable for art, architectural history, and heritage students. Fig (3,4) shows some of his records.

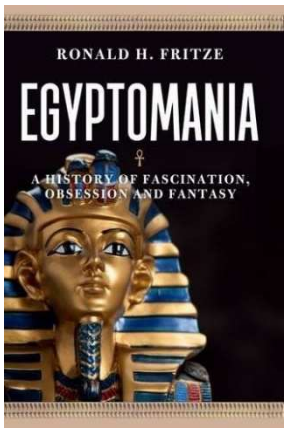

Fig (3)

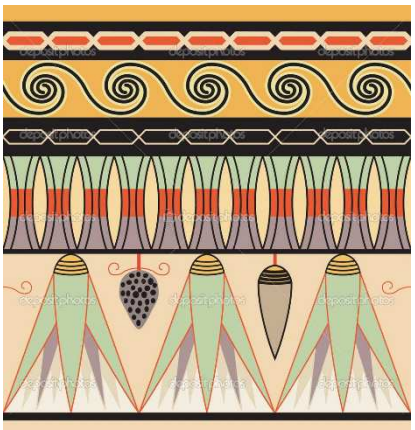

Fig (4)

Fig (3) Egyptomania: A fascination, obsession, and fantasy history.

Fig (4) Egyptian tombs are adorned with colourful border designs featuring flowered friezes.

Remuera, (2024). [13] his review illustrated The Golden Throne of Tutankh Amun, with carved figures of the young pharaoh and his wife under the sun's rays, from his tomb in the Valley of the Kings near Luxor (ancient Thebes) as in Fig (5,6).

The Treasure of King Tut is a beautiful educational exhibit with Egyptian treasures and artefacts featuring the treasures of King Tut [14], as shown in Fig (7,8).

The second of three anthropoid coffins is fig (9). The larger one was originally in Thebes and is attributed to the innermost coffin. Wood coated with gold and inlaid with polychrome glass. It is hard to believe the amount of work required to complete this coffin. The carved wood was first overlaid with sheet gold on a thin layer of plaster. Narrow strips of gold, placed on the edge, were then soldered to the sheet gold to form cells in which small pieces of coloured glass, fixed with cement, were laid. The technique is known as Egyptian cloisonne work.

Fig (7).

Fig (8).

Fig (9).

Late 19th c. Egyptian Revival Polychrome Carved Throne Chairs and coffins Coated with different colours.

Pharaoh King Tut figurine is a premium quality replica of an ancient Egyptian Pharaoh King Tut Matryoshka Sarcophagus with Mummy. It stands 16" tall, 7.5" wide, and 5.25" deep and is made of designer composite resin that has been hand-painted for an authentic look. The discovery of an intact mummy during an archaeological excavation in Saqqara, Egypt, has sparked a renewed interest in ancient civilisations. This particular

sarcophagus is modelled after one of the many found in the area (Paper blog 2024) [15], as shown in figs (10, 11, 12).

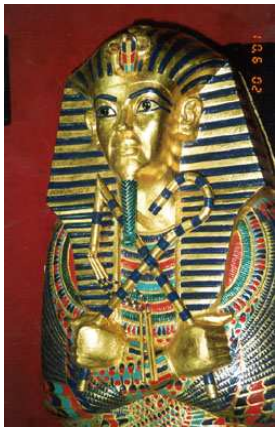

Fig (10).

Fig (11).

Fig (12)

What Is Resin?

Resin is commonly a high-gloss-viscosity substance derived from organic and synthetic sources. There are many opinions about these two materials, which have characteristics similar to plastic. Most people consider it plastic, while others look at it the other way around, with plastic resulting from processed resin. On the other hand, some individuals believe that plastic and resin are entirely the same. Epoxy art on wood is a type of wood wall art that uses resin to create a unique design on wood. Over the years, this technique has gained popularity in the furniture and jewellery industries because it is beautiful and durable. Wood resin combines two types of wood and resin, which is highly valuable.

Origin of wood resin

Unfortunately, wood materials are now costly because they are becoming increasingly rare, and wood is often gorgeous. If used to make decorative materials, they will be great and of high value. Resin wood was created by an Australian manufacturer when he discovered excess wood samples after crafting furniture such as dining tables, cabinets, and doors. If removed, it would be very costly. So, he thought of combining it with resin to take advantage of these excess wood samples (Wood Epoxy2024) [16].

Fig (13,14) shows some Resin wood art.

Fig (13)

Fig (14)

What is an epoxy component used for in woodworking?

Types of Resin Used in Wooden Artwork.

There are several types of resins and plastics, but there are only three commonly used in art (Acrylic2024) [17]as follows:

1. Acrylic

This resin is aptly named for precise acrylic products like lenses, screens, textile fibres and containers. It is made by mixing a powder, an acrylic polymer, a liquid called methyl methacrylate monomer, and a hardener. After setting, the acrylic polymer is a thermoplastic product and could be reheated and manipulated. Bearing in mind that acrylic resin components are highly toxic and flammable. [Vizoli ,2024) [18]. Fig (15,16,17) shows some designs of artwork of Acrylic Pouring.

Fig (15).

Fig (16).
Acrylic Pouring

Fig (17).

2. Polymer

Polymer and epoxy resins are types of thermosetting plastics that differ from thermoplastics. Thermosetting plastics do not melt with heat. Instead, they solidify and become a permanent solid product that cannot be remelted. On the other hand, thermoplastics melt when exposed to heat and can be remoulded. Although polymer is similar to epoxy resin, it is of lower quality and more affordable. (Goodman,2013) [19]. Fig (18,19,20) shows Mixed colours of Polymer epoxy resin.

Fig (18).

Fig (19).

Fig (20).

3. Epoxy

Epoxy resin is a popular material in the art world, as it can be used to create various stunning resin-based pieces. The advantage of using epoxy resin is that it is safe to work with. The absence of unpleasant Odors and multiple health warning labels attest to this.

Fig (20,21,22) show three epoxy artworks [(Geode ,2024)[20].

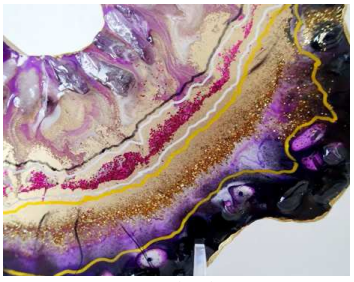

Fig (21).

Fig (22).

Fig (23).

An epoxy resin geode.

Resin medium

The resin medium that is ready to be used for the artwork is basically in three different ways: Casting, coating, and creating (resin2024) [21].

1. Casting

Casting is a technique that involves pouring a resin mixture into a mould. Although numerous moulds and objects are available for resin casting, thin plastic moulds like those used in candy production should be avoided since the resin mixture will stick to them. It is recommended to utilise silicone baking moulds since they are affordable and come in various designs.

Fig (24).

Fig (25).

Fig (24) Resin coasters created.
Fig (25) Casting resin uses a mould to contain the resin before it sets hard.

2. Pouring

Pouring is another popular method of creating resin art. In this process, to create a marbled 2D piece, pour the resin onto a surface. Instead of creating 3D shapes through casting, however, pouring creates translucent and ethereal layers of colours that are difficult to achieve using other mediums.


Fig (26).


Fig (27).


Fig (28).

Fig (26) Pouring on round surfaces,

Fig (27) Pour painting,

Fig (28) Acrylic pouring.

3. Coating

The Coating technique involves applying a resin layer on an object's surface for either sealing or aesthetic purposes. This method combines casting and pouring techniques, and the resulting layer can be peeled off using fingers.

The coating is a cover applied to a substrate's surface and can serve decorative, functional, or both purposes. Coatings, however, like powder coatings, may come in liquid, gas, or solid forms. (Fotovvati at al. 2019) [22].

Wood coating

Epoxy is commonly used in the coating industry due to its exceptional performance. It can protect both metal and non-metal surfaces. The adhesion and cohesion strength are essential for coating, directly affecting the performance and applications. This work summarises and analyses state-of-the-art technical enhancements on epoxy-based coating systems. The durability of a wood coating in outdoor conditions depends heavily on its flexibility. Wood appropriately swells and shrinks due to moisture uptake and drying, which can affect the performance and adhesion of the coating. To improve the properties of coatings on modified wood, coating formulators can alter the surface properties of the wood by using preservative treatments or new modification techniques. The effectiveness

of wood coatings is affected by various factors, including the physical characteristics of different wood species, coating types and properties, application procedures, and exposure conditions. (Wei, Hongyu, et al 2020) [23].as shown in Fig (29,30)

Fig (29)
Painting - acrylic pour
with abstract Phoenix coated in resin.

Fig (30)
Wood Coatings

In epoxy resin, Bagheri et al. (2023) [24] replaced petroleum-based bisphenol A (BPA) with unmodified kraft softwood lignin. Epoxidised lignin was created by reacting with biobased epichlorohydrin (ECH) and blended with a biobased agent derived from chew nutshell to form a fully biobased epoxy resin. Pre-impregnated composite sheets were produced using unidirectional bamboo fibres and the newly developed water-dispersion epoxy resin. The lignin-based epoxy composite had lower flexural strength than commercial epoxy. However, adding bamboo fibres to the lignin-based bio composite increased the flexural strength and modulus due to the higher compatibility of bamboo fibres with lignin, which acts as a natural adhesive in plants.

Eastland et al. (2012). [25] and others (Frank, 2020) [26] reported that paints and lacquers are used for protection and decoration, although some artists' paints are solely decorative.

Types of Synthetic Resins:

Engineered tars are artificial materials made through a course of substance blends. They are ordinarily made from various natural and inorganic mixtures, including polymers, monomers, and added substances. (William,2024) [27].

A few typical instances of manufactured pitches include:

a) Epoxy Resin: The epoxy pitch is an engineered SAP shaped by the response of epichlorohydrin and bisphenol-A. It is usually utilised as a cement, covering, and projecting material (Fan-Long et al., 2015) [28].

b) Polyester Resin: Polyester SAP is a manufactured pitch shaped by the response of styrene and polyester. It is ordinarily utilised as a projecting material, as well as in the development of

fibreglass and other composite materials.

c) Polyurethane Resin: Polyurethane tar is an engineered pitch framed by the isocyanate and polyol response. It is usually utilised as a covering and projecting material and in developing froth items (Lewis et al., 2021) [29].

Physical Properties of Resin:

The actual properties of SAP differ enormously depending upon the kind of tar being thought of. Notwithstanding, there are a few general properties that are normal to numerous tars:

- **Viscosity**: Tars are regularly exceptionally thick, implying they have high protection from the stream. This makes them valuable as cement and coatings, as they can be applied in a thick layer that will not run or dribble (Mendes et al., 2019) [30].
- **Hardness:** Gums can solidify into a strong structure through polymerisation. The hardness of the subsequent material can differ depending upon the particular tar utilised and the circumstances under which it was relieved.
- **Chemical Resistance:** Tars are, for the most part, impervious to many synthetics, including acids, bases, and solvents. This makes them valuable in various modern applications where protection from compound erosion is significant.
- **Transparency:** Numerous gums are straightforward or transparent, which makes them helpful for applications where optical lucidity is

significant. Models incorporate focal points, coatings for electronic presentations, and ornamental things.

- **Strength:** Tars can be planned to have severe solidarity and durability, making them reasonable for use in primary applications. For instance, epoxy tars are usually used as a network material in composite materials, such as carbon fibre-supported plastic.

What Kind of Resin Art Could Be Made?

Resin Paintings

Scientific jargon like "epoxy" and "compound" can obscure the fact that resin can be used to create unique and beautiful works of art. The following examples showcase the potential of this medium. Figures (31,32,33) demonstrate a resigned painting.

Fig (31).

Fig (32).

Fig (33)

Fig (31)A gorgeous resin painting.

Fig (32)A painting on canvas, sealed with resin.

Fig (33) Preserve pressed flowers in a coaster made from resin.

Resin Coasters

Resin coasters are made by pouring a specific type of resin into a mould of the desired shape and allowing it to set. These coasters are a protective layer for wooden surfaces, preventing them from getting stained or marked by cups and glasses. Choosing the appropriate type of resin for practical use is crucial, but it is also possible to add decorative elements to be more visually appealing (Coasters,2024) [31]. Figure (34,35) shows Blue Oak Handmade Coasters and Resin Coasters.

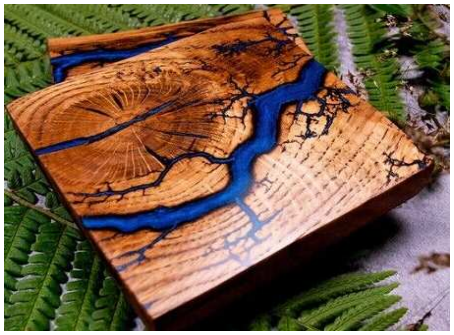

Fig (34)

Fig (35)

Fig (34) Blue Oak Handmade Coasters, Fractal Burn, Resin
Fig (35) Resin Coasters - Sea

The Five Inspirational Resin Artists. (ArtResin2024) [32].

1. **Mike Mozart, AKA "MiMo"**

Mike Mozart, also known as "MiMo," is a renowned street artist and Disney illustrator who began creating street art in the 1970s. His art often features Hasbro's Mr. Monopoly Man. Mike Mozart is credited with originating the technique of painting vintage Monopoly game boards with Art Resin, which has become increasingly popular in New York City. Many of these exceptional works are currently on display at the 212 Art Gallery in NYC. Fig (36,37,38) shows some of his designs.

Fig (36)

Fig (37)

Fig (38)

2. **Bruce Riley**

Contemporary Abstract Artist.

Bruce Riley is an artist who creates unique pieces by pouring paint and Art Resin. While his work often has a psychedelic feel, this is not

necessarily his aim. "flow" as a subconscious mental zone where heightened creativity is He is genuinely interested in the creative process behind each large panel of his work and the sense of "flow" that painting provides. Bruce defines possible. Fig (39,40,41) shows some of his pouring paint and Art Resin designs.

Fig (39)

Fig (40)

Fig (41)

3. Mitch Gobel

In 2012, Gobel began experimenting with various materials, including resin, which led to his development of a wide range of mixed media artworks, as depicted in Fig (42,43,44). On January 22, 2023, Mitch mentioned that Gobel's new approach to art reflects the essence of his style in resin. However, he also noted that Gobel's art practice has become slower and more intentional. Mitch described Gobel's art as a physical manifestation of his heart's desires, a reflection of his internal state, and a cosmic vision.

Fig (42)

Fig (43)

Fig (44)

Gobel's style in resin

4. Dustin Yellin.

Dustin Yellin is a Sculptor Innovator and an artist in New York known for his unique sculptural creations. He embeds various objects into resin and suspends them to create boxes that are his distinctive works. Yellin started by making small shapes with different prints and objects. Later, he made life-sized boxes with multiple layers of glass, each with different prints. Figure (45,46,47) shows Dustin Yellin Boxes made by embedding objects into the resin.

Fig (45)

Fig (46)

Fig (47)

5. Bree Ramirez.

Contemporary Abstract Artist. Because she lives in Australia, Ramirez's art evokes the beach, the ocean, surf and freedom. One look at her marbled/lacy resin techniques and one will know the secrets —and the impressive of Ramirez's works, especially the ability to distinguish colour.

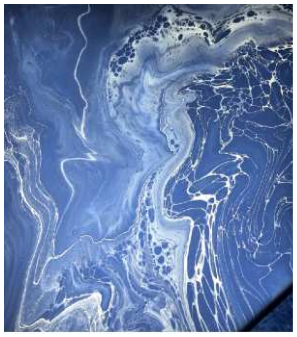

Fig (48)

Fig (49)

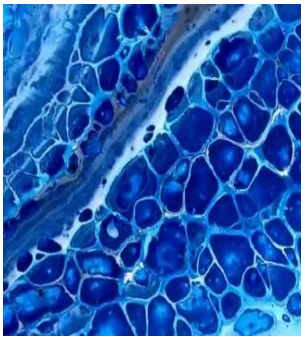

Fig (50)

Experimental work

Compared to other interventions of art learning, assistive materials like epoxy resin may have a significant effect in helping students progress

towards the goals outlined in their individual education Plans (Watson, Ito, Smith, & Andersen, 2010) [33]. Technical assistance is enhanced in two ways: It can help students learn how to create experimental artwork and overcome technical difficulties. For example, when a student starts handling this complicated material artwork, it goes beyond the complex area of experience. However, if students focus on the process sequence to complete their artwork, they can learn unfamiliar and experienced steps.

Step 1: Wood Preparation

The wood should be prepared before coating it with epoxy resin**:**

- Sanded,
- Degreased and
- Prevent any surface contamination like oil or dirt.

Step 2: Mixing the Resin

It is recommended to practice with a test piece before starting the actual project. To blend resin and hardener, use an appropriate container and a plastic or wooden spatula to blend the two components. Stir the mixture carefully for several minutes to minimise air bubbles and achieve uniform fluidity without any streaks. It is essential to wear nitrile gloves to prevent direct skin contact with the fluid.

The ratio for mixing resin can be either 1:1, 2:1, or 4:1, according to the system used. After stirring the resin mixture, it will quickly flow and spread until it cures. To avoid this, tape the table's edges before pouring and spreading the epoxy over the wooden surface with a spatula or squeegee.

Let us take the example of Charlene Lewis's resin painting ground. If the size of the painting ground is 150 cm in length and 100 cm in width, you need to apply resin on the sides of the ground up to 2.54 cm thick to achieve a perfect finish. This will require an additional 203 ml of resin, making the total amount needed 2603 ml. (Lewis, 2024) [34].

Preparing the epoxy

Using a hot air gun or torch is recommended to avoid air bubbles. It is vital to stop working on the surface when the viscosity becomes thicker to

achieve a uniform finish. Timing is crucial since the surface can be sealed in just half an hour. In Fig. 1, 2, and 3, you can see the epoxy in the wooden mould and the timber interior with wood mould-coloured epoxy. Once the epoxy hardens, you can remove the artwork from the wooden mould.

Fig (51)

Fig (52)

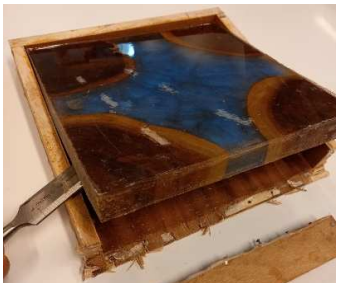

Fig (53)

Fig (51) Intermingling the wood material with the epoxy in the wooden mould to trap the epoxy in its liquid state.

Fig (52) The timber interior with wood mould-coloured epoxy

Fig (53) Removing the artwork from the wooden mould after the epoxy Hardens.

Experimental 2

Surface Treatment

It is possible that epoxy resin may not require any surface treatment, depending on its intended use. However, surface treatment may be necessary if used alongside untreated wood. Additionally, the resin may have visible stress marks and the depth effect may not be optimal.

Waiting a week before sanding and polishing the resin surface is recommended to achieve an excellent finish. Even though the resin may seem cured, it can still be soft underneath the surface.

Sandpaper with a fine grain can be used for dry or wet sanding for small objects. It is always recommended to start sanding from coarse to fine grain to avoid any visible traces of sanding. Larger surfaces, on the other hand, require the use of an orbital sander for better results. The orbital sander not only rotates but also gives a much finer sanding. Additionally, it takes less time to sand and is less likely to file unevenly in some places.

Finally, the last step is to polish, oil, and finish the artwork. Figures (54, 55, and 56) show the finished artwork pieces.

Fig (54)

Fig (55)

Fig (56)

Fig (54): This step involves completely removing the artwork from the wooden mould.

Fig (55) The artistic work of overlapping wood and epoxy before starting painting

Fig (56): The artwork involves engraving inside a cross-section of a tree trunk, colouring the engraved shape, and pouring epoxy. The artwork will also include expressing a name in Arabic. After sanding and painting, the artwork will be complete.

Experimental 3

Epoxy resin coat

Epoxy resin and wood offer endless design possibilities. It could use epoxy resin to coat wood, create wood moulds, make epoxy resin river tables and much more. The present instructions, ideas, and tips are to help the student get started. The artwork is first finished in wood and epoxy, then with paint during the process sequences. Figures 7, 8, and 9 describe three artistic works.


Fig (57)


Fig (58)


Fig (59)

Fig (57): This tray is made from the wooden shell of a coconut. The process involves cutting the coconut shell into rings and pouring epoxy over them to shape the tray. Once the shape is formed, the tray handles are added.

Fig (58): Here is a modern incense burner made of interlacing wood with epoxy.

Fig (59): A beautiful walnut epoxy river wooden tray has been created. The final epoxy finish can be matte, satin, or high gloss, which gives an excellent piece of art. The artwork was finished by spraying several coats of durable epoxy to achieve a glossy finish.

Conclusion

Epoxy resin is a versatile and durable material that has become popular in the arts and crafts community. Due to its unique chemical composition can be used for casting, encapsulating, coating, and laminating. Many artists prefer epoxy resin because of its transparency and durability, making it a trendy medium in resin art.

One of the challenges of using resin art is figuring out how to use it to create wooden crafts for art education. However, epoxy resin is expected to become more prevalent in art education due to its versatility and potential for creating impressive wooden crafts. Despite this challenge, many artists continue to use epoxy resin as a creative and productive medium in their artwork. Epoxy resin, therefore, is likely to continue to thrive in the field of artwork in the coming years.

Recommendations

Epoxy resin educational course

Resin casting is a great way to preserve and showcase stunning pieces of wood, especially those with vivid grains or refined burls. It could create epoxy jewellery, use a piece of wood for turning, or craft a decorative item. However, it is essential to manage epoxy resin educational courses.

This course is mainly based on creating resin products through moulds and could also create resin wall art, and how much actually to create with the appropriate resin from coasters, keyrings, jars, jewellery, etc.

The following recommended course guidelines:

1. Utilising the proper safety tips and equipment when working with resin.
2. Set up an appropriate working environment.
3. Utilising the right tools and materials for the intended artwork.
4. Understand the different types of resin materials available.

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