

# Research on Modern Women's Clothing Creative Design Based on Rust Dyeing

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**Abstract:** Rust dyeing is an ancient and deeply historical dyeing technique with unique colors and textures. Rust dyeing is a dyeing method that uses rust as a dye to leave unique marks on fabrics. By analyzing the artistic characteristics of rust dyeing and extracting traditional patterns, this paper combined rust dyeing with Miao wax dyeing, conducted experimental exploration with feasibility and selected feasible experimental techniques to apply in the series of works. The combination of ancient and modern rust dyeing is a cultural fusion. On the path of pursuing modernization and innovation, it is a valuable and meaningful work to combine modern concepts and technology.

**Keywords:** Rust staining; costume designing; Wax printing; artistic features

## 1. Introduction

In the long river of history, China's cultural and artistic traditions have integrated various exquisite techniques. According to Wu Shusheng and Tian Bingyi's "History of Chinese Dyeing and Weaving", it can be traced back to the use of iron ore to dye clothing by the people of the mountaintop cave in Zhoukoudian, Beijing. The Chinese pharmaceutical work "Kaibao Bencao" also mentions the technique of making iron powder and dyeing clothing.

In modern society, with the renewed attention and appreciation of traditional culture, designers often seek inspiration between ancient and modern times. And rust dyeing, an ancient dyeing technique that uses rust to draw patterns on fabrics, has once again attracted people's attention due to its unique color and texture. Nowadays, research on rust dyeing by researchers still remains limited to the techniques of ancient tie dyeing, such as Ding Rongrong and Luo Ying's discussion of rust dyeing technology and dyeing steps in "Experimental Application of Rust Dyeing in Clothing Design" [1]. Most researchers have also conducted research on its experimental principles, such as Shi Xue's in-depth study on the principle of rust dyeing in "On the Art Expression Form of Combining Rust with Fabric" [2]. This article attempts to explore the application of Miao wax dyeing in rust dyeing, as well as the visual, cultural, and market value brought by this combination. We hope to explore a new path that integrates classical and innovative elements in the field of modern design through in-depth research and practice.

## 2. Overview of rust dyeing

### 2.1. Principle and characteristics of rust dyeing

The basic principle of rust dyeing is to use iron oxide produced by the reaction of iron with water or oxygen in the air, commonly known as rust, to dye fabrics. Rust has a specific ochre tone and when combined with fabric, can produce natural and versatile textures and colors. Cotton, linen, or other natural fiber fabrics are most suitable for rust dyeing because these fabrics have better adhesion to rust. Iron sheets or iron products can be old nails, chains, wires, or any rusty iron object.

Clean the fabric to remove oil stains or impurities on it. If you want to get deeper or more obvious rust marks, you can soak the fabric in vinegar or other acidic solutions in advance, which can accelerate the formation of rust. Soak iron products in water and expose them to air to accelerate their rusting process. A small amount of salt or vinegar can be added to accelerate the corrosion and rusting of iron. The rusty iron sheet should be contacted with the wet fabric, and the fabric should be in close contact with the iron sheet by means of binding, clamping, folding and so on. Then the fabric should be placed

in a damp, exposed place to allow rust to continue to develop and infiltrate into the fabric. Depending on the desired effect, the process can last from a few hours to several days. Once a satisfactory rust dyeing effect is achieved, the fabric need to be soaked in cold water, added a small amount of salt to help fix the color and rinsed with clean water to remove excess rust and salt. Finally, the dyed fabric need to be dried and ironed if necessary to make it look smoother.

In the process of rust dyeing, rust itself acts as a dye. But in some cases, additional dyes may be needed to enhance or adjust the color. Natural colors such as mulberry blue, polygonum red, and walnut shells can be added to rust dyeing. Copper, zinc, molten iron, etc. can enhance the color effect of rust or provide other color effects. Naturally rusted iron products are the most common and primitive source of rust. Iron nails, wires, sheets, or any rusted iron products can be used. In order to quickly obtain a large amount of rust, new iron products exposed to water and air can be chosen, and salt or vinegar can even be added to accelerate the rusting process. There are also iron powders available on the market that can be mixed with water to form a paste, which is then coated on fabric and rusted when in contact with air.

Choosing appropriate materials not only ensures the quality of rust dyeing, but also endows the work with more artistic value according to its needs and characteristics. Different combinations of fabrics, dyes, and rust sources can produce different effects, so selection and adjustment can be made according to specific needs.

## ***2.2. Technological changes in rust dyeing***

In ancient times, people may have stumbled upon spots left by iron products in contact with certain fabrics, which were aesthetically pleasing in certain contexts, thus exploring and utilizing them as a dyeing method. In some cultures, the color of rust is endowed with specific symbolic meanings, such as representing decay, the passage of time, or the power of nature. These cultural backgrounds may encourage rust dyeing to become a popular way of dyeing<sup>[3]</sup>.

With the passage of time, people began to study and improve the technology of rust dyeing more systematically. For example, how to control the generation of rust, how to make rust adhere evenly to the fabric, and how to make dyeing more durable. In some traditional processes, rust dyeing may be combined with other natural dyes to create complex and unique color effects. In modern times, rust dyeing has gradually become an artistic expression technique. Many modern artists and designers use rust to create abstract and textured works on fabrics, paper, or other media. In the current era where environmental protection and sustainability have become the focus of attention, rust dyein” has’gradually been regarded as an environmentally friendly dyeing technology due to its natural and harmless characteristics, attracting many people who pursue a green lifestyle.

Overall, rust dyeing has had its value from ancient times to the present, and its uniqueness lies in the natural processes it represents and the texture effects that cannot be replicated. From accidental discovery to systematic research, to the application in modern art and design fields, rust dyeing has demonstrated its unique charm and broad potential for application.

## ***2.3. Application of Rust Dyeing in Modern Design***

With the pursuit of diversity and originality in modern design and art, rust dyeing, as an ancient dyeing technique, is increasingly being incorporated into the field of modern creativity. Its unique colors and textures provide a expressive palette and tool for modern designers and artists.

Rust dyeing has been used by some avant-garde fashion designers in their creations, creating a unique and "historical" appearance that often appears in high-end fashion weeks or art performances (as shown in Figure 1). Printed T-shirts or accessories have also begun to use rust dyeing as a design element, adding a primitive and natural feeling to the product. The rust dyed texture and color have been applied in home accessories such as pillows, carpets, and tapestries, adding a retro, industrial, or natural style to the home space. Wallpapers and wallpaper designs have also begun to use rust dyed effects, bringing a unique visual impact to the space. Many contemporary artists use rust dyeing techniques to create abstract works on fabrics, paper, or other media (as shown in Figure 2), which are exhibited in galleries, art exhibitions, or outdoor art festivals. The combination of rust dyeing with other media, such as embroidery, painting, or installation art, forms a rich and diverse artistic language. Traditional crafts such as Japanese rusty dyed handkerchiefs and Chinese rusty dyed cloth bags have gained new life in modern design. Personalized daily necessities such as notebook covers, shopping

bags, or scarves are also designed with rust dye, becoming popular art pieces in daily life. In order to emphasize the handmade, original, or natural characteristics of the product, some brands use rust dyed elements in their logo or packaging design.

The application of rust dyeing in modern design and art is diverse. It provides a unique way of expression for designers and artists, satisfying modern consumers' pursuit of personalization and uniqueness. With the return of green, environmentally friendly, and handmade art, it is expected that rust dyeing will still have a wider range of applications in the future<sup>[4]</sup>.



Figure 1: China International Fashion Week Dalang Day Show.



Figure 2: Baidu Source.

### 3. Innovative Exploration of Rust Dyeing in Clothing Design

#### 3.1. Exploration of Rust Dyeing Technology in Clothing Design

The rust dyeing techniques are usually rubbing and tie dyeing, and in the rust dyeing process, the effect of the patterns produced by different dyeing methods also varies to a certain extent. Rubbings can fully immerse rusty patterns on fabrics and create effects similar to traditional Chinese painting and watercolor through the medium of water. The thick rust red gradually fades into a halo, presenting a color that gradually changes brightness and purity until it fades back to the original color of the fabric. This kind of dyeing produces a gradient effect, from real to virtual, that is, real is virtual. Tie dyeing method wraps the fabric layer by layer on a three-dimensional rust iron, and the fixed thick threads leave anti dyeing marks on the dyed fabric, which seem to be broken and connected, with a strong sense of form. The third type of local rubbing dyeing method involves local rust dyeing on pre designed geometric patterns, or orderly arrangement of rectangular or elliptical rust stains on the fabric, with rust colors overlapping and varying in depth or light. The following is an experiment conducted by the author based on rust dyeing technology and clothing fabrics.





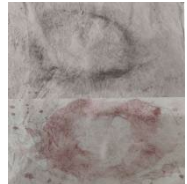



The traditional technology of rust dyeing mainly relies on the natural oxidation process, which requires long-term exposure and waiting. The application of modern technology, such as chemical

catalysis, can accelerate the oxidation process of iron and greatly shorten the dyeing time. Ancient rust dyeing usually uses natural fiber fabrics such as cotton and linen. New types of textiles, such as synthetic fibers and special fabrics, have brought more choices and possibilities for rust dyeing. Traditional rust dyeing typically presents a natural, random texture effect. Rust dyeing in modern design may pay more attention to the regularity, geometry, and symmetry of patterns, reflecting the trend of modern aesthetics.

Experiment 1: On the basis of rust dyeing, immerse cotton fabric in water, vinegar, and salt with ferric oxide and ferric oxide, and expose it to the sun. Wait for the iron powder to be printed on the fabric. When water comes into contact with the surface of iron, water droplets will turn slightly red, and rust will suspend in the water. When water droplets evaporate, rust remains on the surface, forming a reddish rust layer. After rust forms, it can be applied to the fabric to create beautiful rust patterns. This rubbing method has poor dyeing effect, as the iron powder is insoluble in water, resulting in a final color that is too light. Experiment 2: Irregular tie dyeing of the fabric was carried out using iron powder and coal dyeing agent for high-temperature heating to dye the fabric. Wrap the fabric around a three-dimensional rust iron, wrap it with a rope to fix it, soak it in water, and expose it to sunlight to form a random rust pattern. Experiment 3: Wrap iron objects in fabric and dye them with coal dye. Due to different tie dyeing methods, the halo dyeing effect of the dye varies, and it can exhibit diffusion from the inside out. Experiment four involves directly rubbing rusted iron objects onto the fabric for dyeing. This method has the best dyeing effect. During the experiment, it was found that the degree of rust and the duration of exposure to sunlight vary, and the color of dyeing changes from orange to reddish brown (As shown in Table 1) .

The color and texture of rust complement the form of natural patterns, enhancing the beauty of nature. When popular culture is combined with rust dyeing, they present the audience with a collision of time and trends. The work has both a modern and retro texture, forming a unique fashion style. Overall, the interaction between different patterns and rust dyeing creates a variety of effects.

*Table 1: Rust Staining Experiment.*

|                      | Experiment 1  | Experiment 2  | Experiment 3   | Experiment 4  |
|----------------------|---|---|--|---|
| Experimental method  |  |  |  |  |
| Experimental results |  |  |  |  |

(Image source: Author's selfie)



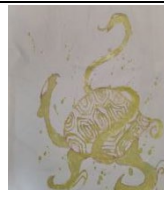



### 3.2. Combination of Rust Dyeing and Miao Wax Dyeing Techniques

Integrating different traditional dyeing techniques can lead to unique and deeply ingrained design works. Miao wax dyeing is an ancient dyeing technique known for its exquisite lines and natural textures. Rust dyeing, on the other hand, is favored for its unpredictable natural texture and ancient atmosphere. Wax printing is a process of painting on a cloth using a wax knife dipped in melted wax, followed by dyeing with rust to remove the wax, resulting in a white rust colored pattern on the surface of the cloth. Wax printing was approved as a national intangible cultural heritage in 2006.

The wax printing template is created according to the sketch, and is used to applying wax to the fabric to form a pattern. Using a wax knife for fine wax line painting, and dyeing colors inside the wax line, not only allows the wax line to play a shaping role in the entire pattern, but also serves as the skeleton of the pattern, forming a sharp contrast with the same color block. This not only enriches the effect of the picture, but also demonstrates the exquisite quality of the wax line under the wax dyeing technique and the artistic expression of the pattern<sup>[5]</sup>. On the other hand, using block surface dyeing, wax proofing and painting dyeing are applied to each part of the pattern that needs to be colored,

gradually achieving the painting and dyeing of the entire pattern starting from the layout. By exposing the waxed fabric to sunlight and staining the unpasteurized area with rust, the rust can react with the fabric and produce a unique rust color and texture. Then let the fabric naturally oxidize in a moist environment to achieve a richer texture effect, and the wax is removed from the fabric by heating to expose the pattern<sup>[6]</sup>. Through this fusion, we not only obtain a unique design work, but also give new life and meaning to two ancient dyeing techniques. This method is not only a respect for traditional skills, but also a reflection of modern design philosophy, emphasizing originality, innovation, and the harmonious coexistence of tradition and nature<sup>[7]</sup>.

Table 2:Combination experiment of wax dyeing and rust dyeing.

| 1 Make a sketch   | 2 Heat the wax  | 3 Color with wax  | 4 Place the sheet metal on the fabric   | 5 The high temperature melts the wax   | 6 Secondary decoration  |
|---|---|---|---|--|---|
|  |  |  |  |  |  |

(Image source: Author's selfie)

#### 4. The application practice of rust dyeing in the clothing design of the “Dream of Yesterday” serie

Rust dyed patterns have rich content forms and unique artistic language, using different techniques to combine clothing. Applying wax printing technology to clothing design not only enriches new elements and forms, but also promotes excellent traditional culture. Because rust dyeing, like tie dyeing, has its unique charm, each piece of fabric after dyeing has its unique randomness. Even if ironware is placed according to rules, due to the influence of the surrounding environment and time, it cannot be fully guaranteed that the graphics will be fully presented. But it is precisely due to these uncontrollable factors that the unique gradient beauty of rust dyeing is presented. The combination of wax printing allows the irregularity of rust dyeing to permeate its regular patterns, giving the work a new life.

The theme of this series is Dream of Yesterday, which means that on the road of pursuing modernization and innovation, we should not forget the roots of tradition and culture, and we should respect and absorb its essence. The combination of Miao wax dyeing and rust dyeing is a pursuit of tradition, presenting a unique classical charm. Providing modern audiences with emotional connections to the past, this fusion approach makes design works a link for communication in the era. They have stood the test of time, representing moments and reality. The clothing is made of cotton fabric as the main fabric, and the pattern is drawn using a combination of rust dyeing and wax dyeing while bronze and tribute satin is used as supplement (As shown in Figure 3). With combining modern concepts and technology, the valuable and meaningful works is created.



Figure 3: Renderings of the Dream of Yesterday series

## 5. Summary

This paper explored how to best integrate patterns into rust dyeing technology, and achieved good artistic effects and a long shelf life. After multiple experiments, natural fibers such as cotton and hemp performed the best. They evenly absorb the dye, making the pattern clear and visible. Naturally rusted iron products produce a more natural and delicate effect than iron powder. Iron products that accelerate rusting can be used for projects that require quick completion. By using rubbing technology to transfer patterns onto the fabric, every detail is clearly reflected. The optimal time for rust staining is 24 to 48 hours. Insufficient dyeing for too short a time may lead to fabric damage if it is too long. Before dyeing, ensure that the fabric is clean, moist, and free from grease. This helps rust adhere more evenly to the fabric. Choose patterns with thicker lines to reduce pattern blurring caused by rust diffusion. After dyeing, rinse with cold water and clean with neutral detergent. To fix the color, it is possible to consider using a color fixative. Meanwhile, it is recommended to hand wash and air dry naturally. Art is always evolving. It is recommended that designers maintain an innovative spirit, continue to explore and try new technologies and applications, and inject new vitality into rust dyeing art.

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