



Tessellation Technique on LORI MSME as Part of the Creativity and Application of Project-Based Learning for Design Students

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Abstract. Technological advancement is inextricably linked to the advancement of human civilization. Fashion accessories are a result of human civilization. Through this article, we will describe one endeavor to advance and broaden the range of jewelry designs is the use of Escher's tessellation modular design to fashion accessories at LORI (Laras Ornamen Indonesia) MSME. LORI is also a place for project-based learning by design students from Universitas Kristen Maranatha and Telkom University in the practice of making lecture assignments. This study used a qualitative methodology based on an experimental case study using metallic tools and materials. The result of this experiment is the design of a jewelry accessory prototype using the Lasem batik motif as a local source of inspiration for the design's content and the modular tessellation technique. It is hoped that the outcomes of this prototype will serve as a guide to improve the design features and marketing of LORI MSME products.

Keywords: Batik Lasem · Fashion Accessories · Jewelry · Modular Technique · Tessellation

1 Introduction

One of the cultural legacies of Lasem, a subdistrict in Central Java's Rembang Regency, is batik. Through designs created as a result of both internal and external forces, the Lasem community started to investigate batik techniques [1]. Internal forces, influenced by the palace and the local culture of coastal settlements, are the primary influences on cultural acculturation in Lasem batik. Meanwhile, foreign cultures from China and the Netherlands affected external variables. Lasem batik differs from other coastal batik motifs because of the effect of these two aspects, giving it a very distinctive decoration and color [2].

In addition to batik, metal crafts are a global strength of the Indonesian handicraft industry [3]. The annual INACRAFT, or International Handicraft Trade Fair, in Jakarta showcases a variety of Indonesian metal crafts, including accessories, gamelan, jewelry, and home appliances. Since its inception in April 1999, this exhibition has been organized regularly thanks to ASEPHI (Asosiasi Eksportir dan Produsen Handicraft Indonesia). Organizing INACRAFT every year demonstrates the potential for growth and the viability of the metal craft sector. Future commercial prospects exist for the metal craft sector, which has the potential to develop into one of the more intriguing handicrafts. A quality finish will raise the decorative value of the craft, add protection that can boost the craft's basic materials' endurance, and add a final value that appeals to customers. Finishing innovations in the handicraft industry, mainly metal, are critical to growth.

Indonesian society has long adopted the custom of wearing jewelry or other accessories, elevating one's status and facilitating nonverbal symbolic exchanges with others [4]. People use fashion accessories in contemporary culture as jewelry and a means of communication to express one's identity [5]. Since accessories can help people express their personality and character, their aesthetics are crucial. Trends influence the aesthetic diversity of accessories.

The tessellation technique is one of the numerous repeating techniques used to create motifs. Tessellation [6] produces a two-dimensional plane using repeating geometric components without gaps. Maurits Cornelis Escher (17 June 1898–27 March 1972), a Dutch graphic artist, invented tessellation using non-geometric module shapes. Escher's method uses four techniques to create it—translation, reflection, rotation, and glide reflection—and has a mathematical structure based on mathematical angle games. Graphic designer M. C. Escher (1898–1972) used mathematics in his designs. M.C. Escher's non-geometric motifs are modeled after the forms of live things like birds, fish, and horses.

One of the motivations for this research is a lack of information about the metal craft industry. This study was carried out by making several efforts to collect data, documentation, and experiments and publish them scientifically. As a result, this research will describe the experimental results of LORI MSME design students in the form of metal jewelry using the tessellation technique.

2 Method

The method used in this research is a qualitative methodology based on an experimental case study using Project Based Learning (PBL) technique approach as researched by Al-Tabany [7, 9] is based on projects in the learning process. Project Based Learning (PBL) has three stages in the form of planning, implementation (creating), and processing [10], which is divided into the following procedures: Phase I involves conducting a literature review on jewelry and decoration motifs, in general, to serve as an experimental reference for applying batik motifs to metal; Phase II, Design reference/recommendation, pre-design stage to determine the purpose, direction, and design blend of Batik Lasem and lifestyle as a recommendation for jewelry design [8]; Phase III, design, metal experiments with laser cutting and forging techniques; Phase IV, Product realization, analysis and explanation of design concepts in research based on research stages completed (Fig. 1).

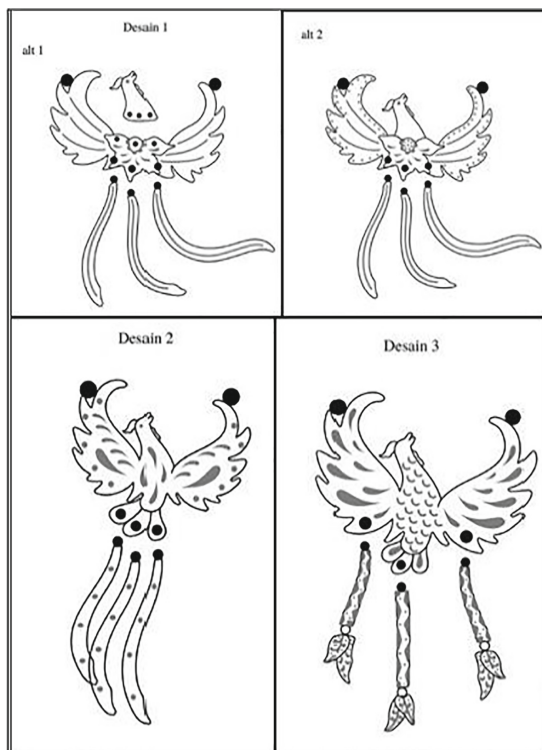


Fig. 1. The primary motifs of Lasem Batik to be applied to the design: are Hong/Phoenix. (Source: Author's documentation, 2022)

Table 1 highlights findings from past studies that the study team evaluated and interpreted [8]. The design outcomes for jewelry are based on particular stylized forms from existing motifs, as seen in the table above about the interpretation of Hong or phoenix themes.

3 Results and Discussion

Considering the above context, the results of metal laser cutting and forging tests [11]. Figure 2 shows the pendant necklace design taken from the Hong or phoenix motif. Because of the distinct characteristics of the two metals' colors, the pendant necklace design was tested on two different metals: copper and brass. The Hong or phoenix theme, which can provide a contemporary, opulent, and dramatic impression, is entirely formed of metal.

Design analysis is carried out by evaluating the designs that have been designed based on the results of consultations with LORI MSMEs. Some things that are decided to implement the design are materials, application techniques, and product type.

Material: This module can be applied to jewelry accessories with brass metal material, similar to the process carried out in previous studies [12, 13]. The technique that can

Table 1. Hong/Phoenix Interpretation of Lasem Batik

Hong/Phoenix		
Description	Anatomy	Meaning
Bird (Chinese)	Tail [old] → Body (scales) and tail [new]	Phoenix (Feng huang) for the Chinese community, is one of the four supernatural creatures: along with the dragon (liong), kilin (qilin), and turtle (gui) [18]. The symbols of human nature include: the head as a virtue, the wings are a responsibility, the back as good deeds, the chest as humanity, and the belly as trustworthiness. The Phoenix has become a symbol in various joints of the human life cycle.
Bird (Javanese)	Body parts, tail [old] → head and tail [new]	Similar to Sawunggaling motif in batik, a combination of phoenix and partridge motifs. The creature in this motif has a chicken's head and a phoenix's tail—the symbol of women, beauty, and strength.
Bird motifs (Batik Lasem)	Head and tail [new]	The symbol of virtue, achievement, immortality, a symbol of the cycle of life after death, and a symbol of the resurrection of the body after death.

be applied in metal experiments is laser cut following the results of direct consultation with LORI MSME owners.

Application technique: the correct jewelry-making technique to apply the design that has been produced is a laser cut technique with modular repetition to produce precision. At the same time, the detailed form of the design is formed with forging techniques so that the texture of the metal material can be seen and adds to the aesthetic element of the jewelry.

Product type: Based on the visuals generated from the tessellation rotation technique, the Escher module can be repeated continuously, thus creating the considerable potential for jewelry products, namely necklace pendants. In addition, it is also necessary to add connections in the form of links or additional connecting modules so that the modules can be integrated into a unified whole and still have aesthetic value.

Ancient metal craftsmen in Syria/Turkey discovered brass metal as early as 3000 BC. Brass is a copper-zinc alloy. As a result of its constituent material, zinc, brass has resistance and strength. This quality influences the properties of brass, which is easy to shape and a good conductor of heat [14].

Compared to other metals, copper has unique properties, like being yellow with a faint reddish tint, conducting heat well or being a good conductor, being malleable and straightforward to shape or forge, and not reacting, which prevents rust [15].



Fig. 2. The Hong motifs were tested on metal as jewelry. (Source: Author's documentation, 2022)

For formal situations, brass metal is suitable since it has a contemporary and opulent appearance. Brass is excellent for usage in formal settings since its color resembles a gold medal. Contrarily, copper metal has a more obvious purpose and appeals to younger generations more due to its fashion. Because it is so common, copper has a definite industrialized vibe [16].

Based on the above description of the fashion accessories as a piece of jewelry with the inspiration of the Hong or phoenix motif, it can be demonstrated that decorative motifs or batik motifs can be done on more than just a piece of cloth. Furthermore, the research team expects to develop [17] an everyday product that enriches the treasures of distinctive and contemporary ethnic fashion accessory designs. The pendant necklace with the Hong or phoenix notion represents a wealth of cultural acculturation in Lasem Batik.

4 Conclusion

Indonesia's ornamental themes and batik motifs are abundant and diverse. Coastal Batik is replete with characteristics of cultural assimilation, and as a result, it has distinct connotations. Batik Lasem is one of these coastal batiks with distinguishing qualities.

Thus, the experimental results and jewelry design with the Lasem batik concept have the potential to be further developed, enriching the treasures of eclectic concept fashion accessories designs in Indonesia in the future. Furthermore, it does not rule out the possibility of future collaborations between the research team, the industry, and ASEPHI (Asosiasi Eksportir dan Produsen Handicraft Indonesia).

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