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EXPLORING THE USE OF BUFFING DUST FOR SCULPTING IN GHANA

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Abstract: *Waste is an inevitable part of life and this is the case for the leather industry. Despite this, very few studies have focused on understanding how leather waste like buffing dust can be managed by harnessing its potential to serve as a resource to the benefit of society. This study experiments with buffing dust for recycled art through sculpting. Through modelling and casting techniques, the study leverages experimental arts to extend the possibilities of buffing dust. The study sought to find answers to questions like effective binders, ideal proportions and material properties like water resistance among others. Three artworks were executed and data collected during the production process through reflective journaling and analysed thematically. The study concludes that bonded glue is an effective binder for using buffing dust in modelling. However, buffing dust can be used for modelling with limitations. Additionally, the study concludes that buffing dust is a suitable material for casting and resin is an effective binder. The study recommends that art professionals and art student practitioners explore the use of buffing dust for their sculpture practice and evaluate clients' acceptability of the new material.*

Key words: *Leather Industry, Waste as Resource, Up-cycled Art, Modelling, Casting*

1. INTRODUCTION

Generation of waste is inevitable in any human community. Human activities in prehistoric times involved using materials for domestic activities which led to the generation of waste [1]. Wastes were usually small in quantity and very little effort was put into creating a management system to ensure their safe disposal. Over time, increasing populations led to high quantities of waste that nature could not absorb some of which were toxic, hazardous, and non-biodegradable. Currently stakeholders including [2] have been experimenting with recycled art to manage solid leather wastes. Buffing dust (BD) is one of the solid waste types that has received little attention in the literature. BD is usually associated with soles that require smoothening as part of the leather products manufacturing process. BD may pose greater health risks, in comparison to other waste types in leather product manufacturing due to the ease of inhalation. In contrast, few research [3, 4] have discovered benefits from BD. This study experiments with buffing dust as an alternative material for sculpting. Using modelling and casting techniques, the research produces sculpture artworks with buffing dust to answer questions about effective binders, ideal binder-BD proportion among others. The study also investigates the water resistance and enzymatic properties of buffing dust.

2. LITERATURE REVIEW

Traditionally, materials such as stone, marble, bronze, wood, clay, metal, and plaster have been preferred for sculpting. Stone and wood are preferred for carving due to their ability to withstand chipping without breaking. Clay is also popular for modelling due to its malleability and non-drying attributes [5]. Thus, clay can remain workable for a long time when wet as well as achieve good cohesion, adhesion, and plasticity when dry. Plaster is also a good material for casting due to its fluidity, quick setting ability, and resistance to shrinkage upon hardening. Over the years, contemporary materials such as glass, plastic, and paper have emerged and artists need to consider the availability of these materials locally when making decisions. Clay, wood, plaster, and cement are core materials for sculpting in Ghana [6]. Ghanaian researchers have experimented with waste materials such as bones, drinking straw, plastic bottle, and eggshell for sculpture work [6] due to their cost-effective benefits. Notwithstanding, practitioners face challenges in getting to these materials in the right quantity [6]. Further, it possible, but challenging, to combine different materials in each sculpture work [6]. Considering that materials can behave differently under different conditions; there is a need to experiment with even more materials to understand their suitability for sculpting.

3. RESEARCH METHOD

This study used an experimental art design where buffing dust was used to create different artworks for the purpose of learning about a material. This study used practice as a data collection instrument to discover a new material from waste in leather footwear production [7]. During the experimentation process, data was collected using reflective journaling and analysed thematically in an iterative and reflexive process [7]. Three artworks were produced: a miniature human foot, a miniature rabbit and an abstracted crab-shaped flower vase (Fig. 1). The foot was selected for its simplicity while the rabbit created room to experiment with intricate designs. The flower vase facilitated experimentation for a sculpture in-a-round artifact. Bonded glue was selected as binder for modelling based on findings from a study that experimented with groundnut shell powder [8]. Resin was chosen as a binder for casting following a preliminary experiment with bonded glue, contact glue and resin. Below is a description of the production process for the different artworks. Once the artifacts were ready, the study conducted a water resistance and enzymatic test to better understand the new material using established guidelines as reference [9, 10].

***Fig. 1**. Exhibit of final artworks produced*

4. RESULTS AND DISCUSSION

Modelling with buffing dust

Findings showed that BD mixed well with bonded glue with good cohesion. Further, BD emerged as workable due to its ability to withstand handling for a long time before hardening. The bonded glue- BD mixture was easy to manipulate for 10 to 15 minutes in the modelling process. After manipulation, the mixture dried at a very slow pace with the first application taking an average of 3 hours to obtain a reasonably dry surface. The second and third applications also took 72 and 24 hours respectively to dry completely. Results from the study also showed that BD had limited malleability properties. BD could not be pressed easily into shape without breaking. To make modelling possible, the bonded glue-BD mixture had to be applied in thin layers on the armature. Each layer needed to surface dry before the next layer of mixture could be applied. Ease of spread of the mixture varied based on texture. While the very coarse BD sample used for the foot was difficult to spread, the fine BD particles used for the rabbit was easy to manipulate.

Limited malleability made it problematic to cut through the partially dry bonded glue-BD mixture to create intricate designs. For example, lines that portrayed the toes of the foot could not be deepened to make the toes stand out properly. Initially, the researcher assumed that this difficulty may be a result of the hard nature of the Styrofoam used for the armature of the foot. Therefore, the modelling of the rabbit adopted a slightly different approach where clay was used first to model the rabbit; after which the mixture was applied. Despite this, there were still challenges with making details on parts of the rabbit distinct (Fig 2). Findings revealed that the bonded glue-BD mixture did not adhere properly to Styrofoam when freshly mixed. This was evidenced by the dripping of the mixture at one side of the miniature foot in the early stages of the application. BD on the other hand proved capable of adhering easily to clay without support. Fidings revealed that BD gave a unique texture that made the artifact look real.

Fig. 2*. Depiction of intricate details in clay vs BD sculture (see groove of the eye)*

Casting with buffing dust

Findings from the preliminary BD binder experiment indicated that contact glue and bonded glue were not effective for casting with buffing dust. They produced buffing dust composite with very slow setting times and poor adhesion. Resin showed potential for casting, hence its use in the main artwork construction. To understand the fluidity property of BD, the researcher experimented with different proportions of resin for casting. The first mixture used a proportion of 500ml of resin to 0.17kg bottles of buffing dust for the first coat of the resin-buffing dust cast work. This ratio of resin to BD was less fluid so the mixture was unable to enter some of the corners leading to defects (Fig. 3). For the second and third applications, the proportion of 250 ml of resin to 0.17 kg of buffing dust worked well because, the mixture were meant to fill the space in the mould rather than pick intricate designs.

The casting process was repeated a second time using a resin to buffing dust ratio of 500ml of resin to 0.086 kg of buffing dust for the first application. This revised ratio led to an improvement in the fluidity of the mixture. This formulation was light enough to penetrate all the corners of the mould with no defects on the final output. A total of seven 0.6 kg of BD and 1000mls of resin was used to produce the entire work. Setting time for the resin- BD sculpture was fast. Overall, production time stood at one hour twenty-five minutes. The use of an accelerator and a hardener, in line with practices established in casting with plaster helped to speed up the setting time. The cast work showed no evidence of contraction upon cooling.

Fig. 3. *Defects in work cast with resin-buffing dust mixture of 500mls to 0.17kg*

To allow for a comparison of the features of BD with plaster of Paris (PoP), the researcher repeated the casting process for the abstracted crab using a resin-PoP mixture. Findings from this study showed that a resin-PoP ratio of 250mls of resin to 0.0867kg of PoP worked well for the first application. A total production time for resin-PoP sculpture was one hour twenty-two minutes. Thus, although the chemical composition of BD varied from PoP, the setting time was the same for both artworks because of the equal quantity of accelerator and hardener was used. Findings also showed that although the same quantity of resin (i.e., 1000 mls) was used, more PoP (0.95 kg) was needed to produce the same artwork as opposed to 0.6kg used in the BD case. Regarding portability, findings indicated a difference in favour of BD. While the cast BD sculpture weighed 1.5 kg, the PoP sculpture weighed 3.2 kg. Findings also showed that finishing with lacquer was an effective approach in preserving the glossiness of the resin-fibre buffing dust composite.

Findings from observing the modelled work revealed no change in aesthetic appearance after subjection to humid conditions over the one-month period. There was no evidence of microbial action and effect on the modelled work. Regarding the cast work, findings showed no evidence of mould generation in the first three weeks of subjection to humid conditions. Nevertheless, the cast work revealed changes in the appearance of the artefact like small white spots and reduction in the glossy effect of the artefact (see Fig. 4) in the fourth week. Suggesting some reactions that need further investigation.

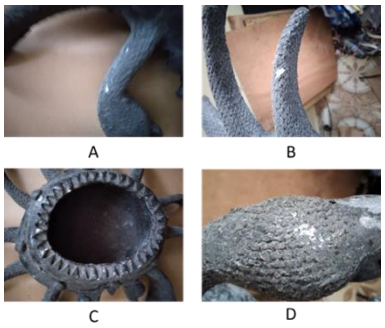

Fig. 4. *Evidence of White Spots after Enzymatic Test*

The researcher anticipated that bonded glue- buffing dust composite will absorb water due to the water-soluble nature of the glue. Therefore, experimentation with the modelled work without finishing involved the pouring of drops of water on the artifact. This suspicion was confirmed as the drops of water mixed with the glue and gave a whitish look (Fig 5). Therefore, the researcher experimented further to see if lacquering could improve its water-resistant features. The bonded glue-BD composite improved in its water-resistant ability as drops of water poured on the lacquered artefact suspended (Fig. 5). Regarding the cast work, findings showed that the resin- BD composite had water resistant features irrespective of the use of a finish or not. The resin-BD cast sculpture weighed 0.8kg before and after exposure to water leading to a porosity rate of 0.071%.

A B

Fig. 5*. Effect of water on lacquered and on-lacquered modelled work*

5. CONCLUSIONS

The study experimented with buffing dust as alternative material for sculpturing. Findings from the study showed that bonded glue worked well as a binder in using BD for modelling. However, key features such as malleability and adhesion strength were inadequately present with limited degree of workability. Resin on the other hand worked well as a binder in using BD for casting. BD possessed all of the characteristic features of materials that are suitable for casting. The feature of portability was an additional benefit of BD in comparison to other traditional sculpting materials. Based on the above findings, it can be concluded that bonded glue is an effective binder for using buffing dust in modelling. However, buffing dust can be used for modelling with limitations. Additionally, the study concludes that resin is an effective binder for using buffing dust in casting. Additionally, buffing dust is a suitable material for casting.

It is recommended that art professionals and art student practitioners explore using buffing dust for their sculpture practice and evaluate their clients' acceptability of the new material for artworks. The evaluation should capture how much clients would pay for the artworks to enable a cost price analysis. The bulky nature of the work limited the researcher's ability to undertake several tests to understand the properties of the buffing dust. Although the study has established that buffing dust can be used for sculpting, there is need to conduct more tests on the material composition and properties of the new material to determine its suitability for different functional items.

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