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Experimenting On The Application Of Selected Pigments On Ghanaian Indigenous Tanned Leathers

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Abstract: ***The benefits that can be derived from the use of Ghanaian indigenous tanned leather have necessitated the search for material and technological means to help improve upon its value. The limited range of colours used by indigenous Ghanaian leather tanners restrain them from achieving variety and this have hindered their aesthetic appeal and competitive market value; these limited colours are red, black, white and brown. The researchers used the practiced based research approach to concentrates on adopting selected locally available pigments that could be obtained in different colouration, to experiment their application on indigenous tanned leathers. The selected colouration that were used successfully are acrylic paint, and printing paste and oil paint. The selected application techniques used were marbling (controlled and uncontrolled), dabbing and screen printing. The experiments that were conducted on the selected colourants and the associated application techniques proved successful and have thus made available to Ghanaian leather tanners alternative means for decorating leather and thus increase their aesthetic and functional value in competitive market.***

Keywords: Pigment; Printing; Marbling, Indigenous tanned Leather, Dabbing. Fabric-Printing paste.

I. INTRODUCTION

The desire to promote the quality of Ghanaian indigenous leathers and finished items to make them equally competitive internationally have necessitated the search for technological and material means to improve their values. Among these efforts are the search for other improved colouring agents that are durable and come in different shades. Currently, the known colour ranges used by indigenous Ghanaian leather tanners are limited to red, black, cream and white; these colourants are mostly dyed by immersion, incidentally they fade within a limited period of time. In other to obtain a more permanent colouration the researchers have decided to experiment on three locally available pigments which would be easily accessible by local leatherworkers' or tanners; they are acrylic, oil paint and fabric printing paste.

According to Nguyen (2008), Pigments are insoluble coloring compounds. Crosby, Marshall & Raven, Peter (2007), opine that, pigment is a colouring substance that is added to give something such as paint or ink its colour, they are often available in the form of dry powders to be added to liquids, and this is also corroborated by Oyarzún, (2000), Pigment (2011). Unlike dyes, they are insoluble, and are applied not as liquid solutions but rather as finely ground hard particles blended with a fluid. The same pigments are utilized in oil-and water-based paints, printing inks, and plastics. Pigments may might be natural (i.e., contain carbon) or inorganic.

Unlike dyes, pigments do not liquefy; they are applied as fine hard particles blended with a fluid. When all is said in

done, the same ones are utilized as a part of oil-and water-based paints, printing inks, and plastics'. ("Paint and Varnish." 2007). A paint shade is a fine powder that either firmly scatters light, to yield a white impact, or retains certain wavelengths of light, delivering a coloured result.

Pigments may be classified into two main forms; these are organic and inorganic or synthetic. Natural pigments are normally compounded from fragrant hydrocarbons; which incorporate the nitrogen-containing azo pigment (red, orange, and yellow) and the copper phthalocyanines (splendid, solid blues and greens). They are any of several white, granular organic compounds produced by all green plants. ("Paint and Varnish." 2007).

Inorganic pigments arise from substances that are not organic. Among the most common inorganic pigmented colours available on the local Ghanaian markets are acrylic paint, enamel paint, and printing paste.

According to Aatcc, (1995), pigment printing is the application, by standards, of coloured glues comprising of fasteners, thickeners and particular chemicals, and colouring components. The selection of pigment for imprinting on leather depends on its accomplishments in textile printing. Pigment prints offer a strong scope of colourings with great end use properties at cogent expense on an extensive variety of base fabrics beside, fastness of pigment prints is also quite acceptable for most end uses. (Aatcc, 1995)

The quality of paint as oil or water based colourant is determined by its formation. Paints are formed by blending a pigment (the substance that gives colour) and a binder, a liquid vehicle, for example, linseed oil, that become solid when exposed to air, or water that dries up by heat. Paint is liquid that solidifies when exposed to air, and are utilized to cover surfaces for ornamental and defensive purposes. Oil painting techniques could be adopted in the colouration of leather; and that oil painting is the art of applying oil-based colours to a surface to create a picture or other design. ("Oil Painting" 2007),

The application of dyestuffs on leather through screen printing and other related techniques, require the use of commonly available vehicles to colour leather. This also depends on the ability to convert them into pigments, (Lewin, Seymour Z., 2007). Dyestuffs are any of an expansive group of chemicals only natural in nature, utilized for the colouring of fabrics, inks, food items, and other substances. Present day manufacturing terms characterizes a dyestuff as an item containing immaculate organic dye and cutting agents or fillers that make the item less demanding to handle. dyes are not to be mistaken for pigments, which are powdered coloured substances that must be blended with adhesive binding agents before being applied to surfaces. The common vehicle that can best hold dyes without disturbing its hue is starch. (Asmah, Okpattah, & Frimpong 2013).

Among the selected colourants for the research is acrylic paint. Acrylic is defined as any of a range of synthetic substitutes for oil paint used in oil painting. Acrylic paints—emulsions of pigments, water, and clear, non-yellowing acrylic resins (Wendon Blake. 1998, "Acrylic Paint." 2007). The paints are applied as a part of an assortment of painting schemes or techniques, from wash (a slight or thin covering) to impasto (thick pigment). For the most part solvent in water, they dry faster than oil paint without changing colour nor darken with time, they are waterproof when dry, and remain marginally flexible, however they do not have the translucency of natural substances.

Acrylic is made by the polymerisation of acrylates or other monomers containing the acrylic group. Acrylic compounds are thermoplastic (able to soften or fuse when heated and reharden upon cooling), impervious to water, and have low densities. ("Acrylic." 2007, The striking feature of acrylic paint is its remarkable versatility – its adaptability to a great variety of colouring techniques (Wendon Blake, 1998), these qualities make them susceptible to use as colourant on leather. The successful application of the identified colourants through the selected techniques would enhance the value of leather, as it opens new opportunities to indigenous leather technologist and traders of finished leather goods.

The vehicle selected for transferring the colourant in control and uncontrolled marbling is starch, it is the basic name associated to a white, granular or powdery, unscented, tasteless, complex carbohydrate, $(C_6H_{10}O_5)_x$, plentiful in the seeds of cereal plants and in tubers and bulbs, some common ones of which are mainly cassava, corn, though wheat, tapioca, rice, and potato. Particles of starch are made of hundreds or a huge number of molecules, comparing to estimations of x, as given in the recipe over, that range from around fifty to numerous thousands. Starch is practically insoluble in cold water and in liquor, yet with boiling water it gives a colloidal suspension that may form a jelly on cooling. Boiling hot water changes starch gradually into smaller molecules called dextrins. ("Starch." 2007).

To achieve the required objective of the project some colouring techniques were identified and used for applying the selected pigments on indigenous tanned leathers. These were marbling, screen printing and dabbing.

The creation of marbled effect, accordingly, has been described as the process of applying mottled streaks of colour to paper or other material to create the appearance of marble. ("Marbling", 2007). This technique was found to be very convenient for adoption as a colouring technique on leather, in the light of its simple technical application processes.

The selection of dabbing as a colouring technique on leather also brings to the fore an easily applicable colouring process which does not entail much technical cost to the leatherworker. Dabbing is described as applying something or a substance gently using a quick light tapping action to apply (paint, cream, etc.) with short tapping strokes. ("Dabbing" 2007). Dabbing provide the leatherworker the opportunity to explore the use of both artificial and natural materials within the immediate environment to create design patterns.

II. MATERIALS AND METHODS

This research explores the use of three identified pigments for colouring leather; these are (a) Acrylic (water based pigment) (b) Enamel Paint (oil based pigment) and c) Printing Paste. The research involves four different experiments through application of the following printing techniques: Control Marbling, Uncontrolled Marbling and Dabbing.

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General preparatory stages, for the application of Control Marbling.

Working procedure; A wooden trough to hold the (size) cooked starch. 65cm x 4cm x 59cm. Plate 1, was secured. Two kilogrammes of cassava starch was prepared with hot water plate 2 and was poured into the wooden trough; it was made to spread evenly in the trough, plate 3 and plate 4.

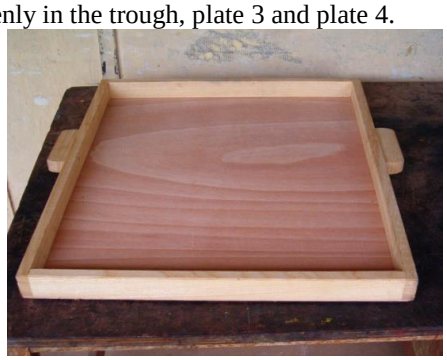

Plate 1: Wooden trough

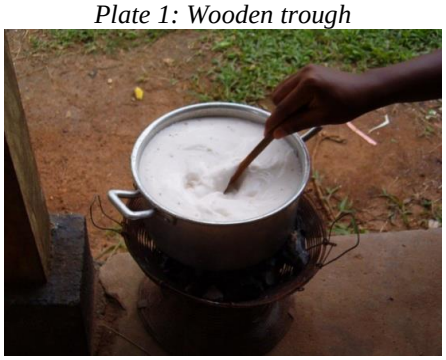

Plate 2: Preparing the starch

Plate 3: Pouring starch into trough

Plate 4: Starch is left to settle

EXPERIMENT 1: Using Acrylic (water based pigment through controlled marbling)

White and black acrylic pigments of 75milliliters was selected and mixed with 20 milliliters separately to the required consistency. Each colour was stirred up with brush and placed beside the trough for easy accessibility. The first colour to be dropped was white, and then followed by black; these were dropped all over the surface of the starch. When all the colours had been dropped serpentine lines were drawn with a stylus point and then the pigment was drawn from front to back of the trough, with a comb shaped object cut out from straw board (Plate 5and 6). The comb was then drawn evenly across the trough, from left to right, with the teeth just touching the surface of the starch.

The piece of leather was held at the middle of the bottom and at the top edge, it was then lowered gently upon the surface of the starch, starting from the bottom edge and gradually lowered towards the top edge, until the leather laid perfectly flat upon the surface of the starch. The back of the leather was then tapped gently to make sure that every part touched the pigment beneath, Plate7 and 8. The leather was lifted up at one end and pulled gently over the edge of the wooden trough. Excess pigment and starch on the leather were carefully washed off with water under a smooth running tap. The leather was next dried in a shade to finish plat 9.

Plate 5: Stirring the drops of pigments

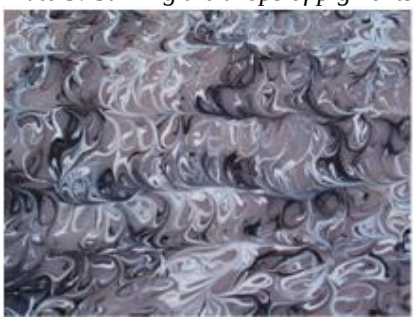

Plate 6: Created pattern

Resultant pattern that was created after dropping and stirring the surface, Plate 6, 7.

A piece of leather is dropped gently over the created pattern to pick the design as in plate 7and 8. Plate 9; illustrates the finished effect of the transferred design.

Plate 7: Dropping the leather

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Plate 8: Leather was pressed down firmly

Plate 9: Finished marbled leather

EXPERIMENT 2: Enamel Based Marbling (i. Controlled, ii. Uncontrolled)

A. CONTROL MARBLING

Following after the procedure used for water based controlled marbling, blue and black enamel (oil) paint was also used resulting in the production of oil based controlled marbling effect on a cream coloured sheet of leather as shown in plate 10. The natural surface of the leather responded positively to the printing with the pigment.

Plate.10. Transferred pattern on leather (oil based controlled marbling)

B. UNCONTROLLED MARBLING

This is done mostly with oil-based pigment. Water is the size used for this technique and oil is insoluble in it. Three hues of enamel paint (yellow, red, blue) were prepared in small containers and placed beside a large plastic bow (36cm in diameter x 30cm) that contained the size.

Yellow was dropped all over the surface with number six sable brush, followed by red and then blue, for three colour work. A stylus was swirled in a great variety of ways, producing many different patterns as in Plate 11 and the piece of leather was laid gently upon the patterns, and then tapped gently at the back, making sure that every part of it touched the colours as in plate 12.

The one edge of the marbled leather was lifted gently from the size, plate 13 and placed on a flat support to dry it as final finished product, plate 14.

Plate 11: Creating patterns on the size

Plate 12: Picking pattern with leather

Plate 13: Lifting leather from the size

Plate 14: Uncontrolled oil based marbled leather

EXPERIMENT 3: Fabric Printing Paste (Using Dabbing technique):

The highly compressed and glossy nature of the grain side of vegetable tanned leather does not allow fabric-printing

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paste to penetrate the fibers easily; therefore, the act off dabbing was tried on it.

A sheet of cream coloured leather was prepared by sanding the grain side, then soaked and stretched on a stretcher board to dry. The dry leather was laid on a flat board to work on and two colours of printing paste, brown and blue were poured into two separate plastic plates and placed on the printing board for easy transfer onto the leather.

The flat edge of plantain stalk was used by dabbing it first into the dye, and then unto the leather. The light blue paste was first applied all over the leather to dry; thereafter the brown paste was also applied in likewise manner (Plate 15), this resulted in a decorative pattern as in the figure below, (Plate 16).

Plate 15: Dabbing with plantain stalk.

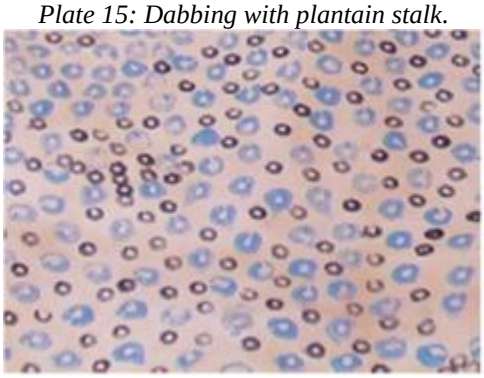

Plate 16: Finished dabbing design

EXPERIMENT 4: Using Acrylic (water based pigment through Screen Printing technique).

Black dyed Indigenous tanned goat leather was used for the screen printing. To render it effective for the required purpose, it was soaked and stretched flat on a wooden stretcher board and allowed to dry softly in a shade. Following after the silk screen printing a piece of porous, finely woven fabric mesh network framed over an edge of wood. Area of the screen is closed off with non-penetrable material to a stencil, which is negative of the motif to be printed, that is, the open spaces are the place the ink show up. Plate 17 aftermath effect of screen print on the black leather.

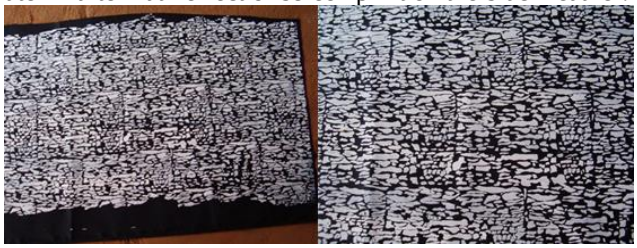

Plate 17: Acrylic Screen on leather.

III. RESULTS AND DISCUSSIONS

Using pigments to colour leather: Exploring the use of (a) Acrylic (water based pigment) (b) Enamel paint (oil based pigment) (c) Printing paste as colourants on leather.

EXPERIMENT 1: Using Acrylic (water based pigment through controlled marbling technique)

The pigment worked effectively on leather just as it does on paper, fabric and other surfaces. The very fine grains of the pigment made it possible for the paint to seep through the grains to fix firmly on the leather surface. Acrylic pigment come in variety of colours and therefore its use in leather, successfully provides the indigenous leather technologist the opportunity of selecting alternate colourant which has varied colour schemes. The effectiveness of the pigment on leather is demonstrated by the production of leather articles, an example is seen in plates 17.

Plate 18: Traditional Slipper. Acrylic (Controlled marbling)

EXPERIMENT 2: Oil Based Marbling (i. controlled, ii. Uncontrolled)

The use of the marbling technique with the oil based pigment as a colourant on leather proved useful. By stirring the pigment on the surface of the sizes to create designs the transferable paint became lighter, and therefore was able to be transferred onto the sheets of leathers placed on them. The thin layers of the designs created were successfully transferred onto the underside of the leather surface (grain side) placed on them. The following (Plate 18,19 and 20), shows the effectiveness of using controlled and uncontrolled marbling techniques as a means of colouring leather with oil paint for the production of leather articles.

Plate 19: Controlled Marbled leather sandals

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Plate 20: Uncontrolled oil marbling slipper

Leather articles illustrating the use of Oil based Uncontrolled Marbling. Plate 24 and 25.

EXPERIMENT 3: Fabric Printing Paste (Using Dabbing technique):

The dabbing/stamping exercise proved very successful, the pigment had sufficient time to settle on the surface of the leather and this facilitated the gradual penetration of the pigment into the upper layer of the leather. The result thus indicated that, although printing paste could be applied on leather, it would require some applicable time to fix it on the surface layer of leather, which is between ten to thirty-minutes. The ability of using dabbing technique to cover the entire surface of leather in a more controlled fashion has further demonstrated the possibility of adding value or restoring the surface value of leathers that have been stained or shown signs of ageing.

The following plate illustrate the successful use of the technique, plate 21,

Plate 21: Leather bag with decorative dabbing

Experiment 4: Using Acrylic (water based pigment through screen printing technique)

The screen printing technique was successfully used in the experiment, the prepared surface of the black dyed leather enabled the acrylic paste to adhere effectively on it. The resulting effect of the print is effectively shown in plate 22, this provides another decorative technique which leather tanners can adopt for use in the leather enterprise.

Plate 22: Shopping bag- (Front view and Back – view)

Plate 23 and 24 further demonstrates the use of acrylic pigment through the application of stamping technique on indigenous tanned leather.

Plate 23: Stamped Print

Plate 24: Men's Slipper (Acrylic print)

IV. CONCLUSION

The successful unaccustomed application of unaccustomed pigment on indigenous tanned leather is an effort that would transform the production, patronage and usage of locally produced leathers and leather products. Besides, it would help to boost the value of the industry in the face of the competitive international market. Leather is known to be easily stained, and minor stains occur during the handling and marketing stages. These identified techniques of dabbing/stamping will help to save waste; which leather dealers are confronted with. It also makes it possible for

leather technologist to discover alternate and varied colourant applications for leather.

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