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Abstract- This paper enunciates the viability and durability of Plexiglas material based on characteristic strength, shatter-proof properties and brilliance. The paper explores the suitability of Plexiglas in the display of information in outdoor advertising. Plexiglas is also appropriate for indoor décor because of flexibility, easy to shape and not too sharp edges. The paper utilized Plexiglas as a key material in the production of customized electric powered table–led display for selected principal officers of Olabisi Onabanjo University Ago-Iwoye. Findings shows that the LED lamp add ambience and aesthetics to the office of the principal officers, Plexiglas material gives durability to the lamp and enhance the allure of its illumination and customization of the souvenirs with images and positions of the university officers celebrates the accomplishments of the individuals.

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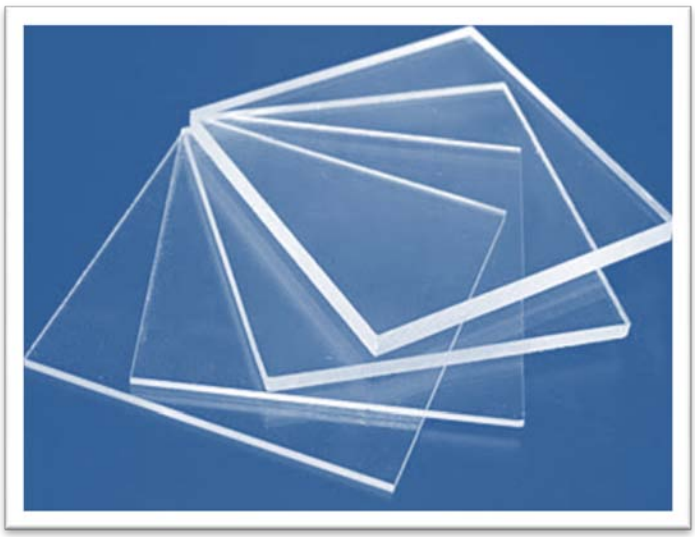
Production of Customized Electric Powered Table–Led Display using Engraved Plexiglas

Michael Abiodun Oyinloye [α] & Afeez Babatunde Siyanbola [σ]

Abstract- This paper enunciates the viability and durability of Plexiglas material based on characteristic strength, shatter-proof properties and brilliance. The paper explores the suitability of Plexiglas in the display of information in outdoor advertising. Plexiglas is also appropriate for indoor décor because of flexibility, easy to shape and not too sharp edges. The paper utilized Plexiglas as a key material in the production of customized electric powered table–led display for selected principal officers of Olabisi Onabanjo University Ago-Iwoye. Findings shows that the LED lamp add ambience and aesthetics to the office of the principal officers, Plexiglas material gives durability to the lamp and enhance the allure of its illumination and customization of the souvenirs with images and positions of the university officers celebrates the accomplishments of the individuals.

I. Introduction

Plexiglas is a thermoplastic materials also known as acrylic glass or Perspex, often used in sheet form as a lightweight or shatter-resistant alternative to glass. The technical name for this material is polymethylmethacrylate *(or PMMA for short),* other trade names, such as Perspex, Acrylite, Acrylplast, Lymacryl, Lucite Acrivill, Altuglas, Perclax, Oroglas, Trespex and Vitroflex ((Blandino, 2018). However, its original and most famous trade name is Plexiglas. The material was developed in 1928 by chemists, such as William Chalmers, Otto Rohm, and Walter Bauer (Blandino, 2018). Plexiglas is a cost-effective alternative to polycarbonate (PC) when tensile strength, flexural strength, transparency, polish ability and Ultra-Violet (UV) tolerance are more important than impact strength, chemical and heat resistance. Plexiglas materials are viable substitute to glass.



Source: mindsetsonline.co.uk

Plate 1: Plexiglas

Plexiglas offers tailor-made, durably brilliant solution for information display. This material is mainly used in the signage industry because of its durability and transparency which makes it easy for illumination in signages to shine through even in the dark. It is preferable to glass due to its high transparency, shatter-proof and flexible characteristics. Plexiglas is broadly utilized in the advertising industry as a primary material for effective quality signage. Its diverse usage in the outdoor publicity of the physical presence of corporate businesses such as luxury boutiques, financial institutions, shopping malls, eateries, hotels, educational institutions and other businesses in an area. It's a

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solution for beautifying *trade show stands* or furnishing household *apartments. Plexiglas plaques* are suitable for *offices.* Also, it can used to create directional signages for both indoors and outdoors. The displayed information on Plexiglas fascinate audience by the brilliance sleek, shiny high gloss exterior of the signage. Apparently, Plexiglas appeal to the target audience and creates positive indelible impressions in their minds.

a) Engraving of Plexiglas

Engraving is the process of creating print impressions from incised metal plates. The incisions are achieved with the aid of a tool referred to as *burin*. Impressions are formed from the drawn lines which are artistically marked on the metal plates. Tones and shading are achieved by making parallel lines or crosshatching. Silver, gold, steel or glass can also be customized through engraving. Engraving is one of the oldest, most popular and important techniques in printmaking. Plexiglas can be engraved manually using burin, the strength required for pressing the tools against the surface is minimal, forceful pressing of *burin* can cause breakage

Burin, also called graver is the tool used in engraving, it has a metal shaft that is cut diagonally downward to on the ground to form a diamond-shaped point at the tip. The angle of the point of a particular tool affects the width and depth of the engraved lines, the shaft of the tool is fixed in a flat handle that can be held close to the surface being worked on. It also has a wide rounded end for bracing against the palm of the hand while the point is steered by thumb and forefingers. Engraving is categorized into the following:

i. *Intaglio Engraving*

Grooves or pits are incised into the plate using either a sharp instrument or the action of a strong acid solution (Kelber, 2019). Greasy inks are filled into the depressions, and the surface of the plate are wiped clean. The high pressure of a press enables soft, dampened paper to reach and take on the ink (Kelber, 2019). Basic intaglio processes include etching, engraving, drypoint, and mezzotint.

ii. *Relief Engraving*

Relief engraving is a more accurate surface printing, the ink is applied on the part left in relief (as in printing from type), while in the former the ink is extracted by dint of great pressure from the engraved lines themselves. Engraving, in its widest signification, is no discovery of the modern world. Goldsmith and metal-chaser have flourished amongst almost every cultured people of antiquity of whom we have any knowledge, and the engraved line is one of the simplest and most universal modes of ornamentation in their craft. But there is no evidence that the art was used as a basis for taking impressions on paper before the fifteenth century. However, technology is shaping the techniques and processes in which works of art are made and the art of engraving inclusive.

II. Methodology

This research is product development and experimental in design. Eight pieces of round shaped Plexiglas were engraved and fused with an experimental lightning wooden base to create table lamp table souvenirs for the principal management officers of Olabisi Onabanjo University. The procedures of production are classified as follows:

a) Designing and Editing the Portraits

The portraits of the principal officers which are to be printed on the Plexiglas were photographed digital camera, edited and enhanced on both Adobe Photoshop and CorelDraw software installed on the computer system (see Plate 2).



Plate 2: A screenshot of their portraits being worked on in CorelDraw (Author's fieldwork, 2019)

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b) Pre-Engraving

The file for engraving was first of all prepared using CorelDraw and was sent to the engraving machine. The outline shape of the Plexiglas, textual information and Olabisi Onabanjo University logotype were also created on CorelDraw graphic package and connected to engraving machine (See plate 3).



Plate 3: Outlined CAD file ready for engraving (13.4cm x 17.8cm)
(Author's fieldwork, 2019)

c) Process of Engraving

Each of the seven Plexiglas was engraved using the engraving machine.

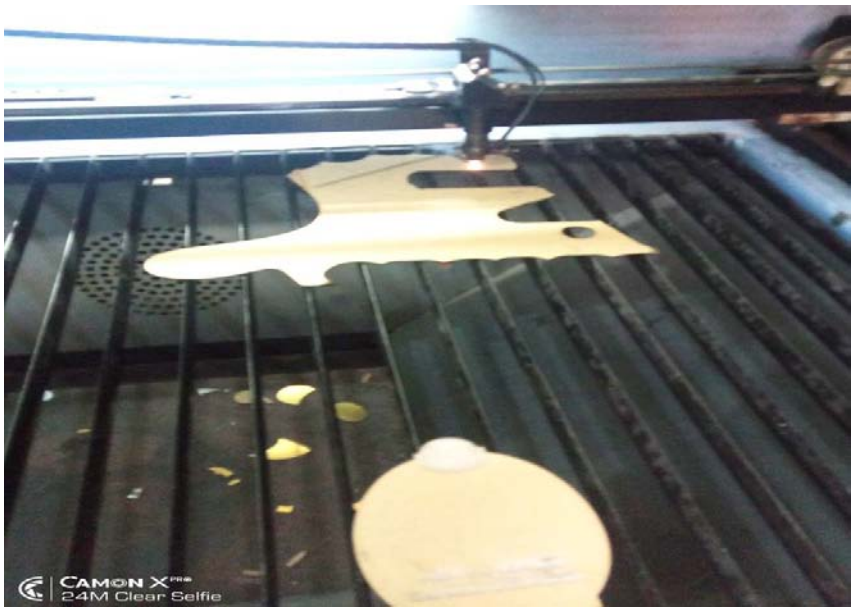


Plate 4: Engraving of Plexiglas
(Author's fieldwork, 2019)

d) Production of the Plexiglas base with Plywood

The plywood was measured and cut to sizes according to the width of the engraved Plexiglas needed for each of the LED display stand using measuring tape(see plate 5).Precision was ensured in the cutting of the plywood by holding the jigsaw machine firmly to avoid vibration which could create rough edges on the plywood (see plate 6). Thereafter, sandpaper was used

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to smoothen the surfaces and blunt the edges of the cut plywood. The plywood were joined together with gum (see plate 7). The LED strip with lightning bulbs were soldered to the wire passed and connected to the AC power adaptor affixed into the base of the plywood casements of the seven lamps (see Plate 8 and Plate 9). The LED strips were tested one after the other before proceeding to the next stage (See Plate 10). After installing the LED strip, the base was wrapped with the reflective Navy Blue geometric-patterned leather (See Plate 12). Navy blue acrylic paint was applied to the portion where the names of the principal officers have been engraved on the Plexiglas, masking out other exposed area to prevent staining.



Plate 5: Measuring the plywood to size before cutting (Author's fieldwork, 2019)



Plate 6: Cutting the plywood with electric jigsaw (Author's fieldwork, 2019)



Plate 7: Assembling plywood to create the base (Author's fieldwork 2019)



Plate 8: Soldering the LED strip to the wire (Author's fieldwork 2019)

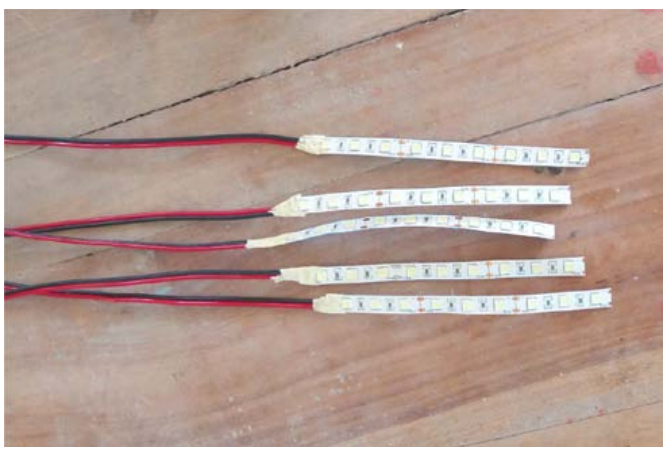


Plate 9: Soldered and insulated LED strips (Author's fieldwork 2019)



Plate 10: Testing of the LED strips after soldering (Author's fieldwork 2019)

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Plate 11: The LED strip being pasted into the base casement
(Author's fieldwork 2019)

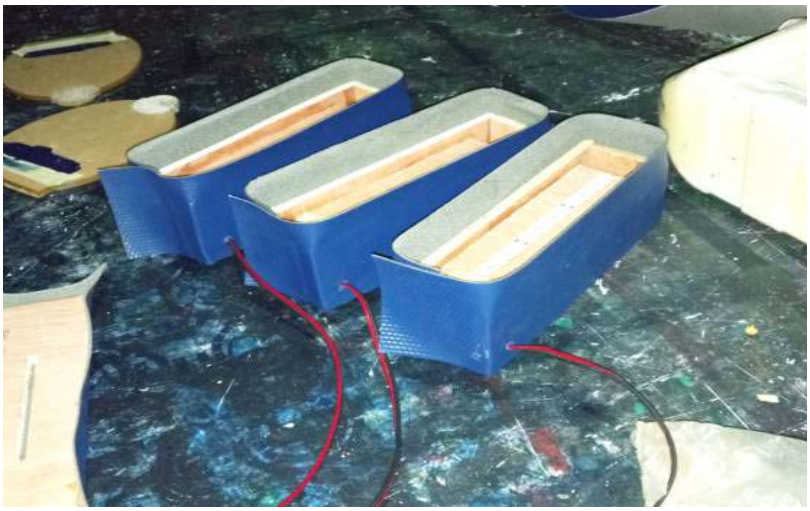


Plate 12: Wrapping lamp casing with leather
(Author's Collections, 2019)



Plate 13: Some of the base casement being wrapped with leather
(Author's Collections, 2019)

e) Testing

The LED multifunctional table top display was tested after coupling it. The scratch-proof paper wrapped on the Plexiglas was removed halfway to confirm its illumination.

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Plate 3.5.1: One of the completed table top LED display stands (Author's fieldwork, 2019)

f) Maintenance

The electric powered table top LED display can even be repaired. The top of the base on which the engraved Plexiglas rests have been screwed to the main base which can be unscrewed to reveal the LED strip that lights us the Plexiglas for repairs and replacement of the LED strip in case it somehow get damaged. When this is done, the display stand starts working again. One should ensure that the AC/DC Power is well plugged into power socket and it shows the red power indicator at all time.

The lamp should not be plugged directly on its own to the power socket without the adaptor; it will burn the LED strip instantly as it will be taking in more than 12V from the socket and its maximum capacity is 12voltage.

III. Discussion

The result of this project shows that, portfolio tag and interior lighting can be put together in a table top multifunctional display stand. Office space management was considered in the conceptualization of this project, hence the project size is 8inches x 3inches, thereby making it easy and comfortable to place in a confined office. It`s lightweight and compact miniature structure enhances movability.

The importance of energy saving Light emitting diode (LED) bulbs to our lives and environment cannot be over-emphasized. Compared to traditional incandescent, energy-efficient light bulbs such as halogen incandescent, light emitting diode LED) are becoming more preferable. It typically use about 25%-80% less energy than traditional incandescent bulbs. It is cost effective and easy to produce. LED light does not generate heat like other conventional incandescent bulbs, it is also not weighty and illuminates brightly. The lamp is durable and the inbuilt lightning can light up to 150,000 hours, their materials are less brittle and require minimal maintenance.

Plexiglas is very strong glass-like material that is shatter-proof when it is accidentally dropped and it does not easily suffer abrasion except sharp object is purpose used against it. It can withstand any kind of weather and the thickness used for this project makes it difficult to break even when one tries to bend it.

IV. Findings

i. The LED lamp add ambience and aesthetics to the office of the principal officers.
ii. Plexiglas material gives durability to the lamp and enhance the allure of its illumination.
iii. Customization of the souvenirs with images and positions of the university officers celebrates the accomplishments of the individuals.
iv. The lamp does not generate extreme heat and it is shock proof.
v. The lamp is compatible, movable and suitable for office décor.

V. Conclusion

Souvenirs are items of value given to people held in high esteem. Plexiglas made souvenirs are premium and high-end. The luxuriant features of Plexiglas makes it suitable for diverse purposes inclusive of souvenirs. Transparency and clarity of the material add brilliance to lamp illumination. Plexiglas is durable to withstand extreme pressure and heat emitting from the lamp lightening. It is break-resistant and display colours in its distinctness. The illumination from the developed table lamp radiates an ambience of aesthetics when viewed. Laser cutting and Plexiglas engraving is an emerging technique of printing that is

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being utilized by professionals in the art and design industry to enhance the value of their crafts.

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