CONSTRUCTION OF A BLUNGER USING LOCAL RAW MATERIALS

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Abstract
Non-availability and high cost of required imported ceramic equipment is causing a setback to ceramic industry in Nigeria. Higher institutions where ceramics is being offered as a course are not finding it easy too. To curtail this challenge, efforts have been made and being made by the stake holders in ceramic sector to proffer solution as a matter of urgency by looking inward and harnessing their potentials by fabricating equipment that will not only meet the need of the ceramic industry but also affordable. The objective of this paper is to state how a simple motor powered blunger can be constructed from locally sourced materials. Some of the materials used for the construction are metal sheet, ferrous and non- ferrous metals, motor belt, propelling blades, nylon mesh, pulley, stainless steel rod, electrodes etc.

Introduction
The improvement in the development of human intellect and man's quest to satisfy his yearnings for improved lifestyle has in the resulted in the fabrication of several tools and equipment that would facilitate his day-to-day activities and make life more meaningful and easy. These phenomenon cut across all fields of human Endeavour including ceramics. There are many sets of ceramic equipment used by potters for both studio and industrial productions. Some of these equipments are simple both in their fabrication and their use while some highly are sophisticated.

Otimeyin (2008) defined the equipment as a simple designed machine that helps to lighten the production process beginning from the winning of the ceramic raw materials to the packing of the finished wares. He further stated the examples of commonly used equipment as kiln, throwing/potter's, wheel, ball mill, pug mill, filter press, vibratory screen, electric mixer, jigger/ jolly machine, spring balance, cru-metro, spray dryer, jaw crusher, grinder, ceramic dryer etc. The emphasis here shall be on one of these sophisticated equipments called blunger.

Blunger is a machine commonly used in the pottery industry and studio for mixing clay and water to form slip or slurry. Egbeji (2000:4) described it as equipment that mixes powdered clay with water to form slip. Blunger, as also described by Dinger (2004), comes in cylindrical, hexagonal or octagonal shapes and in different materials (majorly in stainless steel and concrete) and sizes depending on the function it is designed to perform. Clay is added to the water filled blunger and then mixed into slurry, which is also called slip. This slip is then sieved as it is emptied from the blunger.

In addition to this, Ogunsina (1992) categorized sieve mesh into four for both studio and industrial use i.e. 60, 80, 100 and 120. He stressed further that:

> *The 60 mesh is used for sieving clay body meant for hand built works such as an outdoor flower planters,*

> *large mural works or bricks. The 80 mesh is used in sieving clay body meant for throwing. The 100 and 120 are used for both clay meant for casting slip and glaze compound (recipe).*

The different sieve meshes used will either leave the clay coarse, fine or very fine.

Potters have been forming vessels from clay bodies for millions of years employing different techniques in forming the shapes of wares ranging from throwing, pinching, casting and pressing. No matter what technique they use, it was expedient for them to process their bodies, and the only method believed to have been used was using manual labor to process it. At one time, this was an arduous manual job especially in Britain where according to Wikipedia, the free encyclopedia, a doctor reporting to the 1840 commission into child labour in poultry stated:

> *Slip making or preparing the clay is another unwholesome occupation to a proper consistence on kilns, and during the process of evaporation, the room is filled with dense aqueous vapor. The men engaged in this branch suffer severely from winter, cough and chronic bronchitis: and but few of them if they survive, are able to perform much labor after age of 60.*

Modern technology has now came to the rescue by inventing a device that can quickly help the mixture of clay, save the precious time and at the same time manufacture locally at low cost

Metal and Steel as Material for Construction

According to Encyclopedia Americans International Edition, metal is any substance that conducts electricity and heat well, it's shining (exhibits what is called metalli lister) it is opaque, and can be made very strong by proper allowing and other techniques, and can be readily found by rolling, drawing and cutting. More than 75% of the elements are metal.

Metal can be reactive (cesium readily oxidizes and react violently with chlorine). They can also be highly resistant to oxidation (gold) or to attack by strong acid (gold tantalum, stainless steel)

Steel

In its simplest form as Encyclopedia Americana, International Edition describes steel as an iron carbon alloy. Steel that are more complex contain controlled amounts of alloying element such as chromium Nickel, molybdenum, manganese, silicon and Tungsten, along or in combination. Steel has been made in thousand of different chemical competition and it has been used in various products.

Stainless Steel:

Stainless steel is metallurgically known as inox steel or inox from French “inoxydable” is a steel alloy with a minimum of 10.5% chromium content by mass. Stainless steel does not readily corrode, rust or stain with water as ordinary steel does, but despite the name it is not fully stain – proof, most notably under low oxygen, high salinity, or poor – circulation environment.

Materials and Components Used

The following materials and components were used for the construction:

i. Electric motor
ii. Motor belt;
iii. Metal sheet (Ferrous and non-ferrous metal);
iv. Electrodes;
v. Nylon mesh;
vi. Propelling blades;
vii. Paints, pulley, and steel rod.

Tools and Equipment

Required tools and equipment include:

i. Hammer;
ii. Hacksaw;
iii. Cutting torch;
iv. Welding machine;
v. Drilling machine with assorted cutting bits;
vi. Grinding machine; and
vii. Abrasive paper.

Fabrication of Equipment

The fabrications involve some processes that will entail the following:

I. Drawing: This involves planning and designing of the equipment in black and white. A lot of sketches

are made as far as the structure of the equipment is concerned.

II. **Cutting:** This is the process where all the needed metals are cut into various and required shapes.

III. **Welding**: The various metals that had been cut into various shapes are joined together with the aid of welding machine and electrodes. This requires the services of a proficient welder to ensure strength and durability of the work.

IV. **Filing and sandpapering**: This is a stage where all the rough areas on the equipment are given finishing touches with the aid of the filing tools and abrasive paper.

V. **Finishing**: The rough edges resulting from cutting and welding are treated by smoothening them and later the application of anti rust agents before final coating with gloss paint.

Fabrication of parts of the Blunger

The Tank: The tank is made up of a metal plate 61mm thickness, measuring 67cm in length and 49.5cm in diameter, reinforced with three angle bar iron of the same length. Apart from reinforcing the tank, the angle bar iron help in dispersing clay lump during agitation by the propellers. At the base of the tank are attached four legs that are screwed on to the stand or clamp.

Shaft/ Impelling Rod

This is made of stainless steel measuring $82^1/_2$cm in length and 17 mm in thickness, at the end of stainless steel measuring 4cm in length, 12.7mm in breadth the use of stainless steel is to prolong the life span of the shaft. The rod is rotated by pulley attached to an electric motor and this enables the three impelling blades to stir and blung the content of the tank.

Upper Base

This is constructed with an angle iron $1^1/_2$ x $1^1/_{2\ cm}$, measuring 16 cm in height and 49cm in breadth. This will reinforced base is placed and screwed to upper part or the mouth of the tank. This contains two bearings through which the rod is let into the tank at the centre for its balance and easy rotation.

Pulley and V-Belt

These are important parts that help transfer motion to the shaft from the motor. The larger pulley measured 36.4cm height with v-shape mouth is made of cast iron while the smaller one attached or connected directly on to the motor is made of iron is equally of iron is equally of V belt that helps as a means by which motion is transferred is attached to the two pulleys for easy rotation of the shaft. The belt is a continuous band of material that moves round and is used to carry things along or drive machinery. The suitable one used is measured 1325mm.

Electric Motor

This is a device that uses electricity to produce movement and makes a machine, a vehicle or a boat to work. Electric motor comes in different sizes but in cylindrical form. Powered by electricity, it ranges from one horse power to two or more. It could also be of high speed or low speed range. The suitable one used to power this project is one horse power motor and low speed range. This helps transfer movement to the shaft through the two and the V-belt.

The Bearings, Bolts and Nuts with Washers

Two 1.7mm of bearing were used. The choice of this size of bearing was made considering its strength and the weight of load it carry. A total number of twenty- eight (28) bolts and nuts of different sizes were used with fifty- six (56) washers.

The Stand or Clamp

This is the stand on which the tank is placed or fixed. It is made with an angle iron measuring 21mm in height. It is reinforced and braced with angle iron rod at the top and sides and iron rod at the top and sides and balanced enough to carry any weight placed on it.

Assembling of Parts in Steps

Step I: The first step is fixing upper base holding small bearings to the head of the tank at the centre. It is firmly screwed for a good grip.

Step II: The shaft that runs through the two small bearings is let down into the centre of the small tank with two blades at the end of the shaft.

Step III: Installation and screwing of the tank to the stand making use of the prepared

holes to ensure a firm grip of both of them. It is screwed with bolt and nuts with washers.

Step IV: The installation of the electric motor, fixing of the large pulley and the V-belt. The motor is tightly screwed to the tank at the appropriate place; the pulley is fixed to the shaft from the top while the V-belt runs through the pulleys.

Step V: The tap through which the content of the tank will pass into a container is fixed and tested for use.

Precaution and Care

- Effort should be made that this equipment is not used for other materials outside clay and glaze.
- The equipment is unsuitable for a material with accumulations of gravels and coarse sand, which may block the outlets or overload the sieves
- On no occasion should the operator put his or finger down the bottom of the tank while the machine is working. The pulley belt should not be touched or held while the machine is working equally.
- No material(s) in powdered form should be blunged and no other liquid outside water should be poured into the tank.
- The machine should not be used with any another equipment at the same time by the same operator in order to avoid distraction.
- In case there is any mechanical or electrical problem, a qualified technician should be consulted.
- Children or any unqualified person should not operate the machine (while it is working)
- The equipment must not be exposed to rain or kept outside in the sun.
- Change the pulley belt immediately when there is a cut on it or growing weakness/slack.
- The operator or user should endeavour to clean the equipment after use.

Conclusion

The equipment (Blunger) is found to be effective. It is constructed at a cost not too high since some of the materials used are locally sourced. Though powered by an electric motor, it is easy to operate and the maintenance is also easy due to its simple technical nature. Above all, the blunger is portable, detachable and can be carried from place to place for effective teaching, workshop and for studio use. It is considered appropriate for the enhancement of ceramic production and studio practice in Nigeria.

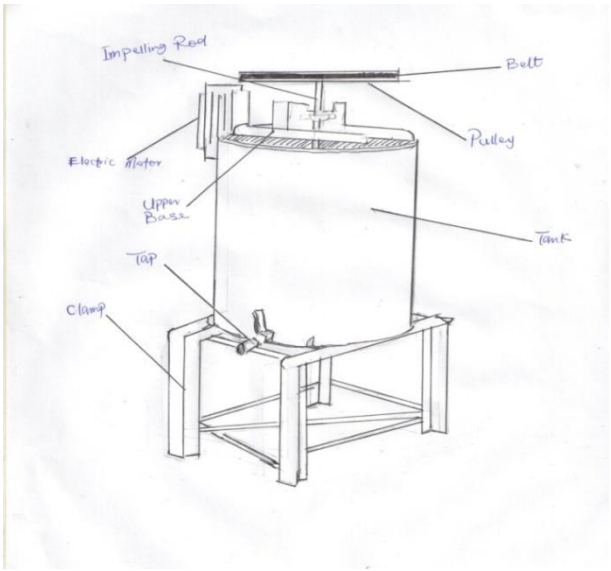

Figure 1: Complete Blunger and its parts



Plate 1: Metal Sheet



Plate 2: Iron bar for constructing the stand



Plate 3: Steel rods



Plate 4: Bolts and Washers

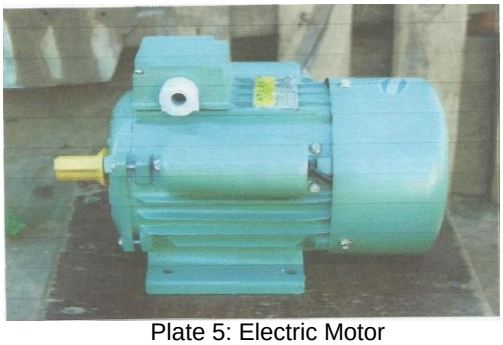

Plate 5: Electric Motor

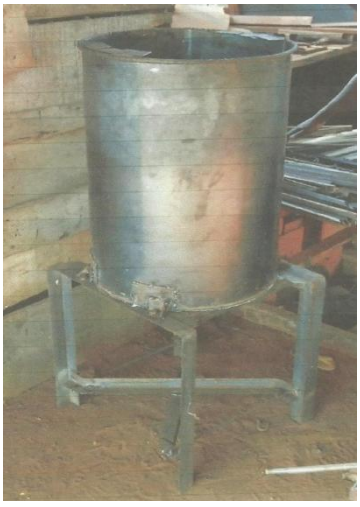

Plate 6: Fabricated Blunger

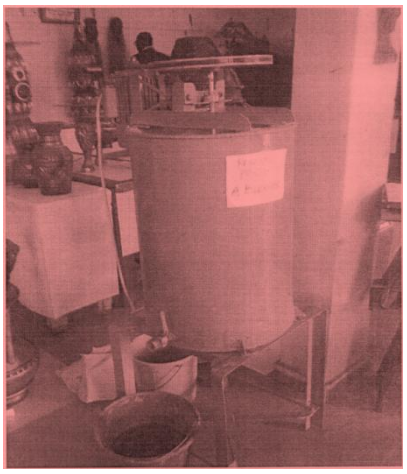

Plate 6: Complete fabricated Blunger

References

Dinger, R.D. (2004): Ceramic processing E-zine. Retrieved from http://www.dingerceramics.com/ceramicprocessinge-zine/CPE back 2 (12).
Egbeji, B. (2000): *Pottery Making Methods and Processes*. Enugu: Snap Press Limited
Encyclopedia Americana International Edition (2006) Vol. 22, 18, 25, 28, 19. pp. 357, 546, 681, 756, Danbury
Hornby, A.S. (2001): *Oxford Advanced Learner's Dictionary of Current English (6th Edition)*. New York: Oxford University Press
http://tlpu.bluemountains.net/keyword.php?w=blunger
New Encyclopedia Britannica Vol. 3. 15th Edition retrieved December, 2010. (Micropedia)
Ogunsina, E.D. (1992): *Ceramic Craft, Science and Technology*. Ibadan: Freeman Productions
Otimeyin, P. (2008): *Ceramic at a Glance*. Asaba: Otoba Press Limited
The Hutchinson Encyclopedia (2001): Edition Revised Edition and updated. Wikipedia, the Free Encyclopedia www.ceramicstoday.com/ceramicsmachinesandequipments
Wikipedia, the Free Encyclopedia. Accessed 12/06/ 2011. www.en.wikipedia.org/wiki/stainless steel