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Technology Education Environmental Issues in Nigeria



NIGERIAN ASSOCIATION OF TEACHERS
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AND
ENVIRONMENTAL
ISSUES IN NIGERIA**

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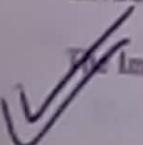
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**DESIGN AND FABRICATION OF ENVIRONMENT FRIENDLY MANUAL
BLACK-SMITH'S FORGE**

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ABSTRACT

This paper presents the result of a practical work carried out to fabricate manual Blacksmith's forge for convenience of local Blacksmith and benefits of rural community. The design specification was solely based on the available local materials. Angular mild steel bars (50 x 50mm); mild steel plate (1mm thick) cut to standard and clay serving as refractory material were the major materials used for it's fabrication. The angular bars were welded mild steel sheet riveted and clay bricks were built in the chamber. The result shows that the fabricated Black-smith's forge had greater efficiency as compared to labour intensive bellow used by Black-smiths and that it can also be adapted for melting of some non-ferrous metals for casting purposes.

INTRODUCTION

It is unfortunate that in spite of the potentials inherent in our rich traditional technologies, such as metal work, pottery, woodwork, leatherwork, artistic design etc, which could have served as ideal springboard for our technological development, we still rely on the importation of finished technology from the developed countries. The fact is that Nigeria will never achieve self-reliance without technological innovations, which demand initiative, resourcefulness, hard working and management of determined effort. We must replicate and improve presently acquired technology without external assistance. The present economic predicament calls for re-examination of how well Nigeria as a nation is doing in the area of developing sound technological base.

Despite the achievement of highly sophisticated technology in the developed countries, Nigeria need to develop and promote her indigenous technology and innovations to transform her rich and varied natural resources into physical wealth. Tukura, (1999) noted that this can be done through experimentation, refining, replication and commercializing technological innovations in our research institutions.

The objective of this paper therefore is to practically forward a simple device that will replace labour intensive "bellow" used by Black-smith to heat all categories of metals especially steels to the required temperature for forging and other heat treatment processes. This work was produced by simplest production processes (cutting, rolling, riveting, welding etc) and all the materials used can be sourced locally, especially now that Ajakuta steel company is gathering momentum on the production of steel. Hence a rural environment friendly design.

MATERIALS AND METHOD

The primary materials used in this work are mild steel (Angular, flat, sheet and rod/shaft), clay and a string of rope. Angular mild steel (50 x 50mm) totaling 12,380mm length was used for the body

the fire from gradually burning through the plates. We stressed that no lining is required for a *new* brick forge.

The use of paint as a protective coating for the forge was based on the fact that it is easily available, cheap and convenient method over other types of protective coatings like vitreous enamel, electroplating, acidic coating etc. This is in agreement with Allyn, (1992) who maintained that painting is very strong and convenient method of protecting products designed to meet rural needs.

CONCLUSIONS

An attempt has been made here to forward an innovation over a labour intensive bellow currently used by local blacksmiths for forging and other heat treatment processes. Based on this, economic benefit would be improved if the forge is put into use by the blacksmiths.

All materials used in the fabrication of the forge can be locally sourced. This makes it indigenously applicable to Nigeria situation. Thus the forge could perform functions of its electrical type used in the urban cities since it is a mobile and rural environment friendly design.

RECOMMENDED ACTIONS

Based on the above, the following recommendations are advised as be necessary:

1. To limit the cost producing the labour directly at the base of the forge could eliminate the stand, which accommodates the bellow.
2. The bellow designer should provide a better way of securing the bellow to the stand instead of the welding as by the designer.
3. For better improvements, the wheels could be more modified to accommodate rounded belts instead of rigs used here.
4. Costs may be employed instead of using both as means of material transport.
5. The designer was found to use the primitive construction of the design. It is therefore recommended that solid metal plates of forge could be used for exterior coverings.
6. Wheel ratio could be increased from 1:6 to say 1:8 so that ease of heat from the forge is improved upon which in turn designs it efficient.
7. Chimney should be introduced in the subsequent design in order to transfer the fumes away from the user.

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