

Local Fabrication of Double Mobile Bench Press to Improve on Existing Fabricated Ones in Dental Technology Department

Faloye A. E*, Bankole R. F, Otukoya A. A, & Idowu P.H

Department of Dental Technology, Ogun State Polytechnic of Health and Allied Sciences

*Corresponding author: Faloye A. E, Department of Dental Technology, Ogun State Polytechnic of Health and Allied Sciences.

Submitted: 09 January 2025 Accepted: 16 January 2025 Published: 22 January 2025

doi <https://doi.org/10.63620/MKJCMRRR.2024.1006>

Citation: Faloye, A. E., Bankole, R., Otukoya, A. A., & Idowu, P. H. (2024). Local fabrication of double mobile bench press to improve on existing fabricated ones in dental technology department. *J of Comp Med Res Rev Rep*, 2(1), 01-06.

Abstract

The aim of this research work is at investigating into the local fabrication of double mobile bench press to improve on existing fabricated ones in dental technology department. Hydraulic dental bench press is a unique equipment in dental technology laboratories, but majority of this bench press are imported into the country and this usually ends at high cost rate. This is a reason why the researchers embarked on this project. For the construction, two (2) expert engineers were involved. The methods used to extract information from the two (2) expert engineers were through verbal interview. This was done in order to ascertain the right materials and other information needed for the fabrication of double hydraulic dental bench press that would be improved and advanced on the existed ones. This double dental hydraulic bench press machine was developed successfully; and was thoroughly tested and contended with imported ones and was rated good. It is also rated to be advanced on the existed fabricated ones in the department. This double dental hydraulic bench press machine was fabricated using locally made materials. The machine is capable of performing double work at a go, whilst also being mobile. The cost of this locally fabricated hydraulic bench press machine is lesser than the cost of imported ones. The repairing of this product is possible with ease. Finally, the spare parts can be sourced within locality. Based on the results of this innovative work, the researchers recommend that this innovative research work should be published in international Journal in order to create more awareness on the locally made dental hydraulic bench press, this will promote the image of dental technology profession in Nigeria.

Keywords: Local Fabrication, Double, Mobile, Dental, Hydraulic.Bench Press.

Background of the Study

The hydraulic bench press is one of the precious equipment uses in dental technology plaster laboratories for the purpose of making metal to metal during flasking and packing the jobs. Hydraulic dental bench press is a device using hydraulic cylinder to generate compressive force to achieved the purpose of been used it for. Hydraulic dental bench press is preferred most especially when large nominal force or pressure is required. The hydraulic bench press is used to compress and decompress different materials. A dental hydraulic press has a cylinder that has a cylinder of different diameter than the other. Consequently, a large cylindrical cylinder will produce more force than a smaller one.

Hydraulic dental bench Press can be classified into three major categories as: hydraulic bench presses which operate on the

principles of hydrostatic pressure, mechanical presses which utilize kinematic linkage of elements to transmit power and screw presses which use power screws to transmit power energy. Jain explained that development of engineering over the years has been the study of finding ever more efficient and convenient means of pushing and pulling, rotating, thrusting and controlling load, ranging from a few kilograms to thousands of tons [1]. Presses are widely used to achieve this.

explained that hydraulic bench press plays a vital role in a majority of the dental laboratories fabricating dental appliances [2]. They are necessary in dental laboratory for flasking wax work and for injection molding system. Bench press varies in size, shape, ranges, construction and application. Virtually all the procedures in restorative dentistry cannot be carried out without the

use of hydraulic bench press Smith Etal discussed that hydraulic bench press include incorporated hydraulic metallic base, metallic spinning handles, horizontal, vertical bars and stainless-steel protector [3].

Review of the Related Literature

Hydraulic Bench Press

Amarnath historically, the hydraulic press, invented by a British mechanic named Joseph Bramah, was one of the first workable pieces of machinery developed that used hydraulics in its operation [4]. It consisted of a plunger pump piped to a large cylinder and a ram. This press found wide use in England because it provided a more effective and economical means of applying large forces in industrial use. Since then hydraulic systems are widely used in many industrial applications. It was the British inventor Joseph Bramah who made the first hydraulic press. He accomplished this in 1795 and patented his concept with a patent. The Mesta 50,000 ton hydraulic closed die forging press is an enormous fabrication tool globally. It was built to produce large-scale custom automotive stampings and components for car manufacturers such as Ford, General Motors, and Chrysler.

Mattikalli, described that as time went on, through the industrial revolution, all the way to present day, the use of hydraulic became increasingly common and widespread [5]. This meant that the innovation in the technology became exponentially faster. New materials were used in new internal design creating greater forces and generating more power which allowed faster and more impressive production.

Ahuwan clarified hydraulic can give more than ten times the power of an electric motor meaning it is more effective at lifting heavy objects and forcing things to move [6]. Hydraulics can be controlled safely and precisely too and are closed off protecting workers. For this reason, they are extremely common. In the present day, hydraulic cylinders are used heavily in construction. Workers in mining, drilling, shipping and manufacturing all use tailored hydraulic cylinders to aid them in their vocation.

According to Yogita modern Dentistry often requires the preparation, simulation, compression of acrylic resin materials and other plastic and thermoplastic resin appliance in flask as well as bench press to get a perfect patient job [7]. These hydraulic

benches pressing procedure is used virtually in all areas of specialty in dentistry.

Alexander, dental hydraulic Bench is defined as a non-disposable mechanical device to which a screw rotary wheel is attached for compression for dental flask in which is used to invest a wax-pattern restoration for full application process/procedures [8]. During fabrication of a Dental restoration, there is need for proper closure of the flask as well as the proper compression of the acrylic resin and other resins depending on the type of restoration to be fabricated. Hydraulic press is a machine press that generates compressive force through a hydraulic cylinder, and it employs a hydraulic lever in place of a mechanical lever.”

In this process, jackscrews, crank, and eccentric are replaced by the piston rod, pushrod, and block. Lawrence gives detailed that hydraulic bench press machines use a hydraulic cylinder containing a liquid such as oil [9]. Hydraulic presses are useful in exerting force through a hydraulic cylinder’s mechanical advantage. The machine can be either single-acting or double-acting, depending on the direction in which the pressure is applied. Hydraulic presses are commonly used in industry, often for pressing metal and plastic parts into shapes, but may also compress solids like soil or stone.

Research Methods

The experimental research design was used for this study, using HDF board of 20 inches wide and 30inches height, 4mm Metal plate, 2-inch angle iron, 10-ton hydraulic jack, Return springs, Tyres (4pcs) and blue Paints. The research was carried out at the research centre, engineer workshop at Okeola Ilese Ijebu-Ode, Ogun State.

Method of Fabrication

The method of fabrication is through mechanical assembling of all the metal sheets that make up the component parts of the locally fabricated dental hydraulic bench press, cutting of the metal scraps to the desired structural outlook, welding together of the cut scraps, assembling of threaded bars and rods, the use of the filler to augment the surface of the metal scraps and finally, the assemblage was painted with desired colour in order to competes with imported ones. The figure 1 below demonstrated where engineer was giving direction on the method of cutting iron pipes for the frame work and wheels of the base

The 1-inch Iron Pipe Was Welded Together to form a Framework for the Cabinet



The wheels were attached to its (framework) base and was painted using a brown-coloured paint

The HDF and MDF oards were measured according to the framework and was therefore cut and attached to the framework accordingly



The 2-inch Angle Iron Raw Materials Was Cut and Grinded in Order to Make it Smooth Before Welded Together to form a Framework



The 2-inch Angle Iron Was Welded Together to form a Framework in Which the Procedure is Going to Take Place



A metal plate was formed (using the 2-inch angle iron and 4mm metal plate); it was responsible for pressing the unfinished job in the dental flask and against the base of the metal framework and it's also responsible for housing the jack.



Note: The jack was placed on the base of the metal framework such that when operated, it will press the unfinished job against the upper part of the metal framework, but since the force the jack will exert when pressing up is smaller compared to when pressing down, it was decided that the jack should be placed in the upper part such that when operated, the base of the jack, together with the metal part presses the unfinished job against the lower part of the metal framework.



The Process of Fixing the Jack Was Successfully Done, as Images Revealed the Techniques



Here, the other required components was made and grinded to support the base of the jack in order to make it firm on the system

The jack was welded on the metal plate and the ports for the return springs was attached to the metal plate and the upper part of the metal framework

The return springs were attached to the metal plate and the upper part of the metal framework. The spring helps the metal plate to return to its original framework. The spring helps the metal plate return to its original position after being operated.



Additional metal plates were welded to the back of the metal framework to cover the inner part.
Metal plates were screwed to the frontal part to aid removal in case of repair



The Images above Presented the Final Product (Double Hydraulic) Bench Press



This fabricated mobile dental hydraulic bench press was tested vigorously to ensure its efficiency. Silver paint was applied to

the entire body and it was fixed together with the cabinet. The product, (double hydraulic bench press) was tested and function-

ality was good according to some experts in the field of dental technology.

Result/Findings and Discussion

This research is an experimental work; two engineers were involved in the construction. The project was successfully fabricated and truly, the project was improved on the existed fabricated ones in dental technology department. Eleven (11) researchers were carried out this innovative research work. The under listed below are the faults observed from the previous fabricated hydraulic bench press.

- the previous ones are not easy to move from one place to another
- the previous product consumed oil, not only that, it wasting the engine oil.
- It required regular services
- It also required electricity before it can perform a single operation

Conclusion

This double dental hydraulic bench press machine was developed successfully; the tested and contended with imported ones was rated good. It is also rated to be advanced on the existed fabricated ones in the department. This double dental hydraulic bench press machine was fabricated using locally made materials. The machine was capable of performing double work at a go. The cost of this local fabricated hydraulic bench press machine is lesser than the imported ones. The repairing also is possible with easy. Finally, the spare parts can be sourced within locality.

Precautions to Be Taken on The Uses of Hydraulic Bench Press
The precautions to be taken when working on this dental hydraulic bench press in order to ensure the effectiveness and efficiency of the machine was maintained are:

- Dental hydraulic bench press should be kept clean immediately after use
- The lubricating parts should be clean and lubricated before usage, but oiling is not all the time.
- Regular cleaning and servicing should be done in order to prevent rust.

Recommendations

This innovative research work should be published in international Journal in order to create more awareness on the locally made dental hydraulic bench press, this will promote the image of dental technology profession in Nigeria

The department should liaise with the management of this great polytechnic to assist by funding all innovative research work carried out in this department. This will encourage students to carry out more innovative research project for the institution and department at large

References

1. Jain, R. K. (2020). Production technology. 17th Edition, Khanna Publishers, New Delhi, 806-824.
2. Sumaila, M., & Ibadode, A. O. A. (2020). Design and manufacture of a 30-ton hydraulic press. Assumption University Journal of Technology, 14(2), 196-200.
3. Parker, D. T. (2019). Building victory: Aircraft manufacturing in the Los Angeles area in World War II. Cypress, Canada, 20-87.
4. Carlisle, R. (2019). Scientific American inventions and discoveries. John Wiley & Sons, Inc, 266
5. Lange, K. (2019). Handbook of metal forming. McGraw-Hill.
6. Sharma, P. C. (2020). A textbook of production engineering. 10th Edition, S. Chard and Company Ltd, New Delhi, 69-146.
7. Muni, P., & Amarnath, V. (2011). Structural optimization of 5-ton hydraulic press and scrap baling press for cost reduction by topology. International Journal of Modeling and Optimization, 3(3), 185-190.
8. Ayodele, O. D., Ahuwan, A. M., Sullayman, U. A. A., & Yawas, D. S. (2019). Design and fabrication of a hydraulic press for the production of kiln shelves. Journal of Chemical, Mechanical and Engineering Practice, 3(1), 26-36.
9. Santoshkumar, S. M., Yogita, N. P., & Mattikalli, A. C. (2019). Analysis and structural optimization of 5-ton H-frame hydraulic press. International Journal of Innovative Science, Engineering and Technology, 5(6), 356-360