

MOTOR DRIVE BENCH VISE

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Abstract

This study presents a brand-new motor-driven bench vise that is intended to increase productivity and decrease manual labor. In contrast to conventional manual vises, the device's mechanism is powered by an electric motor, which allows for faster and smoother jaw movement. A safety system, a compact design, and adjustable jaw width are important features. The device's maximum torque, minimum and maximum gripping capacity, and gripping time were all taken into consideration. The results show notable performance gains, especially in terms of speed and usability. In a variety of sectors, this invention could boost output and lessen employee tiredness.

Keywords: Automotive, Bench vises, Drive, motor.

INTRODUCTION

Bench vises are vital tools in mechanical and woodworking industries, commonly used for tasks like gluing, filing, sawing, and pounding. However, traditional manual bench vises require significant physical effort, causing worker fatigue and delays in completing tasks. Their fixed, non-portable design also limits versatility.

To address these challenges, the researcher developed an automated gripping machine with features like a switch-controlled clamping mechanism and portability. This innovation reduces physical effort, improves efficiency, and enhances workplace productivity. The study evaluates its performance in terms of speed, ease of use, and time-saving benefits compared to traditional bench vises.

Objectives of the Study

Generally, this study aims to design and fabricate Motor Drive Bench Vise that can make work easier, faster gripping and convenient use. Specific study aims to:

- Design and fabricate Motor Drive Bench Vise; and
- Evaluate the operating performance in terms of maximum and minimum grip size, gripping time and maximum torque of the device.

The result of the study will benefit the following: Student. This device may encourage the students to design another clamping or gripping machine guided by its concepts, components, principles, and mechanism. This can be also the basis for future student researcher. Furthermore, they can use this device for their future laboratory work. Automotive Instructors/ Professors. This may provide knowledge to them to make a new and upgraded this kind of device. They may also use this as their reference for the future research of their future students. They may also use this for

encouragement to their student to make this kind of device that is modified and upgraded. Automotive Mechanic. They may use this device for their work like filing, sawing, and pounding School Administrator. This may ensure administrators that using this kind of device in instruction is appropriate and may help students develop their knowledge about the advantages of using a bench vise as their tool or equipment. Future Researcher. This study may benefit the student researcher to be aware and knowledgeable in the process involved in the automotive industry. It may encourage them to be a better analyst. It may be their basis and promote future studies.

The researcher constructs a bench vice that is unique and different to every existing bench vice in order to work properly and fast job. This device can grip up to the size of a 4k engine head which is 10 inches in diameter. It can be closed and open its movable jaw in a faster and smoother way. This device was made at Iloilo Science and Technology University (ISAT U) Miagao Campus. This is made by assembling raw materials such as metals and other materials needed to do and it is made with so many trial and error.

Strength. It is an automated device that construct with some innovation and modification comes from existing device. This device is able to grip at a high torque and a high compression strength. It's movable jaw can open and close at a high speed or faster than existing bench vice. It has a long gripping capacity and has a minimum and maximum length or diameter of an object to be work. This device is have a maintenance schedule which means it can be repair or can be maintain based on the maintenance schedule.

Weaknesses. This device can only grip with a torque of 200 ft-lbs and a compressive strength of 51 psi. This can close its movable jaw within 11.97 seconds and opens within 12.47 seconds. Its minimum length capacity that can be grip is 1 inch and has a maximum length capacity of 10 inches.

Opportunities. This device can be also used by the school administration . They can present it internationally and can be patented in order to claim this innovated device.

Threats. There must be a device that almost the same of this device. It can be steal by other fabricator if it cannot be patented earlier. If this invention comes out some of people are eager to copy this because of its mechanism.

RESEARCH METHOD

The motor- drive bench will be constructed at Iloilo Science and Technology (ISAT-U) Miagao, Iloilo. The design will be innovation based on the study of Hooper (2006). The nearest prior that presented will be realized to have some advantages which have the researcher's basis to conduct further research, especially on the operating performance in driving a bench vise in terms of speed and time.

The device will be made locally available in the vicinity of the researcher. In designing the motor drive bench vise, the researcher selected materials that are suitable for driving a bench vise and gripping an object, fast gripping and smooth turning of a thread for better use. The main activities involved in using this device is fast and easy to operate and gripping any object smoothly. The bench vise can grip up to the 75mm to 300 mm diameter size of an object.

Testing and evaluation will be conducted by testing the finished device. This evaluation will be conducted by the device's researcher. The testing will be conducted twice daily. Data will be obtained by listing the information about the evaluation. In weight, the researcher should use a weighing scale that has a capacity of at least 100kg, in pressure, the researcher should measure the compressive strength of the bench vise, in length, the researcher should use any measuring tools

that can measure the length at least 50cm, and in speed, the researcher should use a stopwatch to measure the time in seconds.



Gathering data will be conducted through testing of the finished device such as weight of the device (kg), size of object to be grip or hold (mm), and speed to open or close the jaws of the device (s). This data will be gathered daily and every minute depends on what data to be gathered.

In gathering data, the researcher should use the weighing scale; pull push rule, tape measure or 1 meter ruler and stopwatch. The weighing should measure the weight of the device. The researchers put the finished device on a weighing scale and record it every minute. The researchers measured the length of a jaw of a bench vise from teeth-to-teeth. They clicked the start button of a stopwatch at the same time stepping on the pedal of the device to close and record it. Same procedure was done in opening the device.

This device has the capacity to grip any object that fit in its movable jaw. This device is almost made of wrought iron. It has a power to grip the object. This device is to accomplish all of this and to secure other and further advantages in the matters of construction, operation, and use, then the improvements involve certain novel and useful arrangements or combinations of parts and peculiar features of construction.

RESULTS AND DISCUSSION

Number of Trials	Minimum grip	Maximum grip
1	0.009 inch	10. 12 inches
2	0.012 inch	10.10 inches
3	0.010 inch	10. 13 inches
Mean	0.010 inch	10.11 inches

It shows the results of minimum and maximum grip size of the device that can grip or hold, based on the parameters testing. In minimum gripping there are 3 trials as well as in maximum grip.

Number of Trials	Time(seconds)	
	Compression	Expansion
1	12.50s	12.00s
2	12.18s	12.17s
3	12.70s	Title
Mean	12.46s	11.98s

The results shows that this device is capable of gripping any object that sizes from 0.010 inch-10.11 inches.

It shows the results of maximum torque of the device based on the parameters testing. There are 3 trials and the results shows that this device can withstand a torque upto 200 ft-lbs.

Number of Trials	Torque (ft-lbs)
1	200 ft-lbs
2	199 ft-lbs
3	201 ft-lbs
Mean	200 ft-lbs

It shows the results of gripping speed of the device in terms of compression and expansion. Compression Speed as well as Expansion Speed have both 3 trials. It shows that this device is more faster to operate than any conventional existing bench vise.

This means that this device can enhance the future research about mechanical works like sawing, gripping, holding, clamping, and pounding. This device can help many mechanical and technical workers especially in automotive works of automotive mechanics. They can use this modern device for their work to have a less force exerted. This device is highly accepted to the industry and economy.

For academic purpose, this is also can helped automotive teachers and instructors to introduce to their students to have a upgrade and innovations in order for this device to improve in the future. They can also use this for their future laboratory like engine works and clamping or gripping objects. This can also provide a less hassle to workers.

The findings and results of this study is based on the study of Hooper (2006). The nearest prior that presented will be realized to have some advantages which have the researcher's basis to conduct further research, especially on the operating performance in driving a bench vice in terms of speed and time. The present invention comprises various embodiments of a power vice in which a Supplementary power source is used to open and close the jaws. All embodiments may be actuated by a remote control, so the operator may have both hands free to hold the work piece as it is placed in or removed from the vice. All embodiments may also include means for regulating the pressure developed between the jaws. A first embodiment is an electrically operated Vice. The output shaft of an electric motor is connected to the advance screw of the vice to turn the screw and open the jaws. A second embodiment includes a hydraulic ram, with a first jaw affixed to the hydraulic cylinder and a second jaw affixed to the piston rod of the hydraulic device. Hydraulic pressure is used to retract and extend the piston rod, thereby closing the jaws.

The future researcher can make this as their basis for their future research. They can also improve their device or add some apparatus to this to became more unique. They can also improve its automated mechanism and make it more easier and reliable to use.

CONCLUSION

This study conclude that in this days almost all tools and equipment are all automated. The existing device of a bench vice are more on mechanical or manually operated. It has a small capacity of torque and pressure, it has also a short length capacity to be open or gripped an object. Therefore,

this study is a successful invented device cause it meet the specific parameters that need to be study and because of its gaps compare to all existing products of bench vice.

The student can use this device for their future laboratory works in their future studies. They use this for holding a piston, oil filter, injector, etc. or any other object that they need to do for their study or laboratory.

The automotive instructors can also introduced this device for their future students to make a device that is more high tech or innovated like this. They can also use this as the basis of their future student study.

An automotive mechanic can use this device for their future works to avoid too much force exerted or to have a less hassle in their works.

The administrators can also benefits from this kind of study as they can sell or be patent this device as it is very useful when its introduced in industry because of its automated mechanism.

The future researcher can make this as their basis for their future research. They can also improve their device or add some apparatus to this to became more unique. They can also improve its automated mechanism and make it more easier and reliable to use.

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