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# DESIGN AND CONSTRUCTION OF WORK OBJECTS USING A MAGNETIC VENUE ON A DRILL MACHINE

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***Abstract***
*The development of science and technology and along with advances in the field of industry, especially in the field of machinery, various tools were created to simplify and increase human comfort in fulfilling their needs. The workpiece gripping mechanism on the sitting drill machine works by being controlled manually using a control lever, making it difficult for the operator to operate and making the processing time long. The author will conduct research on the design of workpiece gripping tools using a magnetic vise on a drilling machine. It is hoped that the design of this magnetic vise can reduce the work of an operator and can shorten the time of installing the workpiece so that it can increase the work productivity of the drilling machine, reduce operating costs and increase the work safety of an operator. From the results of the analysis of the design of the Magnetic Vise designer, it can be concluded that the circular magnetic field around the wire is 8100п x 10-4 Tesla, Resultant of Magnetic Induction in Parallel Wire B1 = 18 x 10-5 Tesla and B2 = 10.8 x 10 -5 Tesla, Resultant magnitude of magnetic induction Bp = 28.8 x 10-5 Tesla. The solenoid is a coilshaped wire with fairly tight turns and has a length of = 360 cm with a number of turns = 150, the magnitude of the magnetic induction at the end of the solenoid is different from the magnitude of the magnetic induction at the center of the solenoid. The magnitude of the magnetic induction at the center of the solenoid is 45 x 10-5 Tesla. larger than the solenoid tip by 11.25 x 10-5 Tesla..*

***Keywords:*** *machine, drill sit, workpiece gripper, magnet, operator*

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## Introduction

The development of science and technology and along with advances in the field of industry, especially in the field of machinery, various tools were created to simplify and increase human comfort in fulfilling their needs. Plastic forming methods are widely used to shape metals into desired shapes. (Youssef.H.A., El-Hofy.H. et al, 2008).

Mechanical work carried out in workshops is usually carried out using certain equipment, such as the seated drilling machine in the Workshop of the Faculty of Engineering, Majalengka University, which has main components, namely electric motors, transmissions, frames, and workpiece gripping mechanisms.

The workpiece gripping mechanism on the seated drilling machine in the Workshop of the Faculty of Engineering, Majalengka University works by being controlled manually using a control lever so that it is difficult for the operator in the operation process. Moreover, if the drilling process is carried out in large quantities, of course it will be inconvenient for the operator in its operation and make the processing time long.

In order to optimize the function of the seated drilling machine, innovations in the workpiece gripping on the seated drilling machine are needed, such as a workpiece clamp with an electric magnet. Magnets are used to grip workpieces made of ferromagnetic material with a magnetic field generated by an electric current. Magnetic fields occur because of the magnetic poles that have a large attractive and repulsive force. (Sudarti, 2015).

So the gripping of the workpiece magnetically on the table of the sitting drill machine is carried out using the electro-magnetic principle. A point is said to have a magnetic field if there is a force (other than electrostatic force) acting on a charge moving at that point. (Journal of Physics Learning and Materials (Drs. Raden Oktova M.Si, 2018).

**Research Method**

below explains the stages of the research to be carried out, starting from observation and literature study to drawing conclusions and finishing.

**Literature Study and Field Survey**

At this stage, a search and study of literature is carried out on the design of a workpiece gripping tool using a magnetic vise on a drilling machine, so that it can be used as a reference and consideration in the design of a magnetic vise as well as field surveys and literature studies in the design.

**Magnetic Vise Component Design**

At this stage, the size determination is carried out according to the drilling machine table in the workshop, to determine the dimensions and dimensions of the Magnetic Vise components and the materials needed.

**Preparation of Tools and Materials**

At this stage, tools and materials are provided for the manufacture of magnetic vise.

**Magnetic Vise Making**

At this stage, a magnetic vise is made according to the workshop design.

**Magnetic vise installation**

At this stage, the magnetic vise is installed directly on the table of the drilling machine in the workshops using 2 14 coarse threaded bolts.

**Data analysis**

The data obtained from the magnetic vise test is used as the basis for the analysis to get the best performance of the magnetic vise

**Materials and Tools Used**

At this stage explain the materials and equipment in the manufacture of magnetic vise as follows:
Ingredient

1. Iron L 6 cm
2. MOT 800 watts
3. Power Supply 27 A
4. NYK power cord 2 x 2.5 mm
5. 15 A outlet
6. Merryhill FR-P ADV resin + catalyst
7. Putty san polac

**Tools**

1. tool length measure
2. SMAW . welding machine
3. Cutting wheel
4. Mixer (Hand Drill machine)
5. Fine sand
6. Iron paint

**Results and Discussion**

The magnitude of the magnetic field around a coiled wire is affected by the magnitude of the electric current and the radius of the loop of the wire. The greater the current given and the smaller the radius of the wire loop, the stronger the magnetic field. The magnitude of the magnetic field strength in a coiled wire;

$$B = \frac{\mu_0 . I}{2r}$$

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Where ;
B = Magnetic Field (T)
I = Electric Current (A)
r = Radius of Circle (m)
o = Empty Space Permeability (Wb/Am)
N = Number of turns

Is known:
r = 1 mm = 10 x 10-3 = 10 m
I = 27 A
μ0 = 4π x 10-3 Wb/Am
N = 150

Asked: B?
Answer:

$$B = \frac{4\pi.10^{-7}.27.150}{2x10^{-3}}$$

$$B = \frac{16200 \text{ x } 10^{-7}}{2x10^{-3}}$$

$$B = 8100\,\pi\, x\, 10^{-4}\, Wb/Am^2$$

The method of determining the direction of the magnetic field induction at point P which is influenced by the second conducting wire is the same as before, Position the thumb/thumb positioned following the direction of the current and four fingers towards point P. This position will also make the palm of the hand turn away from us. So the direction of the magnetic induction at point P by the second wire is in the plane.
Calculate the magnitude of the effect of magnetic induction at point P by the second wire:

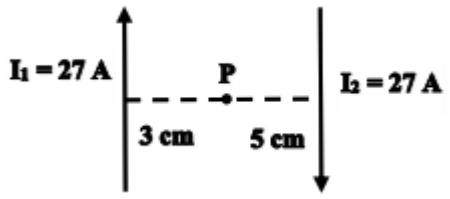
$$B_2 = \frac{\mu_0 . I_2}{2\pi a_2}$$

$$B_2 = \frac{4\pi x 10^{-7} x 27}{2\pi x\ 5x10^{-2}}$$

$$B_2 = \frac{54x10^{-7}}{5x10^{-2}}$$

$$B_2 = \mathbf{10,8x10^{-5}\ Tesla}$$

Calculating the Resultant magnetic field at point P (BP):




The directions of B1 and B2 are the same so that the resultant is calculated by adding up the values of B1 and B2.

$$B_p = B_1 + B_2$$
$$B_p = 18x10^{-5} + 10{,}8x10^{-5}$$
$$\mathbf{B_p = 28{,}8 \times 10^{-5}\ Tesla}$$

So, the resultant magnitude of the magnetic induction at point P is 28.8 × 10–5 T with the direction of the plane entering. The Resultant of Magnetic Induction that is Not Perpendicular Straight with Conductor Wire.

**Conclusion**

Based on the results of the research that has been done, the following conclusions are obtained:

1. A gripper or magnetic vise uses 2 Microwave Oven Transformers (MOT) with a magnitude of 800 Watt, has a circular magnetic field around the wire of 8100π x 10 -4 Tesla, Magnetic Induction Resultant in Parallel Wire B1 = 18 x 10 -5 Tesla and B2 = 10.8 x 10-5 Tesla, Resultant large magnetic induction Bp = 28.8 x 10-5 Tesla so it is strong enough for the workpiece at the Workshop of the Faculty of Engineering, Majalengka University.
2. The gripper or magnetic vise is made using 2 Microwave Oven Transformers (MOT) which are supported by a DC power supply with dimensions of 30cm long, 20cm wide and 6.5cm high. These dimensions are adjusted to the shape of the gripping tool that is already on the previous drilling machine, making it easier to apply it to the drilling machine.

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