Winder automatic for stator

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Abstract –*In the present work, we performed coils by means of an automatic winding machine, since the process that was carried out manually was not so accurate, because it affected the quantity of wire in the coils, and in some cases the coils had more or less wire, so this affected the resistance of the coil, for this reason it has been made an automatic embodiator that will be more accurate in the amount of thread or wire.*

Therefore, this manual windwinder was automated, but a characterization has been sought first to know each of the parts necessary for its automation such as its controllers, motors and sensors. For the construction of the control system for the number turns we developed a counter, which by means of an encoder will send an output signal that will show us the number of turns made in the counter. This document therefore describes the procedure for performing the automatic stator-winder.

1. INTRODUCTION

Electric motors have parts in which a large amount of insulated wire is rolled up, which have the function of inducing electrical energy.

When this wire (winding) is burned or damaged it needs to be replaced, this action is called rewinding, that is to say reforming the coils (different groups of coiled wire in the rotors (the that rotates) or (the fixed part) the stator that operates as a base, allowing the rotation of the motor to take place from that point. The stator does not move mechanically, but magnetically. [1].

This idea arose out of the need to speed up the winding process for the stators, so it was decided to convert a manual to automatic winder to make its processing more efficient, because it is sometimes very expensive due to the incorrect use of the material in the winding, because the slightest error can cause a defect and for consequence motor failure, leaving the rewind process repeated as the only option, resulting in a loss of time; there are two types of stators, the salient pole and the slotted type, where ours is centered on the second type.

Through these coils a system of three-phase currents circulates, a rotating magnetic field is induced that reaches the bars or the winding of the rotor and induces a voltage in them, this voltage induced in the bars is due to the relative movement of the rotor with respect to the magnetic field of the stator, due to the induced voltage, currents are present in the rotor by the rotor bars, these currents produce a magnetic field and, finally, the production of the rotor movement is due to the fields of the stator and the rotor; these fields tend to align as two magnetic bars if they are placed close by; since the magnetic field of the stator is rotating, the magnetic field of the rotor (and the rotor itself) will constantly try to reach it.

1.1 THEORETICAL FRAMEWORK

Antecedents

According to the information gathered from works similar to ours, in some cases the same problem of the windings in the stators was seen, because they are mostly carried out by hand.

The components of the winder are described to continuation.

Geared motor

This speed reducer is the simplest, consisting of a sprocket, usually bronze, that is in permanent contact with a steel screw in the form of a trapezoidal thread or near trapezoidal thread, made of hardened steel, to reduce friction. A turn of the auger causes the advance of a tooth of the wheel and consequently the reduction of speed.[2].

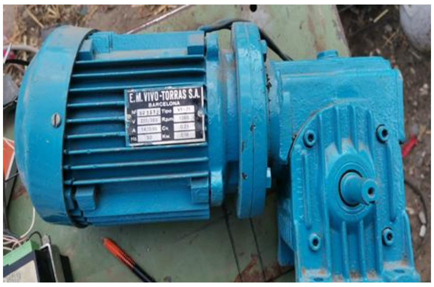

Figure 1: Geared motor

Rowlock

A Rowlock is a device that supports a rotation axis and is positioned parallel to the shaft axis. This part is designed to efficiency the bearing is used in multiple machines in the industry. [3].

Figure 2: Rowlock

Frequency inverter

Frequency variators or converters are systems that are located between the power supply and the electric motors. They are used to regulate the rotational speed of the AC motors.

Regulating the frequency of the electricity that the motor receives, the frequency inverter gets to offer this motor the electricity demanded, thus avoiding the loss of energy, or what is the same, optimizing the consumption. [4].

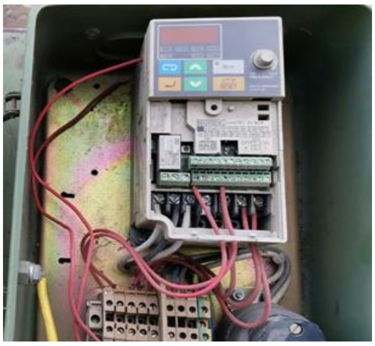

Figure 3: Frequency inverter

Encoder

An encoder is a sensing device that provides a response. Encoders convert motion into an electrical signal that can be read by some type of control device into a motion control system, such as a counter or PLC. The encoder sends a response signal that can be used to determine position, count, speed, or direction. A control device can use this information to send a command for a particular function. [5].

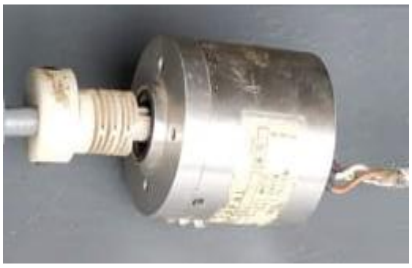

Figure 4: Encoder

Accountant

Counters are sequential systems with a single input of impulses to be counted, whose internal state at each instant represents the number of impulses that have been applied.

Input pulses can be clock pulses or originate from an external source and can occur at fixed or random time intervals. [6].

Figure 5: Accountant

Metal Plate

Steel plate is a relatively flat metal object made of some types of alloys or steel. It was usually used for engine support. [7].

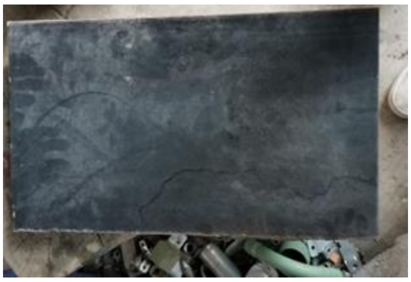

Figure 6: Metal Plate

Metal base for component support

This is the main base that will contain all the mentioned pieces, that is, all the elements mentioned above will be located and placed in this main base.

Figure 7: Metal base for component support

Chain and catarina step 40

The chains and catarines are used to transmit power in the form of torque from one rotating shaft to another. The chains are used to transport, slide, push or pull a large number of materials in any type of industry. [8].

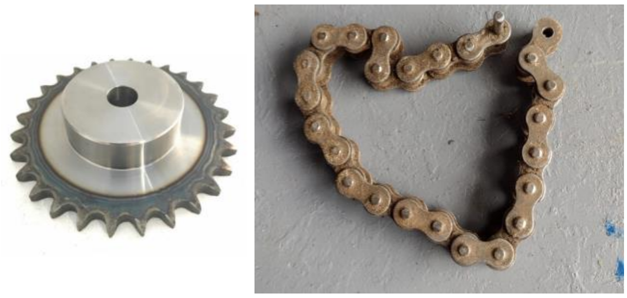

Figure 8: Chain and catarina step 40

2. Results

As a first step

We are looking for the molds we are going to make because each mold has a specific design and, in some molds, they are used for motor brakes and these are triangular or heptagonal in shape and those that are semi-circular in shape are used for stators.

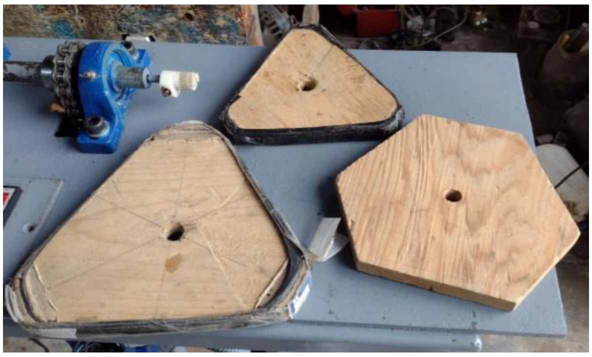

Figure 9: Molds for winding

Once the molds are found, a specific distance is taken that was measured at the previous winding.

As a second step

As a second step the mold is mounted on the pigeon, this will give us a hold and a distance for the molds of the coil.

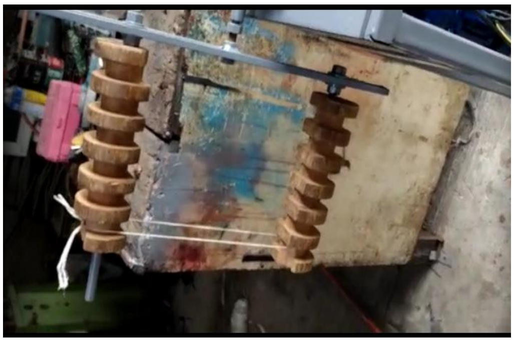

Figure 10: Mold assembly

As a third step

As a third step is to put the copper wire rust so that the part of the molds begin to be filled by means of a circular shape that becomes a cycle.

Figure 11: Placement of wire for winding

As a fourth step

As a fourth step is to enter the data to the counter an example, we put 5 turns until 5 flies this will be parked or rotated to the specified point.

Figure 12: Counter

As the fifth step

As the fifth step is to start it by means of the frequency inverter This helps us to manipulate to control the speed of our motor bike, to finally check if the wire is winding in our molds.

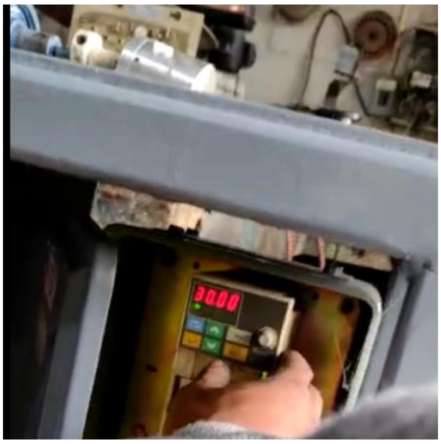

Figure 13: Set the speed on the variable frequency drive

Final design of the automatic winder

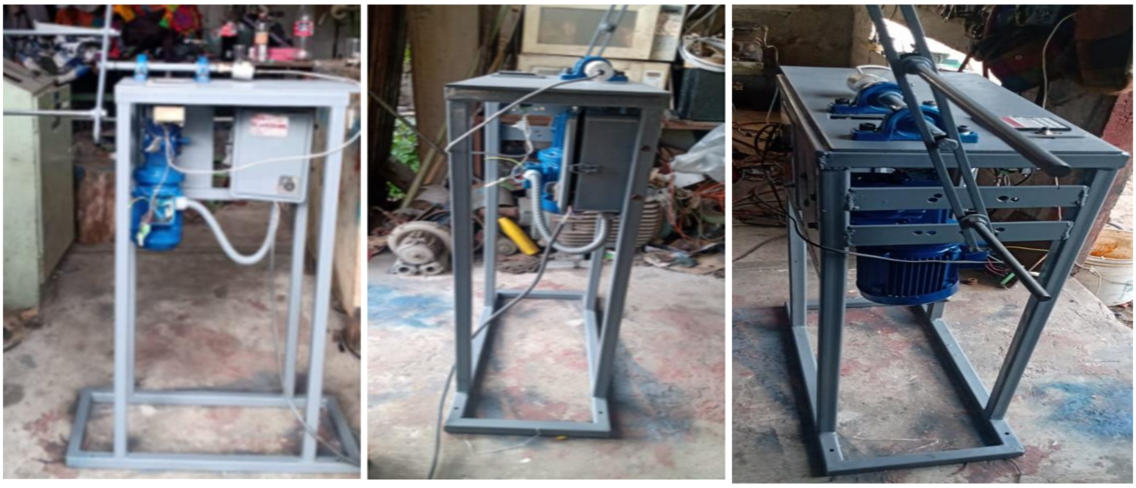

Figure 14: Final design of the automatic winder

3. CONCLUSIONS

We as University students have the appropriate knowledge to be able to develop this work since it took the greatest effort to complete each of the topics. This was also, a very useful experience for us since after doing it, we not only checked the theoretical knowledge, but we acquired practice in winding work and in the different steps to follow to make them safely. From the method of functional analysis, we were able to break down the machine into functions and subfunctions, from which the different components of the machine are derived. Based on the AMEF methodology and using these components, we were able to determine the most critical components for each of the machines in order to orient our redesign toward these components.

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