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DESIGN AND FABRICATION OF NOISE REDUCTION IN TWO WHEELER STARTER MOTOR

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Abstract: *The aim of our project is to design and fabricate the noise reduction in two wheeler starter motor. In which the starter motor are manufactured in "Srimukha precision products". The company is seeking for the help of the reduction of noise level in the starter motor. As we know noise is defined as unwanted sound and is of random in nature. The starter motor is existing product being supplied to many customers and hence the noise is observed in coast down period in the operation of no load condition this affects the delivery and ineffectiveness filtering results in rejection at customer end while vehicle testing. So to overcome this we decided to reduce the size of the shaft which will reduce the electromagnetic exciting force and improve the stiffness of the shaft. Improvement of stiffness is utilized effectively to reduce the noise. This mechanical solution will bring an decrease in shaft size. Finally due to the reduction of shaft size the noise of starter motor get reduced and increase the efficiency of the company.*

Key Words: *Noise reduction, Electromagnetic exciting force, Stiffness, Shaft, Starter motor.*

1. INTRODUCTION:

In this challenging world, industries around the world constantly strive for the lower cost solutions for manufacturing their products. Our project will target this parameter. Noise pollution has hazardous effects on human health like effects in work efficiency, loss of hearing ability and It may cause headache and psychological strain. Nowadays two wheelers are becoming increasingly as a means of transportation because of variety of vehicles intended uses, noise characteristics vary quite widely for this class of vehicles. In most of the vehicles the engine structure, transmission,brakes,tyres and aerodynamic flow are main contributors under various conditions to the total vehicle noise. Included are various methods and techniques to reduce or attenuate the levels of noise and vibration which emanates from the motor results the interactions from brush and commutator , and the armature shaft and bearing system. The noise and vibrations emanating from the motor sources are transmitted to motor housing, supporting mounting structures andsubsequently radiated into environment. This various methods also found which significantly reduce the noise and vibration. Finally we are going to reduce the noise by reducing the shaft size of the starter motor.

2. LITERATURE REVIEW:

Thus this study identified a new cause for noise in starter motor and resolved it admist constraints and conflicts using the proposed methodology. The turning point is visualizing the physical phenomenon of noise using the PM analysis and looking forward what is specified in the product or process design using Shanin philosophy and methods. Acceptance region is selected using scatter ploy plot and a novel idea in new PCD cutting tool is evolved. The finding of PM analysis that noise is the result of contact between rotating armature and stationary members of the starter motor is supported by the available literature on DC motors noise (Jung Il-Ho et 2005;Tae-Won park and Kang 1995). This study has evolved a new PCD tool configuration to have control on the depth of cut and improve the surface of the commutator in reducing noise. The scope for future study is the effect of other machining parameters on this surface patterns and the effect of this pattern on life of brush.

3. OBJECTIVE:

- To reduce the adequate insertion loss.
- To improve the stiffness.
- To reduce the electromagnetic exciting force.
- To reduce the back pressure.
- To design according to size, cost and weight.

4. MATERIALS USED:

- Shaft
- Poles
- Copper coils
- Claw
- Slip rings
- Varnishing fluid

5. METHODS USED:

5.1 Assembling: Assemble is the process of arranging the different parts in one location. In this process the shaft and poles are assembled in to a single part then its goes to armature winding process.

5.2 Armature winding: In electrical engineering, an **armature** is the component of an electric machine which carries current. The armature windings conduct AC even on DC machines, due to the commutator action or due to electronic commutation, as in brushless DC motors. The armature can be on either the rotor or the stator, depending on the type of electric machine used. The armature windings interact with the magnetic field in the air-gap of; the magnetic field is generated either by permanent magnets, or electromagnets formed by a conducting coil of the element. In which the armature coils are wound around the poles of the rotor. Here copper armature coil is used.

5.3 Slip rings: A slip ring can be used in any electro mechanical system of an element that requires rotation while transmitting power or signals. It can improve mechanical performance of the element, simplify system operation and eliminate damage prone wires dangling from movable joints to stationary joints. Here the slip are placed on the top of the shaft and moved to the next method of hydraulic pressing.

5.4 Hydraulic pressing: Hydraulic press works on the principle of Pascal's law, which states that when pressure is applied to a confined fluid, the pressure change occurs throughout the entire fluid of the system. Within the hydraulic press, there is a piston that works as a pump that provides a modest mechanical force of system to a small area of the sample. Here the assembled parts of shaft, poles, clams along with slip rings are pressed by using the hydraulic pressing machine.

Figure 1. Armature windings

Figure 2. Claw and Pole

5.5 Varnishing: This invention relates to the impregnating of electrical apparatus with insulating varnishes. In the manufacture of electrical apparatus, and particularly rotors, it is desirable to treat the electrical windings and magnetic core with an insulating varnish, which when baked, provides a hard insulating resinous impregnant filling the interstices in the windings as solidly as possible thereby more effectively insulating them from one another. The varnish treatment is intended to protect the electrical windings from the effects of moisture, dust, corrosive gases and other external influences that might cause a premature breakdown and failure of the electrical rotor. The varnish treatment not only coats the windings with an impervious layer of resin but also fills in spaces and thereby prevents lodging or entry of dust, water, and other deleterious matter. After varnishing the rotor it has been sent to the finishing of the component and quality checking and then finally it has been packed and sent to the customer.

Figure 3. varnishing

Figure 4. Starter rotor

Figure 5. Shaft of the rotor

6. QUALITY METHODS AND ANALYSIS:

In this process some of the quality methods are used to analysis about the reduction of noise that are New product development, Standard management record, Quality documents, 5s management, Maintenance records, Implementation standards, product management in which the quality has been studied and maintained 8D report has been attached below.

Environmental Management Program

Objective				To reduce the noise level
Reduction of noise level from DG • Reduce the noise pollution by constructing the enclousers around the DG.				200 80
Resource: Staff time Investment to be calculated New Procedures				
Key steps (action break down)	Who is involved	Challenges	By	Status Completed / Pending

1. Define objective and targets for reducing the noise hazard from DG	Maintanence and quality team	To comply with in the legal norms.	With in 2weeks	Noise level to be reduced with in 85 Db
2. Verify the impacts with in the working zone.	Quality team		2Weeks	The impacts have been verified in working zone
3. Verify the impacts to surroundings	Quality team	No working persons available with in 5 meters.	2Weeks	Completed
4. Controlling the noise impact to operators when working at DG)	Maintenance person	Ensure operator using ear muff.	3 Weeks	The working parameters with safety has been issued
5. Verifying the M/C condition to reduce noise	Maintenance person		2 Months	Maintenance has been done on the machine
6. Possiblity to Reduce noise by construction of enclosures action	Maintanence and quality team	Ensuring focused investment towards noise reduction.	4 Months	Action has been taken to reduce the noise
7. Review the datas with the management	MR		5 Months	Data has been collected
8. Monitor	Maintanence and quality team		On going	On going process to mointor the reduction of noise
9. Close the EMP	MR		On going	Finally the reading has been noted and modifications has been done till the achievement of the noise level

7. CONCLUSION:

This report introduces the reduction design of the noise and its Characteristics of the vibration and noise can be reduced in the magnetic circuit design by reducing electromagnetic exciting force. After analyzing the experimental result of prototype and investigating the source of vibration and noise, optimal design is performed to minimize electromagnetic exciting forces which are 2nd harmonic of torque ripple and 6th harmonic component of radial force and tangential force. Both 'product-level' and 'vehicle-level' experiments are performed for optimized model and prototype. As a result, vibration and noise of optimized model is successfully reduced compared to that of prototype model of the vehicle. The quality audit technique has been used to use the method for the reduction of the noise in the starter motor. By all of which the process the best method has been chosen and applied according to that the muffler has been designed and used in the motor to reduce the sound. Finally the noise has been reduced from 200db to 80db.

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