Design and Modification of Interpole Tool Change in Wiper Motor Assembly

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Abstract—

The wiper motor is the engine behind the operation of windscreen wipers. It provides the torque to move them, ensuring a clean windshield. The motor is located in a convenient place that allows it to work the wiper mechanism. Windshield wipers are operated by an electric motor. The electric motor is attached to a worm gear, which transmits the necessary force to a long rod that sets the wiper arms in motion. The worm gear is able to generate the force required to move the wipers as fast as they need to move. The brush plate is Designed to eliminate unnecessary connections and terminations, reducing installation time and the risk of signal degradation. By passing cables directly through the brush plate, the risk of signal loss or interference is significantly reduced. The wiper motor in corporate a simple brush driven engine that slinked to a worm gear to help convert the energy produced into usable power. The primary job of the motor is to produce reliable output, and a typical motor also contains a mechanism that allows its output to be varied and switched off strategically. The motor assembly components include brushes, commutator, armature, and magnet. The wiper motor brushes convey current alternately, causing a reversal of polarity and continuous motion. To enable a two-speed operation, most wiper motors come equipped with three brushes. Brush plate assembly the brush plate holds the motor brushes. Other parts of the plate include the springs that tension the brushes and the electric circuit that regulates the power going into the motor.

Keywords —, Wiper Motor, Interpole Tool,
Torque, DesignModification, Automotive Systems,
Noise, Reliability

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Introduction

Brain tumors represent one of the most critical neurological disorders, with high mortality and morbidity rates worldwide. Early and accurate detection is vital for effective treatment and patient survival. Traditional diagnostic methods such as Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scans are widely used by radiologists, but manual interpretation can be time-consuming, prone to human error, and reliant on expert availability. These challenges underscore the need for automated, scalable, and reliable diagnostic systems that can assist in early-stage brain tumor identification.Recent advancements in artificial intelligence (AI) and medical image processing have shown significant

potential in transforming healthcare diagnostics. In particular, deep learning techniques such as Convolutional Neural Networks (CNNs) have emerged as powerful tools for analyzing complex visual patterns in medical images, leading to improved accuracy in tumor classification and segmentation tasks.

This paper proposes an optimized framework for automated brain tumor detection using Python-based image processing techniques. The approach integrates classical image preprocessing methods and deep learning models to identify and classify brain tumors from MRI scans. Key steps include noise reduction, grayscale transformation, skull stripping, and segmentation using morphological operations and thresholding. Extracted regions of interest (ROI) are then analyzed using a CNN model trained on labeled MRI datasets to detect tumor presence and type.

The windshield wiper motor plays a crucial role in maintaining visibility during adverse weather conditions. Typically powered by a DC motor, it transforms electrical energy into mechanical energy to move the wiper arms. The effectiveness of the wiper motor directly influences driver safety and vehicle performance. In this project, we focus on the modification of the interpol tool within the wiper motor assembly to optimize performance. The wiper motor assembly includes several key components: capacitors, inductor coils, brushes, yoke, gearbox, armature, and gearwheel. These components work in harmony to ensure smooth and efficient wiper operation, especially in varying environmental conditions.

RELATED WORK

Wiper motor are working on this principle of Electrical energy are converted into mechanical energy (Rotor). It helps us to identify problems and find innovative solutions. Designing enables us to create products that meet the needs and preferences of the users. To sustain the pole position within the drawing specification ensures that all components and assemblies meet the specified tolerances to maintain optimal alignment and positioning. Implement active or passive stabilization systems to minimize thermal, mechanical, or vibration disturbances. Perform routine maintenance tasks, such as cleaning and checking components, to ensure optimal performance. To control the magnet height and performance RPM (Revolutions per Minute) within the specified design parameters. This is crucial in precision measurement instruments like interferometers, where small variations can affect accuracy. Regularly calibrate the system to ensure accuracy and repeatability. Continuously monitor magnet height and RPM in real-time to detect deviations and make adjustments. Flux value also to be maintained to get better result. Continuously monitor the flux value in real-time to detect any deviations. Perform regular maintenance tasks, such as cleaning and lubricating moving parts. Continuously monitor the instrument condition to detect sigs of fatigue. Replace worn or damaged components promptly to prevent further damage. It helps us to identify the problems and find innovative solutions. Designing enables us to create products that meet the needs and preferences of the users. Now this project has modification of Interpol tool for pole and yoke assembly. Identify the root cause of rejections to address them effectively. Conduct regular quality control check to detect defects early. From existing method there is no alignment for yoke positioning. Existing tool yoke pole locating pin and yoke orientation pin not available. Due to magnet height variation, Performance machine RPM fail occurred. Magnetization Flux value variation observed. Implementation – Yoke positioning pin (Dowel Pin) introduced.

To transmit motion, the wiper motor gearbox contains a shaft that attaches to the main output gear on one end and protrudes out of the housing on the other. The shaft also usually has a small arm attached to it. The wiper motor arm function is to transfer motion from the shaft to the wiper linkages. The wiper motor gearbox is the transmission part of the assembly. It connects to the motor by means of long bolts and contains parts necessary to the operation of the wipers. Unlike the motor assembly housing that's all metal, the gearbox features a plastic cover on the upper side. The worm gear is one of the most commonly used types of wiper motor gears. It consists of a cylindrical gear (the worm) that meshes with a toothed wheel (the worm wheel). This gear mechanism provides high torque and smooth operation, making it ideal for heavy-duty applications. Main wiper motor parts include permanent magnet, armature, brushes, and shaft. These components work together to produce rotation. The magnet provides the magnetic field that causes the motor to spin..

I. PROPOSED METHODOLOGY

On the machine tool spindle. Rough a series of rotation and linear motion, it can achieve the efficient and accurate exchange of the tool required for the next process in the tool magazine with the tool used in the previous process in the machine spindle. Here is a very large difference of the tool change process between the multi station spring machine and the

machining center. In the machining center, it is generally one-to-one tool change between tool magazines with the single spindle. In the spring machine, it is one-to-eight tool change between. Tool magazine with the spindles of the eight stations which are distributed on the panel at a degree circumference. Therefore, the tool change arm used in the machining center cannot be directly used on the spring forming machine. It is necessary to design an automatic tool change arm that is suitable for the characteristics of the spring.The structure of the spring machine tool change mechanism It adopts the form of single-arm and single-handle. It includes a servo motor, a reducer, and four cylinders, which, respectively realizes two rotary motions, two linear motions, and opening and closing motions of the clamping jaw. In this way, it provides the movement of four degrees of freedom for the clamping jaw of the tool holder and meets the working requirements of the tool change of the spring machine. The function of the rotary cylinder is to rotate the whole tool change arm between the tool magazine.The function of the motor is to make the angle of the tool change arm coincide with the angle of the slide of the spring machine forming plate from which the tool will be removed or

OBJECTIVE/SCOPE OF THE PROJECT

- To Reduce Cycle Time.
- To Improve Productivity.
- To Reduce the warranty related complaints.
- To Improve Quality.
- To Eliminate Inter polar gap.

LITERATURE REVIEW

This invention relates to electric motor sand more particularly to an improved carbon brush holder assembly designed to become part of an electric motor. An object of the present invention is to provide improved support structure for a brush holder. Another object of this invention is to provide a brush holder assembly the improved construction of which facilitates removal or installation of the brush. A further object of the present invention is to provide a brush holder assembly having a compact and relatively uncomplicated design that results in a reduction in the cost of manufacture. Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiments of the invention which is here in after set detail as to enable to understand the function of operation.

A brush holder assembly for an electric motor of a motor vehicle equipment item, comprising a plate for holding at least one connection brush against a collector arranged on a rotor of the electric motor, the plate extending in a plane perpendicular to said rotor, and at least one induction coil configured to be connected to said connection brush, where in the brush holder assembly comprises at least on retaining element of the at least one induction coil.

The advantage of this solution is that the corresponding end sections of the strands and the voltage supply lines assume a defined position which does not change over the service life of the windscreen wiper motor, in particular as the carbon elements wear and therefore the position of the strands correspondingly changes. Secondly, it is known to weld the carbon strands directly to the wire ends of the suppression chokes but otherwise to not fix them.

A solution of this kind has the advantage that no additional components, asks the case when using copper sleeves, are required However , it is disadvantageous in this case that the position of the connecting region between the electrical connections and the strands is not defined and changes over the service life of the windscreen wiper motor.

It is important for a reliable electrical and mechanical connection to be ensured, particularly when an additional welded connection between the electrical connection and the voltage supply line is dispensed with. It is therefore proposed in a further variant of the invention for the receiving groove to have cutting edges for the electrical connection and the voltage supply line in order to generate insulation - displacement connection. Cutting edges of this kind also result in particularly reliable fixing of the electrical connection and the voltage supply line in the axial direction of the receiving groove.In a structural alternative for forming a receiving groove in the clamping holder element, provision can be made for the clamping

holder element to be constructed as a clamping lug which is formed parallel to a side wall of the carbon holder element, in particular to the upper face of the carbon holder element, and for a U - shaped receptacle to be formed between the side wall and the clamping lug. An embodiment of this kind allows for the clamping holder element to be constructed in a relatively simple manner in respect of production by a simple stamping process, wherein, for the purpose of inserting the electrical connection and the voltage supply line, the receptacle is initially of a size which allows for the insertion of the two elements with a low level of play.A brush holder assembly comprising in combination a metallic frame part of an electric motor and a brush holder unit mounted on said metallic frame part; said metallic frame part having means for seating said brush holder unit and said seating means including a pair of Spaced Walls defining a channel adapted to receive said brush holder unit, theouter surface of each of said spaced walls having integrally formed therewith a projecting member, said brush holder unit including a brush holder having a top provided with a locating projection extending between the sides thereof, a retainer clip comprising a pair of legs formed with apertures therein and a top connecting said legs, said top being provided with locating means in the form of a slot extending between said legs, said top of said retainer clip being adapted to engage said top of said brush holder so that said slot will register with said locating projection, said projecting member on each of said walls being adapted to register with a corresponding one of said apertures formed in said legs when said brush holder unit is seated in said channel.

“Design of a rain-based speed controller for automobile windshield wiper motor’’ by Mohammad Fotouhi, Ali Eydgahi, Tom Malaby of University of Maryland. https://peer.asee.org/design-of-a-rain-based-speed-controller-for-automobile-windshield-wiper-motor.

CONCLUSION

Wiper motor are working on this principle of “Electrical energy are converted into mechanical energy" (Rotor). It helps us to identify the problems and find innovative solutions. Designing enables us to create products that meet the needs and preferences of the users. Now this project has modification of Interpol tool for pole and yoke assembly. Identify the root cause of rejections to address them effectively. Conduct regular quality control check to detect defects early. From existing method there is no alignment for yoke positioning. Existing tool yoke pole locating pin and yoke orientation pin not available. Due to magnet height variation, Performance machine RPM fail occurred. Magnetization Flux value variation observed. Implementation – Yoke positioning pin (Dowel Pin) introduced

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