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New Design and Idea for Investigating the Defect Inside the Gearbox by Experimental and Simulation Results

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Abstract
Today, new automotive repair ideas will lead to advances in the automotive industry and lower costs for the driver. The gearbox is called the gearbox. The importance of this part of the automotive can be considered as a motor or power generation. Its repairs need a high specialization, and paying attention to maintaining its health and function is also important in maintaining the automotive engine. In this article, we will examine the new repairs and ideas in the gearbox of Logan automotive. The only weakness of the Logan automotive gearbox is its axle shaft duster, which must always be replaced every 80,000 kilometers. In this article, a completely new idea is given about the axle shaft duster, which no longer needs to be replaced during the said distance. For this design, a sensor has been designed that solves this problem. The amount of vascazin in the axle shaft duster is significant, and with the new design on the automotive odometer screen, we will see the exact amount of vascazin lost. Then the design of the chamber was done carefully, which according to the design, the need to replace the axle shaft duster is reduced to zero. The design with the existing sensor and the design of the axle shaft duster chamber were simulated by Katia and SolidWorks software. Its performance was evaluated by software by providing the exact location of the designed sensor. A clear view of the design was provided to review and show the details, and at the end, the details of the sensor and its accessories were discussed to fully review the new idea.

Keywords: *Gearbox, Axle Shaft Duster, Logan Automotive, Sensor, Simulation*

I. Introduction

The torque produced by the engine must be transmitted to the wheels according to the needs of the vehicle. The task is to control and adjust this power with the gearbox or gearbox of the automotive [1]. In fact, the gearbox allows the driver to control the automotive at different speeds in different situations. The importance of this part is that each engine is able to produce a certain amount of power and torque [3-2]. But through the gearbox, you can achieve the desired speed without increasing the engine speed and torque. In addition to this important task, the gearbox does other things of varying importance. Prevention of unwanted speeds with the help of the gearbox, the automotive can be fully provided to the driver on slopes and road conditions where there is a possibility of speeding out of control and adjusting the direction of the automotive, which can be used to control the direction of the automotive back and forth with the help of the gearbox and give the automotive the power to reverse. Operating the engine without moving the

Automotive, which sometimes requires the automotive engine to be active but with no movement [4]. With the help of the gearbox, the transfer of engine power to the wheels can be stopped and allowed. The signs of failure and the need for Logan gearbox repairs are so precise that the driver can easily notice the failure of the automatic or manual gearbox. When driving with Logan automatic transmission, when changing gears automatically or manually, when the gearbox wants to change gears from one to two gears, the automotive with low noise, the driver will be fully aware of the failure of Logan automatic transmission [5-6]. Important reasons for the failure of Logan automotive automatic transmission, the most important of which are axle shaft and axle shaft duster. The main reason for the failure of the gearbox of Logan automotive is not replacing the axle shaft duster, which is one of the main goals of this research and a new idea for it. Because the axle shaft is the most important part of a Logan automotive, it is affected by driving. Consecutive braking and having high speed can damage the shaft of Logan automotive and even damage the automotive and engine in most cases. If the duster is torn, it can no longer prevent dust from entering, and they enter the chamber, causing the axle shaft, the axle shaft duster, and most other components of the automotive to break down. Suddenly removing the foot from the clutch, driving in the wrong gear, pulling, and boxing a heavier automotive can also damage the Logan axle shaft

duster. Tick-off causes extensive damage to Logan vehicle parts, including the axle shaft [7]. It is very important to check the Vascazin valves because, with the loss of Vascazin in the event of a rupture of the axle shaft duster, the differential, and the shaft headlock together and cause a lot of damage to the machine. If a slight abnormal sound is heard when turning the steering wheel all the way to the end, the wheel shaft axis is damaged in the same direction, and if we notice a more abnormal sound when turning the steering wheel to the end, it means that both axle shafts are broken. Another sign of axle shaft failure is severe vehicle vibration, which is the most important sign of severe forward and reverse gear shaking, especially when biting on the highway and in high gear. The presence of grease or oil on the rim of the wheels can also indicate a rupture of the axle shaft, which is usually reduced by replacing the dusters and clamps [8-9]. In 2011, Stevianov and colleagues analyzed engine reliability and transmission for vehicles with electronic control systems using the Pareto approach. In this paper, the results of research on the reliability of Logan and Fiat engines using the Pareto method are presented. The most useful method of repairing them is indicated in the diagrams [10]. In 2021, Stefano and Hirsto examined the problems of AW 55-50 automatic transmissions. In this article, AW 55-50 five-speed automatic transmissions are widely used in cars. This gearbox is used in Renault, Volvo, Saab, Fiat (Alfa, Lancia), Nissan, and General Motors. There are various problems in their performance. Some problems are mechanical in nature and require major repairs to the transmission. Common defects in the valve body that do not require major repairs. Only the valve body is destroyed and repaired. This report examines the features of the linear valve (electronic pressure regulator) embedded in the AW 55-50 automatic transmission [11].

In this article, we will examine the problems of axle shaft dusters. The design of the new axle shaft duster was done with a complete proposal and a suitable sensor design. The useful sensor shows the exit of Vascazin from the newly designed axle shaft duster on the odometer. Its simulation has been done to solve the problem and prove the new design which is the turning point and progress of the article.

II. Axle shaft duster and chamber

An axle shaft duster is a piece of rubber attached to a gearbox. If not replaced within the specified mileage (80,000 km), it will rupture and drain all the gearbox oil, damaging the Logan Automotives gearbox by draining the oil. The gearbox of the Logan automotive is a very good gearbox, but its only weakness is the axle shaft duster, which must be replaced at the specified kilometer, but this weakness does not exist in the new Logan automotive, which has been changed with the gearbox the axle shaft duster is no longer in direct contact with the gearbox oil. As the oil level in the gearbox of the Logan automotive drops, the first place to be damaged is the gear of five Automotives that the oil has not reached and causes the gear to burn. Signs such as movement in 5th gear from the gearbox howl, indicating gear failure. If you are traveling at high speed and the gearbox oil is completely drained, the gearbox is locked, and the automotive will not move at all. The axle shaft used in the Logan automotive has a very basic design weakness, which in this article, this design weakness has been completely eliminated. The reason for the weakness of the axle shaft of the Logan automotive is the small axle shaft located on the driver's side. The axle shaft duster is integrated with the gearbox oil, and this action causes the axle shaft duster of the gearbox oil to empty due to cracking or wear or tear, and not paying attention to this defect will cause a lot of damage to the gearbox. It has been seen many times that when replacing the axle shaft duster, the Logan automotive shaft seals the engineers around the duster with glue to prevent oil leakage. This is a mistake, and not only does it not seal, but the duster is designed in such a way that the rubber is sealed with the gearbox, and gluing it prevents the duster from sealing the gearbox. Another point in replacing the Logan automotive axle shaft duster is the axle shaft duster clamp that the clamp should not be too tight. The general public believes that the stronger the clamp, the less oil leakage, which is a misconception, and over-tightening the clamp will increase oil leakage because the duster is located on the axle shaft bearing and the clamp becomes too tight it loses its state, and oil leakage multiplies. In this paper, first, the design of a new idea in the experimental test was reviewed. The design of this new idea is a compartment that is installed around the axle shaft duster. When the gearbox is emptied or the Vascazin leaks due to a ruptured duster, it collects inside the chamber and, by designing a new sensor under the chamber, the amount of vascazin discharged from the gearbox to the driver on the odometer. Shows that are designed on this page. One of the Automotives

That has the problem of draining Vascazin from the gearbox is the Logan automotive, which we usually have to go to the repair shop every few months for long distances. Figure 1 shows a Logan automotive.

Fig 1. Logan automotive

When the axle shaft duster of the Logan automotive is t, the Vascazin gearbox comes out of the duster, and even this leak will come out of the roller bearing around the duster. When the Vascazin comes out of the duster, the gears work dry, and no cooling is done, and the four or five gears start to make noise, and eventually, the automotive gearbox burns out. Figure 2 shows the rupture of the axle shaft duster, and Figure 3 shows the discharge of vascazin as described.

Fig 2. Rupture of the axle shaft duster

Fig 3. Discharge of vascazin

In this design, the chamber is installed around the duster, and there is no need to lower the gearbox, and the chamber will be installed on the work, which is one of the advantages of this design. All internal and external machines, whether advanced or non-advanced, all tearing the axle shaft duster and cause the axle shaft to malfunction. This housing can be installed on all machines to protect against duster and damage to the axle shaft and does not allow the sharp object to tear it. For the best location for the sensor, it can be installed where there is oil. This enclosure and sensor are designed for the Logan automotive and can be used for automotive with similar problems. Figures 4 and 5 show the experimental work and design of the enclosure.

Fig 4. Sample of experimental work done **Fig 5. Another angle of the experimental work sample**

III. Design and installation of the sensor

In this article, the oil level sensor is used, but with a different mechanism and a new design. Figure 6 shows the design of an electronic screen for sensor operation. The electronic board that has been designed has been quite innovative. The components of this electronic board are voltage reduction board, microcontroller, sensor circuit, relay and market control circuit, LED, and indicator circuit. In this electronic board, the sensor is connected to this circuit with a wire, and an IC (micro) is defined for it. The design is such that the sensor collides with the amount of vascazin in the chamber and is displayed digitally according to the wire connected to the vehicle odometer. The design on the automotive odometer screen was also accompanied by a new idea that is shown in the figures. According to the new design and idea, if the amount of Vascazin is complete, the screen on the

The automotive mileage screen will turn green, which you can see in Figure 7. If the amount of Vascazin is moderate, the screen on the automotive odometer will turn yellow, as shown in Figure 8. If the amount of vascazin is low or discharged, the screen on the automotive odometer will turn red, as shown in Figure 9. According to this design, when the Vascazin is empty or low and turns red, the automotive power relay shuts off before reaching this alarming stage, and the automotive shuts down. As you can see in Figure 6 and the circuit design, the circuit breaker relay is installed inside the circuit. It should be noted that this issue was used in the initial design, but when the sensor is installed on the automotive, this switch relay is installed in the path of the automotive coil or automotive input power.

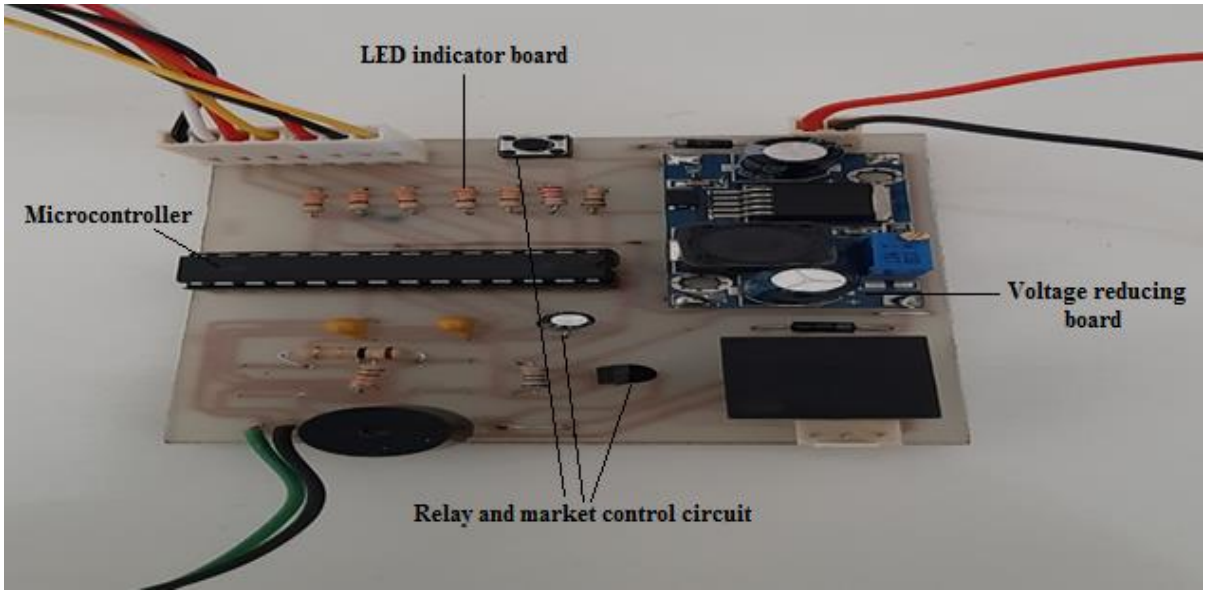

Fig 6. Designed electronic page

Fig 7. Vascazin display on the kilometer screen

(green indicates full Vascazin)

Fig 8. Vascazin display per kilometer

(yellow indicates average Vascazin size)

Fig 9. Vascazin display on the odometer (red indicates Vascazin is too low)

In Figure 10, you see two strands of wire, one positive and the other negative, on the circuit. The red wire is connected to the negative part of the battery or automotive body. The black wire is connected to one of the positive wires of the switch. When the sensor is activated, and the amount of vascazin is reduced or discharged, and before the screen turns red, the automotive power relay shuts down, and the automotive turns off.

Fig 10. Power switch relay wire in electronic board

IV. Simulation

With the help of Solid Works and Katia software, two-dimensional and three-dimensional maps of objects can be easily drawn and modeled. In fact, you can create your shape without having to do the calculations needed for industrial drawing and extract your shape using the design environment of the facade and three-dimensional map. This software's have many features

And tools for tasks such as modeling and other operations under different loads. In this article, the simulation is performed by these two software's, which you can see in the original simulation in Figure 11. The image you see is a chamber that is mounted around the automotive duster and, at the bottom of the chamber, the sensor.

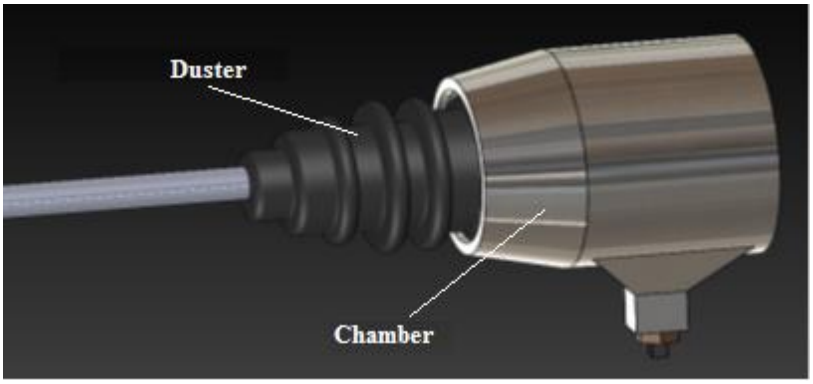

Fig 11. Simulated prototype

Figure 12 shows how to install all the components and their complete design. As you can see, the main duster is inside the chamber, and when the chamber is torn, or there is a leak from the roller bearing, Vascazin hits the sensor, and the digital lines of the display inside the odometer or display light up. The new design idea for the simulation was explored by adding another duster. As you can see in the figure, there is a secondary duster to seal the chamber so that water or duster did not enter the chamber when the sensor was tearing. And the most important point in this plan is that when the duster tearing and the vascazin enters the chamber, the secondary duster does not allow the vascazin to fall to the ground and keeps the vascazin inside the chamber and gearbox; this is the case until the

automotive duster is changed it works. This was also done for a pilot test. The advantages of this design include saving on the purchase of Vascazin and not allowing the gearbox to dry out. You can see a clear view of the designed system in Figure 13. As you can see in Figure 14, a roller bearing is mounted between the first duster attached to the gearbox and the second duster. The damping chamber is installed, and the sensor is

located at the bottom of the chamber. Seals secondary duster around the chamber so that the automotive vascazin is not wasted and duster or water does not enter the chamber. As previously explained, the working chamber closes, and there is no need to open the gearbox components. The final point in the form of using the oil level sensor is to install it inside the chamber. This sensor and circuit can be installed wherever there is oil. Even in industrial devices where there is oil. If the amount of oil is low or leaking, it can act like an installed sensor, but keep in mind that this circuit can be installed anywhere.

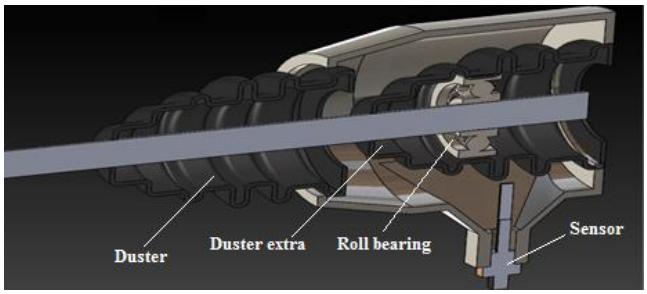

Fig 12. How to install all components on the housing and duster

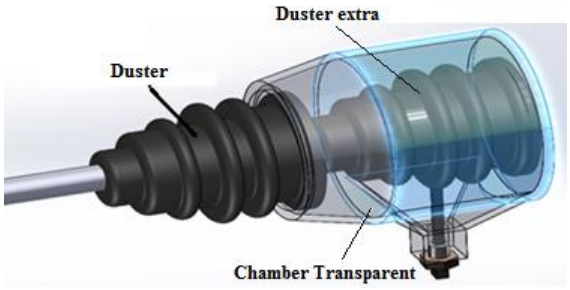

Fig 13. Transparent enclosure to show extra duster

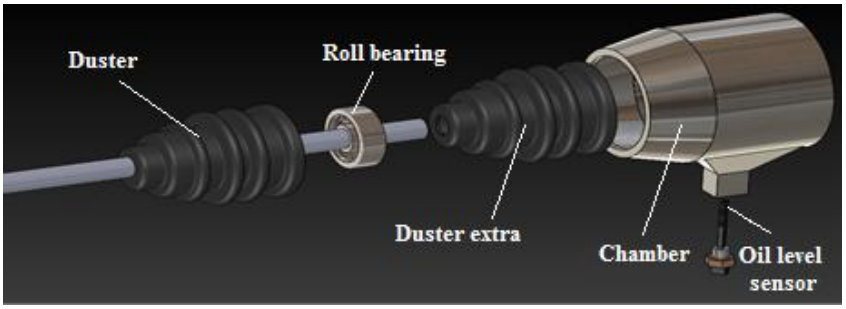

Fig 14. Accurate installation location of roller bearing and oil level sensor

V. Conclusion

In this paper, the new design was implemented by experimental tests and simulation. A new design has been developed for Logan Automotives, and this problem has been solved and will lead to progress in the automotive industry. Logan Automotives has many advantages, but the defect of Vascazin leaks in the axle shaft duster is a concern for most buyers, which will be eliminated with the implementation of this plan. This plan is also applicable to most automobiles. The Vascazin intelligent leak

The detector system of the logan automotive and the Megane manual gearbox with an efficient idea alert the driver to the Vascazin leak at a dangerous time, which is fully displayed by the automotive odometer display in Figure 7. With the implementation of this plan, the damages caused by the gearbox will be completely prevented. One of the important advantages of this design is that to install this innovative part, there is no need for any changes in the automotive gearbox and gearbox, And it is installed separately on the automotive.

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