

Design and Fabrication of Advanced Automobile Wiper

¹R.Girimurugan, ²N.Senniangiri, ³J. Aravinth, ⁴R. Ashok kumar, ⁵S. Gokul Krishnan, ⁶R. Gowtham

^{1,2}Assistant Professor, Department of Mechanical Engineering, Nandha College of Technology, Erode-638052, Tamilnadu, India

^{3,4,5,6}UG Students – Final Year, Department of Mechanical Engineering, Nandha College of Technology, Erode-638052, Tamilnadu, India

Abstract- This is an era of mechanization where it is mostly distinct as alternate of manual effort by mechanical power in all degrees of mechanization. Now a day's not quite all the automobile vehicles are being atomized in order to decrease human being hard work. The design and fabrication of advanced automobile wiper system is a fully automation project. This is a real project which is designed for automobile vehicles and is fully equipped by a wiper motor with automatic water spray technique which is in built inside the wiper arm.

Index Terms- Design, fabrication, automobile wiper.

1. INTRODUCTION

Windshield wiper on a parked car. In this common design, the force from the arm is distributed evenly with a series of linkages known as a Whipple tree.



Figure 1 A common windscreen wiper arm and blade

A windscreen wiper or windshield wiper (American English) is a device used to remove rain, snow, ice and debris from a windscreen or windshield. Almost all motor vehicles, including cars, trucks, train locomotives, watercraft with a cabin and some aircraft, are equipped with such wipers, which are usually a legal requirement. A wiper generally consists of a metal arm, pivoting at one end and with

a long rubber blade attached to the other. The arm is powered by a motor, often an electric motor, although pneumatic power is also used in some vehicles. The blade is swung back and forth over the glass, pushing water or other precipitation from its surface. The speed is normally adjustable, with several continuous speeds and often one or more "intermittent" settings. Most automobiles use two synchronized radial type arms, while many commercial vehicles use one or more pantograph arms. On some vehicles, a windshield washer system is also used. This system sprays water or an antifreeze window washer fluid at the windshield using several nozzles. The windshield washer system helps to remove dirt or dust from the windshield when it is used in concert with the wiper blades. When antifreeze windshield washer fluid is used, it can help the wipers to remove snow or ice. For winter conditions, some vehicles have additional heaters aimed at the windows or embedded heating wire in the glass. These defroster systems help to keep snow and ice from building up on the windshield. In rare cases, miniature wipers are installed on headlights. In this project based on advance automobile wiper. This project details are following below.

2. LITERATURE REVIEW

The first designs for the windscreen wiper are credited to polish concert pianist Józef Hofmann, and Mills Munitions, Birmingham who also claimed to have been the first to patent windscreen wipers in England. At least three inventors patented windscreen cleaning devices at around the same time in 1903; Mary Anderson, Robert Douglass, and John Apjohn. In April 1911, a patent for windscreen wipers was

registered by Sloan & Lloyd Barnes, patent agents of Liverpool, England, for Gladstone Adams of Whitley Bay. American inventor Mary Anderson is popularly credited with devising the first operational windshield wiper in 1903. In Anderson's patent, she called her invention a "window cleaning device" for electric cars and other vehicles. Operated via a lever from inside a vehicle, her version of windshield wipers closely resembles the windshield wiper found on many early car models. Anderson had a model of her design manufactured, then filed a patent (US 743,801) on June 18, 1903 that was issued to her by the US Patent Office on November 10, 1903. A similar device is recorded 3 months prior to Anderson's patent, with Robert A Douglass filing a patent for a "locomotive-cab-window cleaner" on 12 March 1903. Apjohn's 1903 window cleaning apparatus design. Irish born inventor James Henry Apjohn (1845–1914) patented an "Apparatus for Cleaning Carriage, Motor Car and other Windows" which was stated to use either brushes or wipers and could be either motor driven or hand driven. The brushes or wipers were intended to clean either both up and down or in just one direction on a vertical window. Apjohn's invention had a priority date in the UK of 9 October 1903.

John R. Oishei (1886-1968) formed the Tri-Continental Corporation in 1917. This company introduced the first windshield wiper, Rain Rubber, for the slotted, two-piece windshields found on many of the automobiles of the time. Today Trico Products is one of the world's leading manufacturers of windshield wiping systems, windshield wiper blades and refills, with wiper plants on five continents. Bosch has the world's biggest windscreen wiper factory in Tienen, Belgium, which produces 350,000 wiper blades every day. Inventor William M. Folberth applied for a patent for an automatic windscreen wiper apparatus in 1919, which was granted in 1922. It was the first automatic mechanism. Trico later settled a patent dispute with Folberth and purchased Folberth's Cleveland Company, the Folberth Auto Specialty Co. The new vacuum-powered system quickly became standard equipment on automobiles, and the vacuum principle was in use until about 1960. In the late 1950s, a feature common on modern vehicles first appeared, operating the wipers automatically for two or three passes when the windshield washer button was

pressed, making it unnecessary to manually turn the wipers on as well. Today, an electronic timer is used, but originally a small vacuum cylinder mechanically linked to a switch provided the delay as the vacuum leaked off.

3. PROBLEM IDENTIFICATION

The problem is mainly identified while travelling in irregular sandy roads and while travelling behind heavy duty vehicles. The wiper is not only use in rainy seasons, it was use to clean windshields for clear vision and to remove dust in dry climate. In normal washers, the washer nozzles in the bonnet will concentrate the water at one point only, so that the dust in one place was spread to so many places and also the dust will remain in the glass at the end of the wiper blade way. It leads to unclear vision and wants to clean the windshield by stopping the car and splitting the extra water. So our project solves these conflicts. In previous method wiper, the washer is separately fixed in bonnet. So that the water will concentrate at only one place. So, the dust particles remain at the end of the wiper limit. The materials are selected as normal wiper blade and arm. But the tube is selected as rubber and plastic joints are bought. These are assembled. First the tubes are inserted between the wiper blades by pasting the nozzles and joints at the required positions.

4. DESIGN AND FABRICATION

4.1 Components Used

- Water tank, Battery, Pump, Tubes, Bolts, Nuts, Joints, Wiper blades, Wiper arm.

4.2 Construction

Step: 1 the wiper blades are held together and drilled.

Step: 2 a bolt is inserted to the drilled hole and tightened by nut. Likewise another bolt and nut is fixed in already produced hole.

Step: 3 the wiper arm is fitted to a wiper blade lightly using any paste.

Step: 4 now, the tubes are prepared by fixing the tubes in between the wiper blades and both ends are fitted by nozzle, a T-joint is inserted in between the tubes and holes are drilled in bottom of the tubes by heating an iron rod.

Step: 5 then, the nozzles are fixed to the wiper bodies by any paste.

Step: 6 the main tube is fixed to the T-joint of the water tube.

Step: 7 a nozzle is fixed to the outer portion of the glass facing wiper blade body and tubes are connected to the main tube slightly.

4.3 Design Calculations

- $A = A_{\text{whole wiper set up}} - A_{\text{wiper arm}}$
- A whole wiper set up: $A = \pi * r1^2 / 4$; $A = 0.7854 * r2^2$; $r1 = 650\text{mm}$; $A = 331831.5\text{mm}^2$
- A wiper arm: $A = \pi * r2^2 / 4$; $A = 0.7854 * r2^2$; $r2 = 225\text{mm}$; $A = 39760.875\text{mm}^2$
- Area of the wiper: $A = 331831.5 - 39760.875 = 292070.625\text{mm}^2$.

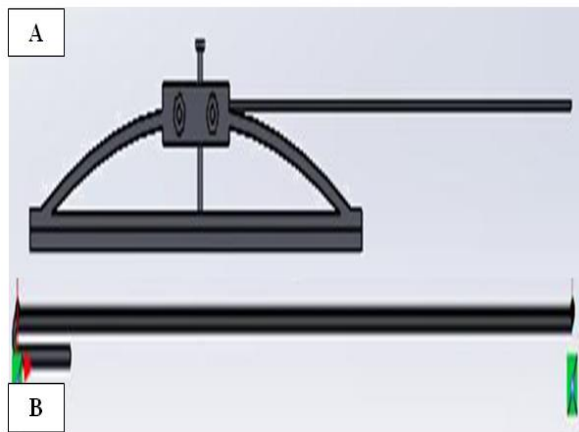


Figure 2 (A) Assembled front view of the proposed wiper (B) Front view of wiper arm

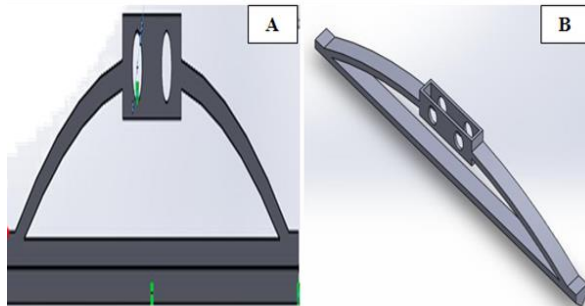


Figure 3 (A) Assembly view (B) Wiper blade

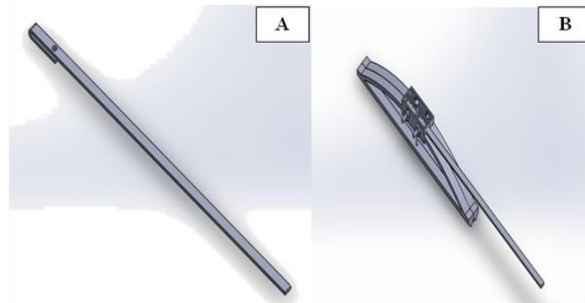


Figure 4 (A) Wiper arm (B) 3D view of the proposed wiper

5. WORKING

Wiper Motor, the power source of the wiper blade, is the core of the whole wiper system. Therefore, the quality of the wiper motor must be guaranteed to ensure its performance. The wiper motor is a permanent-magnet direct current (DC) one. It is equipped on the front windscreen glass with the mechanical parts of the worm gear. The worm gear functions to slow down and increase torque. Its output shafts spur four-bar linkage, by which the movement is changed from rotary to swinging. Three-brush structure is adopted to make speed change more convenient. The intermittent relay, by which the interval is controlled, utilizing the return of switch contacts and the charge-discharge function of the resistor-capacitor in the relay, drives the wiper to wipe in a certain cycle. The wiper blade tape, the tool to clean the rainwater and the filth on the glass, presses the surface of the glass with springs. Only when the tip of the blade is in a certain angle with the glass, can the required function be realized. Generally speaking, there is a wiper control knob, with stalls of low speed, high speed and intermission, on the handle of auto combination switch. The top of the handle is the key switch, after pressing which water will erupt to wiper blade, of the scrubber. The scrubber system, consisting of plastic water tank (1.5-2 litres), micro-electric centrifugal water pump, pipes, spray nozzles, is very ordinary equipment in automobiles. Water in the tank is supplied through the pump to 2-4 spray nozzles, by which it is extruded into trickles. Then the trickles are sprayed onto the windshield glass, to clean the glass with the wiper blade. The water in the water tank is pumped by a pump to the top and of the nozzles and holes.



Figure 5 Fabricated Advanced Wiper – Photographic Views



Figure 6 Fabricated Advanced Wiper (Front) – Photographic Views

6. RESULTS AND DISCUSSIONS

As stated in construction, the wiper arm was connected to one wiper blade only, so that while operating, the other wiper blade is pulled by the wiper arm fixed wiper blade, so that the wiper blade doesn't work properly even in the rainy seasons. For joining the two wiper blades, the wiper weight becomes so high and the force of the motor is not necessary to pull these blades. In rainy seasons, the motor power is not enough to overcome the rain water flowing on the windshield. The pump doesn't take water when the water is down in the washer water tank. The nozzles cannot weld to the wiper blades' body, because of the plastic material of the body. The tubes are not properly connected to the T-joint at the bottom, between the wiper blades. To overcome these obstacles, the two wiper blades also want to be connected with the wiper arm with an external link or arrangement. The motor used should be of high capacity. The whole wiper blade should be made of single metal by placing two rubbers at the ends and leaving gap between the rubbers for tube placement. The nozzles should be welded to the metal of the wiper arm and body of the wiper blades. They should be manufactured in that way. The pump used should be of high capacity pump.

7. CONCLUSIONS

The production is complicated with the design of component parts. But the project carried out by us made an impressive task in the field of mechanical department. The advanced wiper with washer is very useful in obtaining clear vision of the windshield and it is also very much useful for off-road driving vehicles.

REFERENCES

- [1] Three inventors patented windshield cleaning devices at around the same time in 1903; Mary Anderson, Robert Douglass, and John Apjohn.
- [2] In April 1911, a patent for windshield wipers was registered by Sloan & Lloyd Barnes, patent agents of Liverpool, England, for Gladstone Adams of Whitley Bay.
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- [4] Inventor William M. Folberth applied for a patent for an automatic windshield wiper apparatus in 1919, which was granted in 1922.