

Enhancement and improvement in service center through effective optimization tools for betterment of Automobile services.

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Abstract : Increasing number of vehicles have increased the demand for more number of service centers and with this the challenge to serve more number of vehicles has created the demand for more efficient workshops equipped with flexible equipment and tools which saves time and energy of worker ,saves space of workshops and investments of organization in tools and equipment. This paper aims to provide information about multipurpose equipment which have combined tools for headlight alignment, body surface continuity check and under chassis maintenance of car. This equipment has fabricated and installed in workshop. The experiment to analyze the time reduction has been carried out. The results of analysis show considerable reduction in time to carryout headlight alignment and under chassis maintenance of cars

INTRODUCTION

Problem definition-

1. High cost of headlight aimer.
2. High cost of light tunnel used for checking body surfaces after dent repairing and painting.
3. Time required for performing headlight alignment and checking body surfaces.
4. Lack of illumination while working below car.
5. Ease of working for a mechanic below car.

Solution for problems 1,2 and 3.-



Fig. 1.(a) Headlight aiming using wall

usually one in a service station.[9] Again in this case the problem of bringing the car to the light tunnel arises. To solve these problems combined equipment is made which performs the function of headlight aimer and light tunnel. This setup is compact, lightweight, cost effective and easy to handle. It has movable base, due to which it can be directly taken to the point where these operations are to be done, this eliminates the need to move the car from one point to another in a workshop.

The cost of headlight aimers is usually high and those require timely calibration and careful handling. To avoid these issues mostly service centres use a wall as a headlight aimer on which they mark the standard measurements of light beam of a particular car.[1],[2],[3] As shown in fig. 1 Due to this methodology the mechanic has to bring the car near to this marked wall every time the headlight alignment is to be done.[6]

Similarly the cost of light tunnel is very high and



Fig. 2. inspection in light tunnel



Fig.3. Below car maintenance

Solution to problems 4 and 5.

When the car is lifted using 2 or 4 post lift for below car maintenance, the illumination below the car is poor due to which the mechanic working below the car have to hold the torch in one hand to inspect the particular area and due to this he has only one hand free for working. As shown in Fig.3 This creates the problem for mechanic to work with only one hand, this reduces efficiency of mechanic and increases the working time. To solve this problem a equipment is made which has a source of bright illumination, it is lightweight, flexible and easy to use. It has a magnetic holder due to which it can be stuck on any post of lift. Using this illumination is achieved below car and worker has his both hands free to work.

METHODOLOGY

Headlight aimer and light tunnel equipment

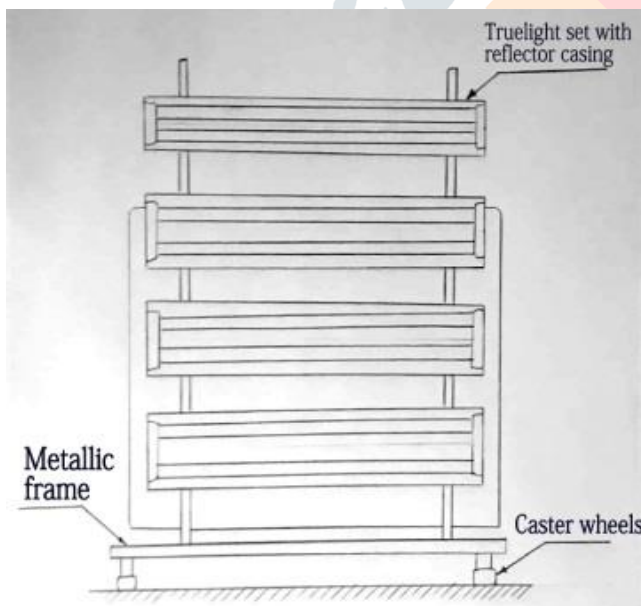


Fig.4. (a) Front view

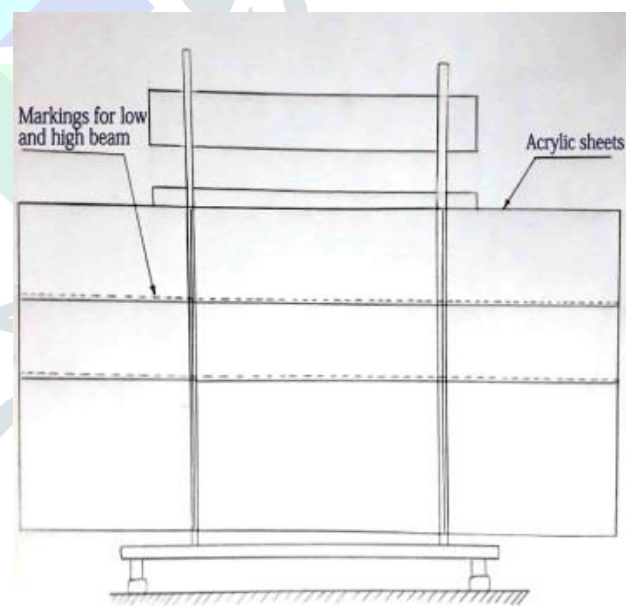
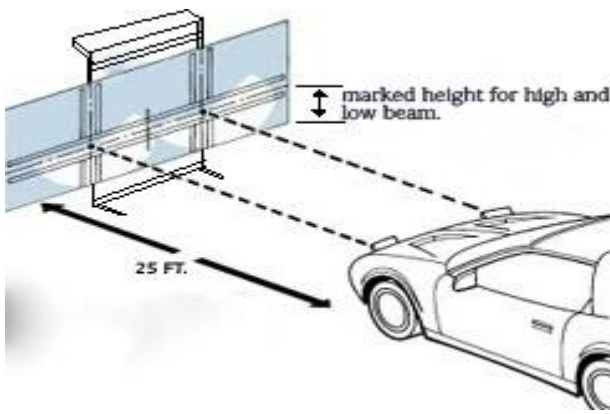


Fig.4.(b) Back view

As shown in fig. 4 (a),(b) and (c), the setup consists of metallic frame on which acrylic sheets have been hinged on one side and 4 sets of true lights with reflector casings have installed on other side. Acrylic sheets are used for headlight aiming. Standard markings for high beam and low beam for specific car has been done on the sheets. This setup has roller (caster wheels) base which provide ease to move entire setup directly to the point of use or at a place where car is in the workshop. Using this portable equipment, headlight aiming and surface finish check can be done directly at any place in workshop. The cost of this equipment is 12000 INR.



As shown in above figures, it is flexible and light weight equipment. It consists of an LED panel mounted on a telescopic rod and this rod is held in metallic holder at its end. This metallic holder consists of a magnet due to which this setup can be stuck on any metallic surface. This can be stuck on any of the 4 posts of the lift which will allow the mechanic to use his both hands. The telescopic rod enables extension and retraction of length. The LED panel can be turned axially and can be turned at any angle as required. The LED panel uses 40 watts AC. and entire setup weighs

500gms approximate. The cost of this equipment is 700 INR.

Fig 4. (c) Headlight aiming equipment

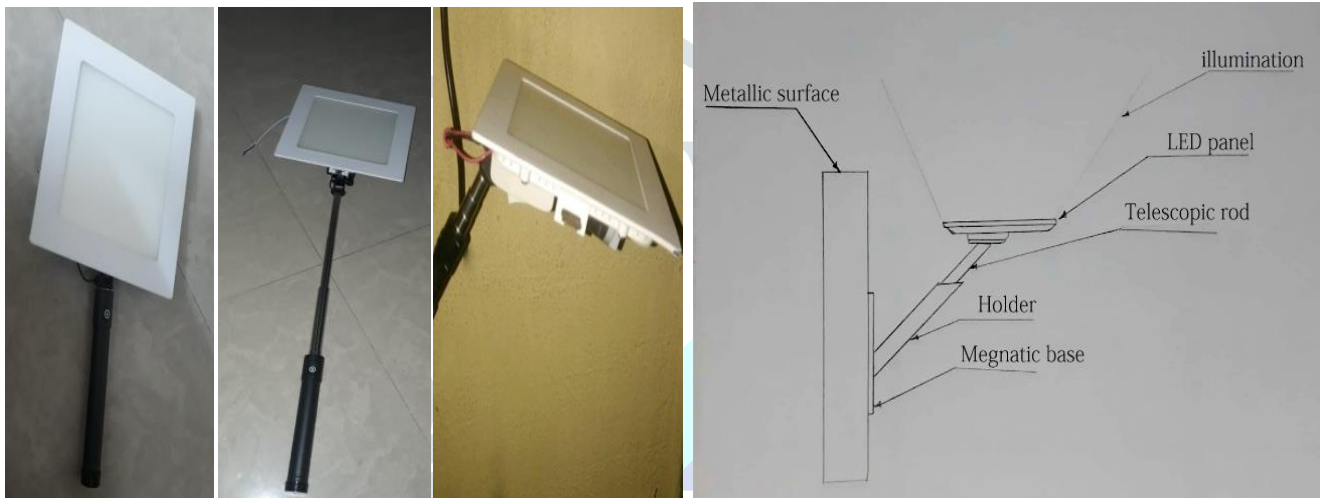


Fig. 5(a)

Fig 5(b)

Fig 5(c)

Fig. (d) Terminology of equipment

RESULTS

Headlight aiming:

Time taken to bring car near marked wall-3.2 minutes

Time taken to bring setup near the car -25 seconds

Approximately 1050 cars visit the workshop every month for routine service (headlight aiming is always done in routine service), therefore $2.95 \times 1050 = 3097.5$ working minutes per month is saved.

Body surface inspection:

Time taken to bring the car in light tunnel-4.4 minutes

Time taken to bring the setup near the car-32 seconds

Approximately 90 cars visit the workshop every month for body work, therefore $4.08 \times 90 = 367.2$ working minutes per month is saved.

Under car inspection:

Time taken to inspect using torch-1.15 minutes

Time taken to inspect using provided equipment-40 seconds

Approximately 1050 cars visit the workshop every month for routine service, therefore $0.75 \times 1050 = 787.5$ working minutes per month is saved.



Fig. 5. (a) Illumination using torch



Fig. 5. (b) Illumination using provided equipment

Improvement in illumination before and after use of equipment is shown in Fig 5(a) and 5(b).

CONCLUSION:

Using this equipment the ease of performing headlight alignment, body surface continuity check and below car maintenance is increased and according to results of experiment it has been proved that using this equipment considerable amount of time for completion of operations, labor efforts and investment in equipment can be saved.

FUTURE SCOPE:

If this equipment produced on mass scale, the cost can be even lowered and Weight of these equipment can be even lowered by use of newly developed lightweight materials like aluminium alloys and polycarbonate plastic.

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