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An Experiment on Manufacturing of Automobile Body Straightening Equipment

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Abstract: *The Auto Body Straightening Equipment responsible not only for the removing dents and straightening of auto body from front and rear side. it also uses to remove the dents of vehicle at all type of the commercial vehicle and light duty vehicle. In this project we are designing the straightening equipment which will be used in multi-direction. The mechanical force dent is remove successful.*

A frame straightening Equipment consists of a platform large enough to hold a car, SUV or pickup truck, and two or three upright posts or towers that can be rotated 360-degrees and moved along the platform perimeter to work on different areas of a vehicle frame.

The most up to date machines use computerized line-of-sight lasers or sonic senders to assess a cars frame and diagnose how much damage it has sustained.

These diagnostics are used to determine whether the vehicle is repairable, and to provide an estimate of how long the repair should take, which is necessary to calculate the cost. This on-board measuring equipment is also used to ensure that a repair is performed accurately.

In todays auto market, there are no any equipment is available for straightening of all types of Light Motor Vehicle (LMV) in manner of height, width and length. Our problem statement is focused on manufacturing of multipurpose vehicle frame straightening equipment which exerts forces on front and rear side.

With this it will also add straightening from top side. This will be addition of available Equipments This equipment will be used for auto body straightening machine. The body or frame of any auto body which was damaged or has to repair in any collision is needed to straighten to maintain its performance and stability. This equipment will help to service station work for easy and adjustable straightening work.

I. INTRODUCTION

Frame straightening is exactly as it sounds. A trained collision repair specialist uses a specialized Equipment to return your vehicle's frame back to normal. The Equipment itself uses specialized lasers programmed to manufacturer specifics. These lasers measure the damage and tell the Equipment how to bend and stretch a damaged frame back to pre-accident condition. Accidents are an unexpected and stressful time.

Here at Complete Automotive, we remove some of the stress with a one-stop collision repair shop that repairs your vehicle to manufacturer specifications. As part of this repair, frame straightening ensures the main structure of your vehicle—the frame—is in perfect alignment.

As one of the most thrust in the collision repair we understand the important fast repair. It's important to work with a certified frame straightening shop when your vehicle is in an accident. This will ensure your vehicle's frame is returned to the proper factory specifications.

Manufacturer certified collision shops are reviewed by those manufacturers to have the knowledge, equipment, and skill to properly repair their vehicles. is professional manufacturer of auto body repair equipment's fully devoted ourselves to creating advanced technical, top quality products.

Company enjoy great honor from customers around the world has professional technician design team, high-precision production equipments, perfect production lines, good after-sale services, nice quality products with does not emit light-waves directly, instead of using a reflector to produce footage in color.

II. METHODOLOGY

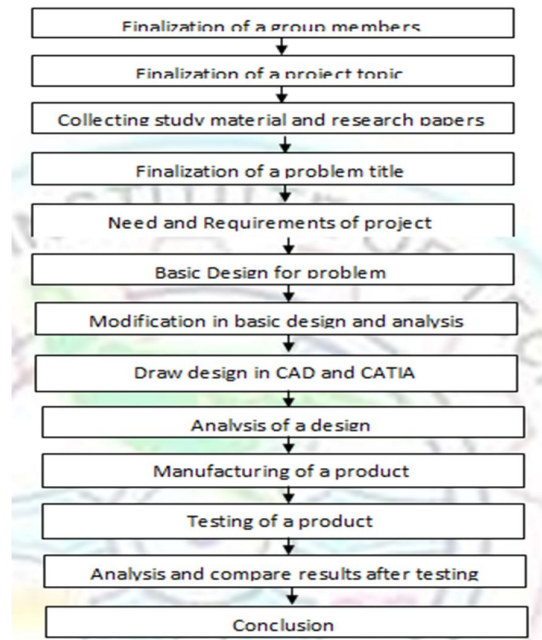


Figure no 1-Methodology

III. PROPOSED SYSTEM

This processed system based on a vehicle dent. The technical person determine the dent on the vehicle and its depth thickness according to that technical person put the Auto body straightening equipment at that place and then according to conviniyans the wire rope or simple rope is attach the car body. Example washer washer welder, dent puller or with the help og glue and clamps according to convenient the technical person attach the rope to the car body. After that start the motor run the motor step by step and remove the dent, run the motor according to technical person or experiences persons guide line and remove the dent step by step. For example when the car dent depth of 12 mm when we run the motor step by step and remove the dent suppose when motor run and remove the dent 4mm then motor run step by step and remove the dent of 12mm.

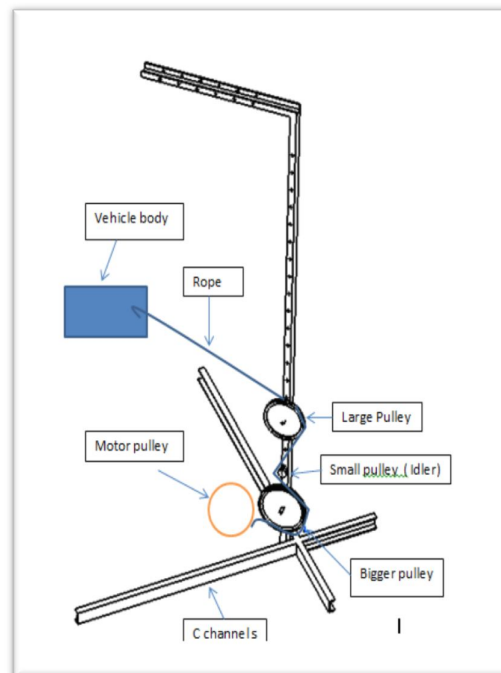


Figure No 2-Diagram of a project

IV. HARDWARE

A. C-Channel

The structural channel, also known as a C-channel or Parallel Flange Channel (PFC), is a type of (usually structural steel), used primarily in building construction and civil engineering. Its cross section consists of a wide "web", usually but not always oriented vertically, and two "flanges" at the top and bottom of the web, only sticking out on one side of the web. It is distinguished from I-beam or H-beam or W-beam type steel cross sections in that those have flanges on both sides of the web.



Figure no 3-C-Channel

Designation	Mass M	Sectional Area, a	Dimensions							Sectional Properties						
			D	B	t	T	Flange Slope, α	R ₁	R ₂	C _y	I _y	I _x	r _x	r _y	Z _x	Z _y
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Medium Weight Channels																
MC 75	7.14	9.10	75	40	4.8	7.5	96	8.5	2.4	1.32	78.5	12.9	2.94	1.19	20.9	4.81

Figure no 4- Specification of C-Chanel

B. Shaft

A shaft is a rotating machine element which is used to transmit power from one place to another. The power is delivered to the shaft by some tangential force and the resultant torque (or twisting moment) set up within the shaft permits the power to be transferred to various machines linked up to the shaft. In order to transfer the power from one shaft to another, the various members such as pulleys, gears etc., are mounted on it. These members along with the forces exerted upon them causes the shaft to bending. In other words, we may say that a shaft is used for the transmission of torque and bending moment. The various members are mounted on the shaft by means of keys or splines.

Following properties shafts :

- 1) It should have high strength.
- 2) It should have good machinability.
- 3) It should have low notch sensitivity factor.
- 4) It should have good heat treatment properties.
- 5) It should have high wear resistant properties.

C. Pulley

What effect does pulley diameter have on efficiency? A larger diameter pulley wheel is slightly more efficient than a smaller diameter pulley. But, a larger pulley has increased bulk, weight more and cost. For example, in a 1:1 haul, you gain about 7% efficiency going from a 1.5" pulley to a 3.75" pulley. How does pulley size affect torque? It is more useful to say that torque is proportional to the ratio of the radii of pair of pulley. Also RPM is reduced or increased in the same ratio so a small diameter gear driving a larger one increases torque but reduces RPM at the output shaft. How do pulleys reduce rpm? Calculate the circumference of each pulley by multiplying the diameter by 3.14. Add half of the diameter of each pulley to twice the shaft-center-to-shaft-center distance. Get the next larger standard size of belt. Install the belt on the pulleys and move the units apart until the belt has a slack of about 1/2 inch

D. Large Pulley



Fig No 5: Large pulley

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave.

E. Small Pulley



Fig No 6: Small Pulley

If a smaller pulley turns a larger one, the larger one will turn slower, but with more power available at the shaft. If a bigger pulley turns a smaller one, the smaller one will turn much faster than the bigger one but with less power available at the shaft. How does pulley size affect speed? By changing the diameter of the pulley wheels, speed can be changed. A smaller pulley turning a larger pulley results in the larger one moving more slowly but with more shaft power.

F. Idler Pulley



Fig No 7: Idler pulley

Idler pulleys are used to take up slack, change the direction of transmission, or provide clutching action. Idler pulleys are rollers that do not produce any mechanical advantage, nor transmit power to a shaft. Idler pulleys are used to lead a chain around a bend or to take up slack in a drive chain.

What is an idler pulley used for? Idler pulleys are engine pulleys that are responsible for guiding and tensioning the engine drive belts. The idler pulley is meant to provide another smoothly rotating point for the engine belt to loop around, so that the desired routing can be achieved.

G. Wire Rope



Fig No 8: Wire rope

Wire rope is several strands of metal wire twisted into a helix forming a composite "rope", in a pattern known as "laid rope". Larger diameter wire rope consists of multiple strands of such laid rope in a pattern known as "cable laid".

H. Starter Motor

Automobile self starter also known as starter motor or simply starter is an electric motor initiates rotational motion in an internal combustion engine before it can power itself.. One of the important feature of these electric motors is a soft on/off electronic switch for easy operation. Automobile self starter or starter motor are known for flawless performance and high durability. These parts find application in trucks, tractors, cars, bikes and ATV of all models and makes. These starter motors are equipped with various high quality components made by renowned companies. These motors are highly dependable and economically priced. These are motors are capable to suit various application



Figure no 9- Starter motor



Figure no 10-Actual model

V. EQUIPMENTS OR TOOL REQUIRED

After design we listed out the equipment's . The following equipment is used

- A. Tool box.
- B. Open ended Spanner (16no.)
- C. Piler
- D. Lathe machine
- E. Cutting tool
- F. Drilling machine (To Drill The plates of diameter 16mm)
- G. Chopsaw Cutter (Model : P200)
- H. Hand Grinder (Model :H135)
- I. Hacksaw
- J. Cutting machine
- K. Welding Machine (Arc Welding, Magnesium Rods)
- L. Punch
- M. Hammer
- N. File
- O. Bench vice
- P. Vernier
- Q. Measuring tape.



VI. ADVANTAGES & DISADVANTAGES

A. *Advantages*

- 1) Its help to remove the dents easily.
- 2) It should be reduce efforts.
- 3) As one of the most thrust in the collision repair we understand the important fast repair
- 4) It's should be reduce time.

B. *Disadvantages*

- 1) When auto body is more damage than more force is required and very difficult to straitening of an auto body.

VII. FEATURE SCOPE

- A. We can use the sensor further in this project for precise work.
- B. We can run the motor in this project with programing in the future.
- C. We can use the servo motor for more accuracy of the equipment.

VIII. CONCLUSION

- A. After completion of this project we successful to achieve following points
- B. Successful to develop a automobile body straghyteating equipment for samll small and large scale
- C. This equipment is easy to dismantle and easy to carry.
- D. This equipment fabricated within minimum cost.
- E. The equipment has been used to remove dent easily.
- F. This equipment will help to service station work for easy and adjustable straightening work .
- G. In todays auto market, there are no any equipment is available for straightening of all types of Light Motor Vehicle (LMV) in manner of height, width and length.

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