

## DESIGN OF AIRBAG ASSEMBLY FOR TWO WHEELER

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### Abstract

DESIGN OF AIRBAG ASSEMBLY FOR TWO WHEELER is an idea put forward with the safety concern for two wheeler rider. This concern has brought this project into existence. As per the statistic in 2022,462 deaths per day were recorded as death fatalities on road (7). This makes a rational mind to think what can be done for it. Then came the idea of airbag. Earlier airbag where used in four wheelers. But now exhaustive research is being made for two wheelers as well.

This research paper is one of the ways to eradicate accidents by designing an airbag system. Airbag is designed in such a manner that it can be used by any two wheeler rider. This design is considered because it is simple and easy to understand and use. It includes design of various parts, design of the assembly and calculations of various parts. It includes it's working, installation and construction as well.

*Keyword: PS=proximate sensor, CS=crash sensor, EGC=elastic gas cylinder, ECU=electronic control unit*

### I. Introduction

The increasing road accident makes this research paper worthy of attention. This airbag assembly consists of a cylinder, 6 proximate sensors, 6 crash sensors, a buzzer, an air bag belt and connecting wire. This connecting wire is fitted such that it wraps the whole vehicle from all angles. The cylinder attach helps to bulge the airbag by filling the nitrogen or sodium azide gas which it contains, in the airbag. The proximate sensor which senses the vehicle around the testing vehicle further leads to buzz the buzzer. There are a crash sensor which senses the crash from the other vehicle. The cylinder is attached to the left side of the vehicle so that the rider and the subordinator can sit comfortably.

As per the research there are almost 1.68 lakhs road deaths in 2022. It is the real cause of this research paper to come into existence. It clearly emphasis that this airbag is quit important form the safety point of the two wheeler riders.

Vibrations are the reason for the cylinder to inject the nitrogen gas into the airbag.

### II. Design of parts

Design of airbag assembly consists of following part:

- Airbag belt
- Airbag
- Proximity sensor
- Crash sensor
- Elastic gas cylinder
- Cylinder jacket

- Electronic control unit
- Connecting wire
- Buzzer

a. Airbag belt:

Airbag belt consists of leather as a material and it is winded around the body. The length of air bag belt is 9cm and its width is 4cm (5).

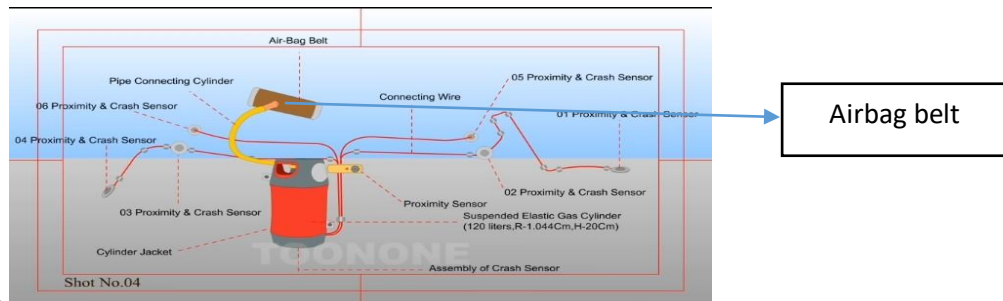


Fig. 1

b. Airbag:

Airbag is made up of nylon and it has the bulging capacity. The nitrogen gas when enter the airbag at certain pressure it bulges. This bulge in airbag protects the person from getting injured when met with an accident.

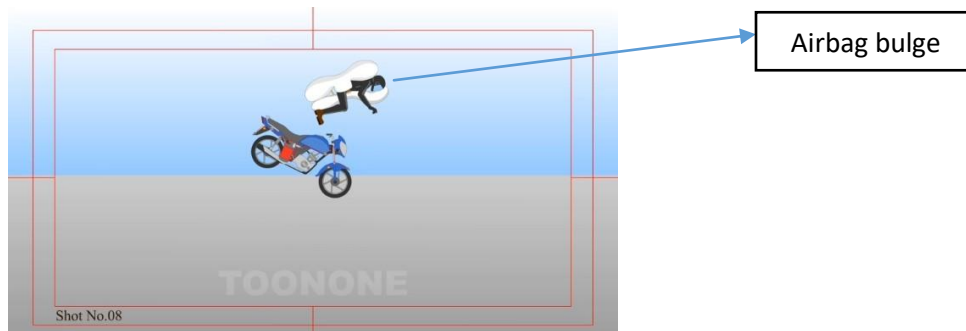


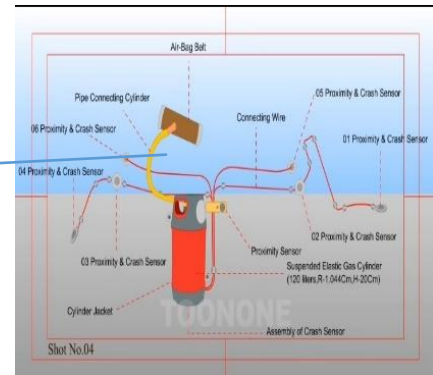
Fig. 2

- c. Proximity sensor:  
6 PS are placed on the 6 sides of the vehicle. These PS senses the distant object and the buzzer buzzes. Each PS when senses vehicle buzzer buzzes (5)

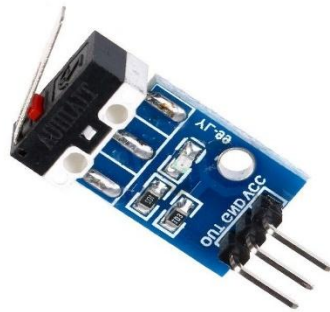
Proximity sensor (8)

Proximity sensor on  
airbag assembly

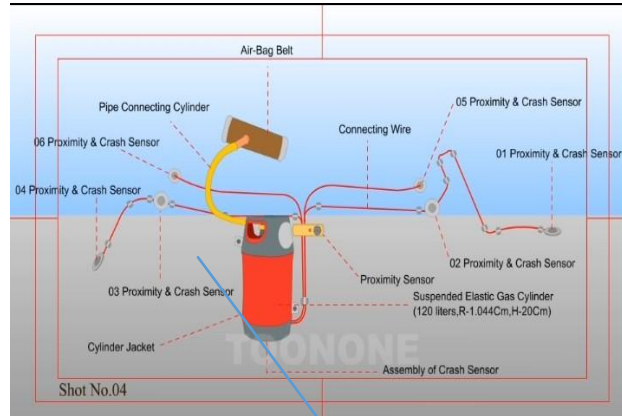
Fig. 3



- d. Crash sensor:  
6 CS are placed on the 6 sides of vehicle. The CS will get activated when a vehicle dash on the vehicle under observation that's vehicle which have airbag belt assembly (5).



Crash sensor



Crash sensor in airbag belt assembly

Fig. 4

e. Elastic cylinder:

Airbag belt assembly consists of elastic cylinder. This elastic cylinder is filled with the nitrogen gas. It has a nob which open when there is impact on the cylinder from bottom surface. Once this nob is opened nitrogen gas rushes into the airbag and as a result airbag bulges. This elastic cylinder is of following dimensions:

Radius: 2cm

Height: 10 cm

Volume:  $\pi r^2 h = \pi * 2^2 * 10 = 125.66 \text{cm}^3$

Pressure which cylinder exerts is calculated as follows:

$PV = nRT$

$p * 125.66 = 1 * 287 * 20$

$P = 45.67 \text{ bar}$

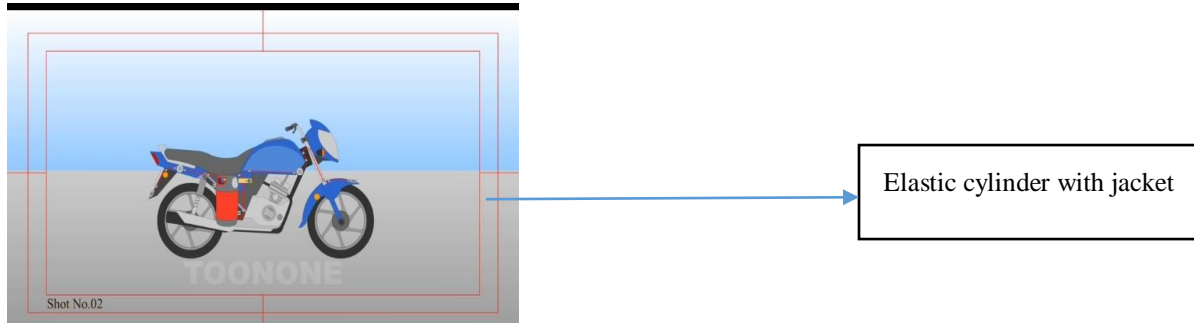


Fig. 5

f. Elastic cylinder jacket:

The elastic cylinder jacket is the outward part of the elastic cylinder. It is covering of it so that gas won't leak out at the small impact or jerk to the cylinder.

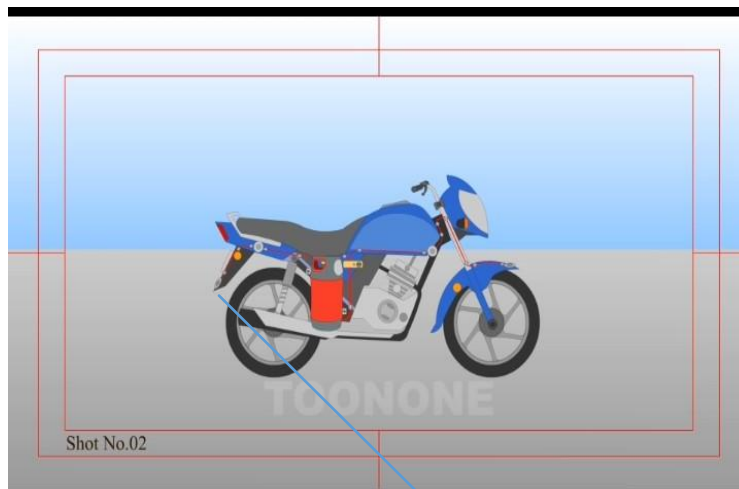


Fig. 6

Cylinder

g. Electronic control unit:

It is a device which controls all the sensors mounted on the vehicle under observation.

h. Connecting wires:

These are the wires which connect the crash sensors, proximity sensors, and electronic control unit along with cylinder.

i. Buzzer: Buzzer is used to buzz when proximity sensor sends the signal of any vehicle coming near to vehicle under observation.

III. Assembly:

It consists of CS, PS, elastic cylinder, elastic jacket, connecting wires, electronic control unit, airbag, airbag belt and a buzzer.

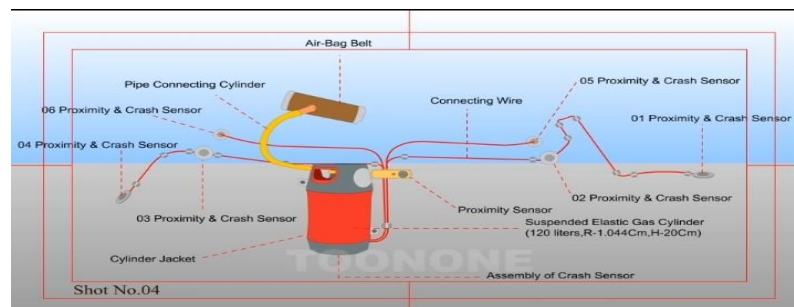


Fig. 7

IV. Working of airbag belt assembly:

Working of airbag belt assembly in this research paper helps us to understand the alternate way in which airbag can be bulge. Here in order to bulge an airbag inflator is not used. The airbag bulges because of elastic cylinder. As there is impact on the crash sensor, the up thrust is given to the bottom surface of the elastic cylinder due to this gas inside the cylinder raises and rushes towards the airbag through the hose pipe. The airbag bulges and the rider is protected from major accident. The working is quite simple. The nitrogen gas inside the cylinder is delivered to airbag with the help of hose pipe. The rider wearing belt will be shielded and on accident will not be accustomed to any injury. This airbag belt assembly also consists of

the proximity sensor which senses the other vehicle and sends signal to the buzzer. The buzzer buzzes and the rider is protected from any further impact.

V. Result:

Therefore, airbag for two wheelers can be designed. And it can be used practically. Here, the concept is pressure exerted and vibration caused lead to movement of elastic cylinder. This movement of cylinder in upward direction makes the air to flow and bulge the airbag. The airbag ultimately bulges on the impact of other vehicle on the observed vehicle and the rider is saved from getting injured.

VI. Conclusion:

Finally, a research paper is concluded on airbag for two wheelers. It proves that airbag can be designed for two wheelers. This airbag assembly which has been researched in this paper is the outward covering to the vehicle no changes in the original vehicle is done to circumscribed this vehicle assembly to the vehicle. The airbag belt which is tied to the waist of the rider is made up of leather and is comfortably fit to the rider waist. The elastic cylinder which on impact to crash sensor moves up because of upward force acting on it. This upward movement in elastic cylinder helps in the protrusion of the airbag. Hence, airbag assembly for two wheelers is designed and all the requirements for the design of the airbag were met. Further modifications can be done to this research paper when the design will be dealt in practicality.

VII. References:

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