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DESIGN OF SEAT BELT BUCKLE ASSEMBLY IN AUTOMOBILE

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Abstract

This design application relates generally to the field of vehicle occupant restraint systems precisely to release seat belts in response to a remote actuator. Such type of design enables the user easily to release the seat belts at the time emergency exit.

Keywords: Seat belt, Emergency release.

Introduction

A safety belt, at times called a seat strap, is a wellbeing bridle intended to make sure about the tenant of a vehicle against unsafe development that may result from an impact or an abrupt stop. We have used here the following components. Pin: Pin is coupled to manually operated dial. During manual operation of the buckle the rotation of the dial is transmitted to the lever.

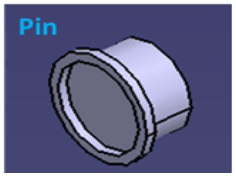

Figure 1

Dial: A physically operable dial associated with the switch so when the dial is turned the switch pivots to withdraw every one of the hook pins from the relating with the objective that all of the tongues is unmated from the catch. Manual operation of the buckle, a user rotates the manually operable dial. As the user rotates the dial, the lever rotates .A manually operable dial is placed on the buckle. The rotating lever may extend from the inner portions of the buckle to the dial. The lever is coupled to the dial.

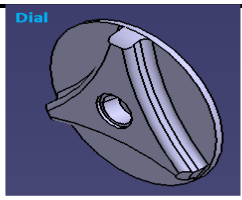

Figure 2

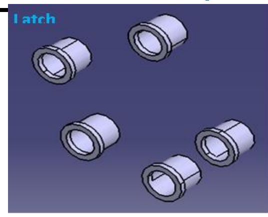

Figure 3

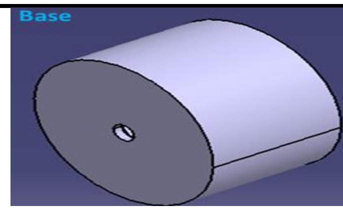

Figure 4

Figure-1: Pin. **Figure-2:** Dial **Figure-3** Latch **Figure-4:** Base

Base: The biasing mechanism is supported by the base. The rotating dial placed over the base. The pin engaged the base and rotating dial. A dial is mounted on a base. The dial includes a gripping portion to facilitate manual operation. The base supports the manually operable dial and a cover supports the base.

Latch pins: Latch pin is also configured to engage the latch base the latch base includes a plurality of openings. The latch pins are dimensioned to fit inside of the openings. A biasing part is dimensioned to encompass the opening and the switch is dimensioned to slid capably embed into the opening. Each hook pin is arranged to draw in a tongue to secure the tongue a drew in situation with the clasp. The latch pins engage the cover when the tongues are in a "lock" position and disengage from the cover when the tongues release from the buckle. The biasing part might be a spring.

Biasing member: Biasing member preferably a coil spring. According to another embodiment there may be more or less than five latch pins and more or less than five biasing member. The biasing members are configured to bias the latch pins. Latch pins are configured to engage the latch plate. When latch plate exerts a force on the latch pins the biasing member bias the latch pins causing the latch pins to move in a vertical direction. The vertical bearing might be up or down contingent upon whether the biasing individuals are packed or decompressed.

Latch plate: The biasing member is supported by the latch plate and surrounds a portion of the lever. The latch base supports the latch plate. The latch plate includes openings. When the latch pins engage the latch base, the latch pins slid ably insert into the Openings of the latch plate.

Figure 5

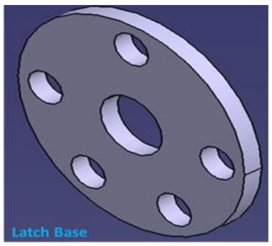

Figure 6

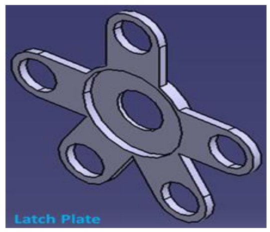

Figure 7

Figure-5: Biasing member, **Figure-6:** Latch Base, **Figure-7:** Latch Plate

Latch Base: Latch pin is also configured to engage the latch base. Latch base consist of five plurality of opening. Latch base supports the latch plate the latch plate includes openings. When the latch pins engage the latch base the latch pins slid ably insert into the opening of the latch plate.

Rotating Lever: Rotational solenoid is coupled to the rotational lever and the lever is coupled to a pin. When the core of the solenoid rotates, the lever also rotates

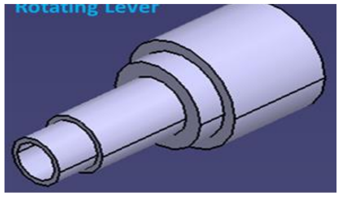

Figure 8 : Rotating Lever

Latch: Latch includes a biasing member. Latch has move through the base. , there are four latch and four biasing members and each latch includes a biasing member. The biasing part is ideally a loop spring. There may be more or less than four latches and more or less than four biasing members. At the point when the tongues are Positioned in the openings, the locks of the biasing component apply a power on the biasing individuals. The force exerted by the latches biases the biasing members of the biasing mechanism. The biasing members are compressed. At the point when the biasing individuals are compacted, the hook pin draws in the openings, in this way placing the tongues in a "lock" position. When the biasing members of the biasing mechanism are decompressed, the latch pins 9 are disengaged from the openings, thereby enabling the tongues to release from the buckle.

Cover: The cover has been used to support the lath at the top side and rotational solenoid at bottom side. The core extended up to cover the core is located inside the rotational solenoid.

Rotational Solenoid: The rotational solenoid may include a core. When an electric current is sent to the core, the core rotates. The core includes a stator. The core 33 and stator are integrally shown. The core and stator are configured as separate parts.

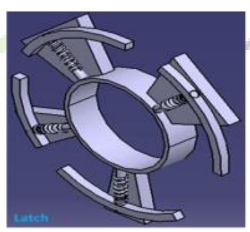

Figure 8 Figure 9

Figure-8: Rotational solenoid. **Figure-9:** Latch

A coil may be mounted on the core for establishing a magnetic field

Tongue: A extension may be round, square or formed of a line of a plurality of buttons dimensioned and arranged to apply pressure to the webbing passing through the tongue also, oppose sliding of the tongue on the webbing. One finish of the webbing is fixed to the retractor. When the seatbelt is unfastened, the webbing is re-wound onto the retractor and the tongue is pulled away from the buckle. Where in the extent of sliding of the tongue on the webbing is limited by one or more protrusions provided on the inside of the aperture in the tongue. The distension is dimensioned and masterminded to apply strain to the webbing going through the tongue to oppose a sliding development of the tongue on the webbing.

Pins: Pin is coupled to rotational solenoid to the base. These pins consist of five members it is also called solenoid pins.

Spring Design Calculations

Shear Stress

$$\tau = \frac{Ks\ 8\ PD}{\pi\ d}$$

WAHL Stress Factor

$$KS = \frac{4C-1}{4C-4} - \frac{0.615}{C}$$

Spring Index

$C = D/d$

$C = 10/1$

$C = 10$

$$KS = \frac{4 * 10 - 1}{4 * 10 - 4} - \frac{0.615}{10}$$

$KS = 1 .1445$

3 Force acting on each coil $P = \frac{15}{12}$

$P = 1.25$ N

$$\tau = \frac{1.1445 * 8 * 1.25 * 10}{\pi * 13}$$

$\tau = 36.43$ N/mm2

Number of active coils

$n = 11$

Deflection of the spring

$$y = \frac{8 P D3n}{Gd4}$$

$$y = 5.44 \text{ mm}$$

Spring Rate or Stiffness:

$$q = \frac{Gd4}{8D3n}$$

$$q = \frac{2 * 105 * 14}{8 * 103 * 9}$$

$$q = 2.777 \text{ N/mm2}$$

Natural frequency:

$$f = \frac{(q/m)^{1/2}}{2}$$

$$f = \frac{(2.777/0.011)^{1/2}}{2}$$

f = 7.944 Hz

Total Coils

n = 9

Free Length : Lf = pn + d

Lf = 2 * 9 + 1

Lf = 19 mm

SOLID HEIGHT Ls

$LS = dn+d$

$LS = 1*9+1$

$LS = 10$

ANGULAR VELOCITY

$\omega = 2*\pi*f$

$\omega = 2 * \pi * 7.944$

$\omega = 49.916$ rad/sec

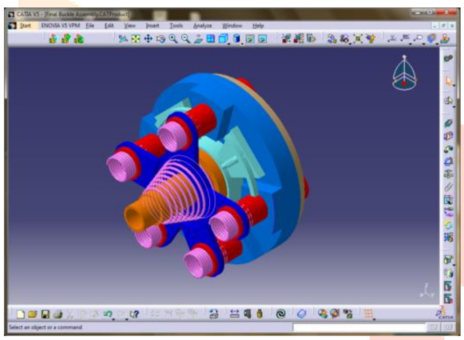

Figure-10: Assembled Model of Seat Belt Buckle

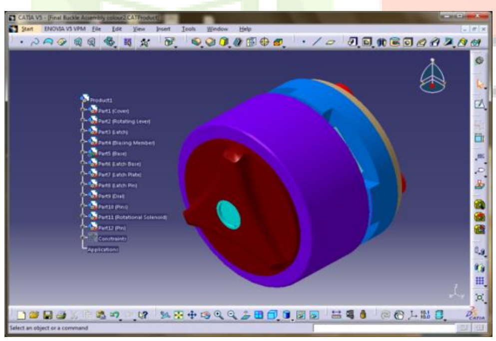

Figure-11: Fully Assembled Model Of Seat Belt Buckle

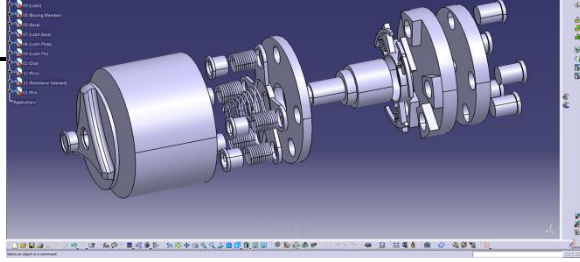

Figure-12: Developed 3d Model (Exploded View)

ADVANTAGES

Seatbelts should be capable of quick release type at the time of emergency exit situation. No usage of any natural fuels.

Wearing safety belts should prompt decreased danger of death and injury in vehicle crashes.

Secure the vehicle occupant to a seat during acceleration and deceleration.

APPLICATIONS

Automobile

Aerospace

Trains tec.,

CONCLUSION

This is to conclude that the Remote Actuated Seat Belt Buckle Assemble for the purpose of quick release at the time of emergency exit situation such as sudden stop, collision, rapid change of altitude, fire etc.

Customary saddle belts for vehicle require an inhabitant to physically deliver a lock to liberate the tenant from the outfit belt.

This developed Remote Actuated Seat Belt Buckle 3D models used in automobiles, especially in racing vehicle, trains, airplanes, motor coach buses, etc.

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