
ERGONOMIC SAFETY DRAWER FOR CARS

Prof. N.B. Chaudhari*¹, Harsh Shah*², Kartish Oswal*³, Soham Bhagwat*⁴,

Aditya Bhavsar*⁵

*¹Professor, Department Of Mechanical Engineering, MIT Polytechnic, Pune, Maharashtra, India

*^{2,3,4,5}Student, Department Of Mechanical Engineering, MIT Polytechnic, Pune, Maharashtra, India,

DOI : <https://www.doi.org/10.56726/IRJMETS38779>

ABSTRACT

Extra storage under the car front seat is a practical and innovative solution for those who need to optimize their car space. Car manufacturers have been implementing this feature in new models, and aftermarket options are also available for older vehicles. The under-seat storage allows drivers to store and organize their belongings in a space that is otherwise unused, providing additional convenience and functionality to the car. In conclusion, under-seat storage is a practical and innovative solution for those who need to optimize their car space. The compartment provides additional convenience and functionality to the car, it is equipped with a safety lock, it is light weight, allowing drivers to store and organize their belongings in a space that is otherwise unused. The versatility and accessibility of the compartment make it useful for a variety of situations, and its cost-effectiveness and ease of installation make it an attractive option for drivers who want to add storage space to their car. While there are some limitations to under-seat storage, it remains a useful solution for those who want to keep their car interior neat, organized, and functional.

Keywords: Extra Storage, Optimize Space, Easy Accessibility, Safety Lock, Light Weight.

I. INTRODUCTION

An ergonomic safety drawer for cars is a detachable compartment in the form of a drawer that is used to store basic items in the car right under the front passenger seat. It is equipped with a safety feature, a locking feature that can be operated electronically and can be locked and opened using a chosen password, no one but the owner of the vehicle can open and close this drawer. This feature enhances the applications of the ergonomic safety drawer by a lot, allowing one to store not only basic use items, but also personal documents, identity cards, wallets and other documents like car registration papers, RC book and documents that are needed on a daily basis. When travelling with a family, this drawer can be used to store health care items, food, medicines, clothes, and a lot more. The most vital details in this text are that the drawer below the front passenger seat is leak proof and detachable, mounted using multiple nuts and bolts for rigidity and sustainability, and equipped with an easy-to-use mechanism that allows the drawer to slide on one or multiple guideways. Ergonomics plays an especially important role in designing of this product as its purpose is to increase the safety, comfort and performance of a product or an environment, such as an office. Ergonomics uses anthropometrical data to determine the optimum size, shape, and form of a product, and make it easier for people to use. Ergonomics can help to identify which user characteristics you should consider during the design process, such as body size, body shape, strength, mobility, sensory sensitivity, mental ability, experience, training, culture, and emotions.

II. METHODOLOGY

1. Define the Purpose: This feature enhances the applications of the ergonomic safety drawer by a lot, allowing one to store not only basic use items, but also personal documents, identity cards, wallets and other documents like car registration papers, RC book and documents that are needed on a daily basis. When travelling with a family, this drawer can be used to store health care items, food, medicines, clothes, and a lot more.

2. Measure the Space: The dimensions were used in millimetres and were measured using a measuring tape. multiple vehicles were used for gathering and average dimension that could be put to use in making of this product. Direct measurement method was used to obtain the required dimensions.

3. Identify the Materials: Select appropriate materials for the locking drawer, such as metal or plastic, depending on the level of security you require. ISO certified Raw material was bough and used to construct this product. We used CR sheets as the main base metal to construct both thee the outer casing and the main

inner storage box. Materials like stainless steel and plastic were also used in components like sliding rails and wheels or knob.

4. Determine the Locking Mechanism: Multi dial locks are used, these are one of the simplest types of combination locks, usually seen in low security bicycle locks or in briefcases, uses multiple rotating discs that are cut into them. The lock is secured using a certain pin with numerous teeth on it that hook into the rotating discs. When the notches in the discs align with the teeth on the pin, the lock can be unlocked.

5. Draft the Design: To design the complete model after gathering all the needed information and the dimensions the software that was used to put to use is AutoCAD. In AutoCAD we designed a 2D and a 3D view of the main components of our project and then put together all the components in AutoCAD itself and ended up creating an accurate 3D model of our product.

III. MODELING AND ANALYSIS

1) DESIGN

The compartment under the front passenger seat of the car will be enabled to slide on two rails that will be screwed with the inner storage box and will allow the inner storage box to slide on the two machine guideways. These machine guideways will be fixed with the outer box using another set of screws.

Drawer slides usually have a mechanism that helps to keep the drawer from accidentally being pulled fully from its enclosure.

With the simplest kinds of mounting, the drawer cannot be pulled out sufficiently to see the full interior, without pulling the drawer fully out of the space it is fitted into, usually leading to the contents being dumped out of the drawer onto the ground. There are at least two ways to make the full interior of a drawer visible, while still being completely supported by the supports. One way places the back side of the drawer such that it is completely visible when the drawer hits the stop, the interior of such a drawer is a lot shorter than the sides of the drawer. Another method utilizes the complete extension drawers, which have complete extension drawer slides, also known as telescoping slides, compound slides that help the drawer when the drawer is pulled completely out of the place it is fixed in.

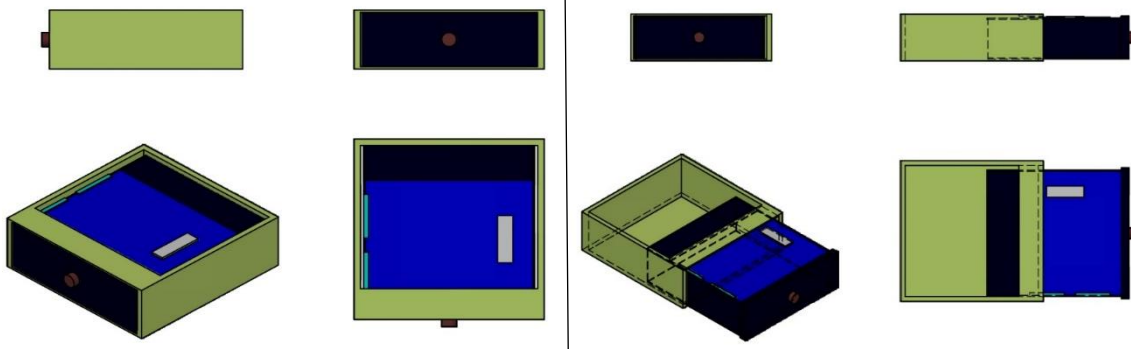


Fig. 1: AutoCAD 3D view of the product (closed)

Fig. 2: AutoCAD 3D view of the product (opened)



Fig. 3: 3D view of the final product
 (inner main storage box)



Fig. 4: 3D view of the final product
 (with the outer cover box mounted under a car seat)

2) Raw Materials used

- 1) Cold Rolled Sheets- They offer a vast variety of amazing properties, including a smooth clean surface and easy formability, these are used in vehicles, furniture, appliances, and many other regular usage items. CR Sheets are available from .30 mm to 3.00 mm thickness with varying widths that range from 900 mm/ 1000 mm/ 1250 mm and 1500 mm.
- 2) Lock- It is basically made up of plastic, but it does have a few parts made up of steel, like the inner flap that locks and opens or allows the opening of the main door/flap of the inner box.
- 3) Hinges- They are made up of a lightweight steel that is stainless steel. It is easy to shape and has a longer life with good durability.
- 4) Knob- It is made up of a plastic like material which is light in weight and not expensive at the same time It also provides a good shiny aesthetic look that enhances the overall aesthetics of the product.
- 5) Sliding rails and channels- these are made up of stainless steel that have a longer life compared to other materials and are light in weight. They are non-corrosive in nature.

IV. RESULTS AND DISCUSSION

An ergonomic storage drawer with a safety lock under the front passenger seat of a car has the potential to provide added convenience and security for car owners. It could help reduce clutter and keep the interior of the car more organized, while also providing added security for valuable items stored in the drawer. However, it is important to consider potential drawbacks and challenges associated with implementing an ergonomic storage drawer with a safety lock, such as the limited space available under the front passenger seat and the cost of implementing such a solution. Overall, an ergonomic storage drawer with a safety lock under the front passenger seat of a car has the potential to provide added convenience and security for car owners, but it is important to carefully consider the design, cost, and potential drawbacks associated with this type of storage solution before implementing it in a car.

V. CONCLUSION

The idea of an ergonomic storage drawer with a safety lock under the front passenger seat of a car has both potential benefits and drawbacks. On the one hand, such a drawer could provide a convenient and secure place to store valuables or other items, while also making use of otherwise wasted space in the car. This could be especially useful for those who frequently travel with expensive or important items, such as laptops, documents, or firearms.

On the other hand, there are also some potential concerns with such a design. For example, having a drawer located under the passenger seat could make it more difficult to access in certain situations, such as when the seat is fully reclined or when there is a passenger sitting in the seat. Additionally, there may be concerns about the safety of storing certain items, such as firearms, in such a location, as they could potentially be accessed by unauthorized individuals.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and appreciation to Prof. N. B. Chaudhari Department of Mechanical engineering, MAEER'S MIT Polytechnic, Pune your commitment to excellence and your passion for teaching have inspired me to strive for academic success and to pursue my goals with dedication and determination. I am grateful for the opportunities you have provided me to expand my knowledge and skills, and for the challenging yet rewarding assignments and projects that have allowed me to showcase my abilities. for his guidance and mentorship during our academic journey. Your vast knowledge and expertise in the field have greatly influenced our learning and growth.

I would like to place on record my deep sense of gratitude for Prof. M. R. Mahajan HOD Department of Mechanical engineering, MAEER'S MIT Polytechnic, Pune, for his guidance and mentorship during our academic journey. Your vast knowledge and expertise in the field have greatly influenced our learning and growth.

I am extremely thankful to Prof. Dr. Rohini S. Kale Principal, MAEER'S MIT Polytechnic, for providing me infrastructural facilities to work in, without which this work would not have been possible. Thank you for your unwavering dedication to education and for making a positive impact on the lives of your students.

VI. REFERENCES

- [1] Wanqiang Li, Hong Hu, and Jie Zhou, Design Research on Storage Space Product Service System for Automobile Passenger Transport and Design, Beijing University of Technology, China, Jan 2020
- [2] Li Yongzhao, Wu Chao, Chen Yingying, Pan Siqi, Tu Zixuan, Design of luggage storage and transportation integrated scheme, Xiamen University Tan Kah Kee College, Aug 2022
- [3] L.Cucu PhD.M. Stoica PhD., N. Crisan PhD., G.F. Stoica, Design of an innovation luggage storage system for passenger train, University Politehnica of Bucarest, Romania , 2019
- [4] Ancuta-Nadia Jurco, Study of the influence of roof luggage box on a vehicle aerodynamics , Universitatea Tehnica Cluj-Napoca
- [5] Thomas Frank, Benedikt Gerlicher, Juan Abanto, DrivAer-Aerodynamic Investigations for a New Realistic Generic Car Model using Ansys CFD, Otterfing, Germany, Oct 2023
- [6] Radosław Mikołaj Janicki and Adam Piechna, Examining Influence of a Rooftop Cargo Carrier Position on Automobile Aerodynamics , Warsaw University of Technology, Poland, 2019
- [7] Jinit Patel , Soham Bhandari, Jeet Patel , Tejash Ahir, Dhaval Chaudhari, International Journal of Advance Research in Engineering, Science & Technology, Department of Mechanical Engineering LIT, Sarigam, Gujarat, March 2016
- [8] Florian Ion Tiberiu Petrescu, Taher M. Abu-Lebdeh and Antonio Apicella , Study of an Oscillating Sliding Mechanism, North Carolina A and T State Univesity, United States , May 2018
- [9] Sumit P Patil, Jignesh R Dhabuwala, Liyakat Ali Patel, Automatic Sliding Window ,B.E. Mechanical, H.J.Theem College of Engineering , April 2015
- [10] Gyanendra K Verma , Pawan Tripathi , A Digital Security System with Door Lock System Using Indian Institute of Information Technology Allahabad-India , Aug 2010
- [11] Forest G. Stark, Filing cabinet or like, Assignor to Art Metal, Jamestown, June 1967
- [12] Saurabh A. Waghmare, Suraj I. Shende, Gitesh S. Kamdi, Shubham P. Hurde, Prof. Pravin D. Padole , Automatic door opening system, Rajiv Gandhi College of Engineering Research and Technology, Chandrapur, Maharashtra, May 2022
- [13] Todd Michael Bello, Jamie Beth Pawloski, Power Sliding Window Assenmbly, Toyota Motor Engineering & Manufacturing North America, April 2010
- [14] Ali Kasal, Nadir Yildirim, Jilei Zhang, Yusuf Ziya Erdil, Selcuk Demirci, Effect of material properties and anchorage location on load-bearing capacity of screw-connected and hung cabinets, Mugla University, Turkey, Jan 2014
- [15] Mohannad H. Al-Sherrawi, Svitlana Sotnik , Vyacheslav Lyashenko, Esraa M. Edaan, Corrosion of metal construction structures, College of Engineering, University of Baghdad, Baghdad, Iraq, June 2018
- [16] LACASSE, Michael A., and MORELLI, Martin, Approach to Assessing the Long-term Performance of Wall Assemblies – Durability of Low-rise Wood-frame walls, Danish Building Research Institute, Denmark May 2017
- [17] Mohannad H. Al-Sherrawi, Vyacheslav Lyashenko, Esraa M. Edaan, Svitlana Sotnik, Corrosion as a source of destruction in construction, University of Baghdad, Baghdad, Iraq, May 2018
- [18] Lizong Lin, Sunhui Du, Baibing Ouyang, Mi Yan, Intelligent Cabinet Lock Control System Based on CloudTechnology, East China University of Science and Technology, China, 2021
- [19] Piash Paul, Md. Abdullah Al Achib, Hazrat Sauda Hossain, Md. Kaviul Hossain, Smart Door Lock Using Fingerprint Sensor, Xiamen University Tan Kah Kee College, May 2013
- [20] Adarsh V Patil, Akshay S, C HandanB Patgar, Sreevarsha Prakash, Mahadevaswamy, Sharath Kumar A J, Android Based Smart Door Locking System, VVCE, Mysuru, Karnataka, India, 2018
- [21] Orji E.Z., Nduanya U.I. and Oleka C.V., System Using Keypad, Enugu State University of Science and Technology, Enugu, Nigeria, Oct 2019
- [22] Jorge Lopes, Jorge de Brito, Waterproofing of Concrete Foundations, University of Lisbon, April 2014
- [23] GuangLiang Fan1, WeiFu Qi1,Yong Yu,ShuSen Liu,Ting Yuan , Research on improvement of moisture proof technology for JIS control cabinet of 220kV substation based on big data State Grid Panjin Electric Power Supply Company, Panjin, Liaoning, China,2021

-
- [24] Huiping Xing, Ouya Ma, Qi Yong, Chun Yang, Xiaolian Chao and Yuhu Li, Study on Removal of Iron Rust from Paper Objects with Thiourea Dioxide, Shaanxi Normal University, 710019 Xi'an, China, 2018
- [25] Miao Yang , Raymund Schäffler, Tobias Repmann, Kay Orgassa, Moisture Absorption and Desorption in an Ionomer-Based Encapsulant:A Type of Self-Breathing Encapsulant for CIGS Thin-Film PV Modules, NICE Solar Energy GmbH, Schwaebisch Hall 74523, Germany, Oct 2020
- [26] Xiaoping CHE* & Stephane MAAG, Testing protocols in Internet of Things by a formal passive Technique, Institut Mines-Telecom SudParis France,Nov 2013
- [27] Mary Lourde R* and Dushyant Khosla, Fingerprint Identification in Biometric Security Systems, International Journal of Computer and Electrical Engineering, October, 2010
- [28] Karthik A Patil, Niteen Vittalkar, Pavan Hiremath, Manoj A Murthy, Smart Door Locking System using IoT, REVA University, Bengaluru, India, May 2020
- [29] Yongjie Wang*, Nina Stojiljkovi ´c, Johannes A. Jehle, Cloning of complete genomes of large dsDNA viruses by in vitro transposition of an F factor containing transposon Neustadt an der Weinstraße, Germany, Dec 2009
- [30] Alireza Biparva , Rishi Gupta, Smart waterproofing system, Civil Engineering, British Columbia Institute of Technology, Nov 20.