



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 7, July 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118



9940 572 462



6381 907 438



ijirset@gmail.com



www.ijirset.com



Development of Innovative 3D Printed Bubble Top can Lifter-Cum-Opener

Sekar K S

Lecturer, Department of Mechanical Engineering, Murugappa Polytechnic College, Chennai, Tamilnadu, India

ABSTRACT: Today, the majority of businesses and households use bubble top packaged drinking water for edible purposes. The can comes with a tightly sealed temporary plastic cover to stop water leakage. The consumers may still find it difficult to remove the cap off the can to open it without breaking it with a knife. The present work is an attempt to solve this issue by developing dual purpose device which can be used for both lifting the can and for opening the can that is simple enough for even women and kids to use. By just positioning the opener correctly, we can easily open the cap by raising it, allowing air to freely enter. With this device, we can easily open the cap by lifting the tool upwards, so it can be operated by anyone like aged persons and challenged persons. This device is designed using CREO Modeling software and fabricated using a 3D Printer and Press working such that it is portable and easy to carry. The developed device was tested and worked fine.

KEYWORDS: Can lifter, Can opener, 3D Printing, Bending.

I. INTRODUCTION

The use of bubble top cans became common in households and offices today. The common issues faced while using the bubble top cans are handling them and opening them. Moving the cans from one place to other and placing them on dispensers to use is a tough task for housewives, aged persons, and many others. Those having backache problems and lean physique find it difficult to do the task. Also, to open the can we have to use the chance tools like knives screwdrivers, etc., which at times harms us. However, these issues can be solved if there a handy device is available to move the cans and open the cans. Though can lifters are already available in use it is used only by the can suppliers. It is not available to the end users. Whereas end users are required to move the cans within their place and to open them frequently. The present work aimed at designing and developing a device to serve both for lifting and opening of the cans by the end users. The can lifter is to be made of plastic material and the opener is to be made of steel plate. Then can lifter and opener are assembled into a single piece. The lifter is designed such that it fits in the hand correctly without making any hardship to the user and the force requirement to lift the can is as low as possible. The sheet metal opener is designed such that it requires less effort to open the can. The device is easy to carry and easy to handle and safe too.

II. COMPONENTS AND DESIGN

The Bubbletop can lifter cum opener consists of two major functional systems. They are,

- i. Can Lifter and
- ii. Can opener

The can lifter is made of plastic (Polypropylene). Polypropylene has good resistance to fatigue, heat, and chemical reactions. The integral hinge property and higher toughness make it suitable for the can lifter. For the can opener, stainless steel material is chosen because of its corrosion resistance, high tensile strength, temperature resistance, durability, formability, and low maintenance.

The design of the can lifter cum opener involves the following sequences and CREO software was used for the modeling:

- i. Modeling the Can Lifting handle
- ii. Dimensioning of Lifting handle
- iii. Modeling of the Can opening tool
- iv. Dimensioning of Can opening tool
- v. Assembly drawing

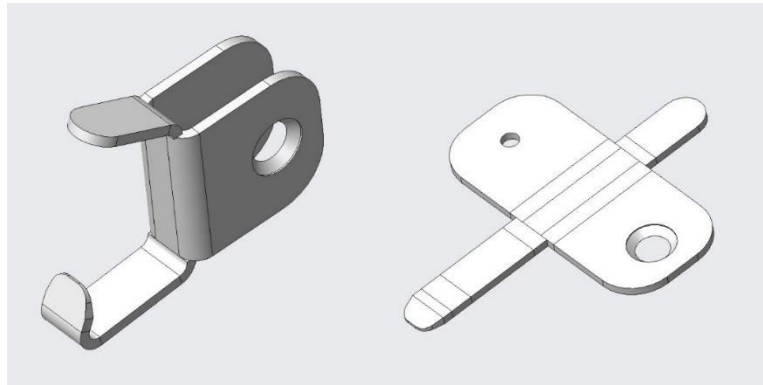


Fig.3.Can opener

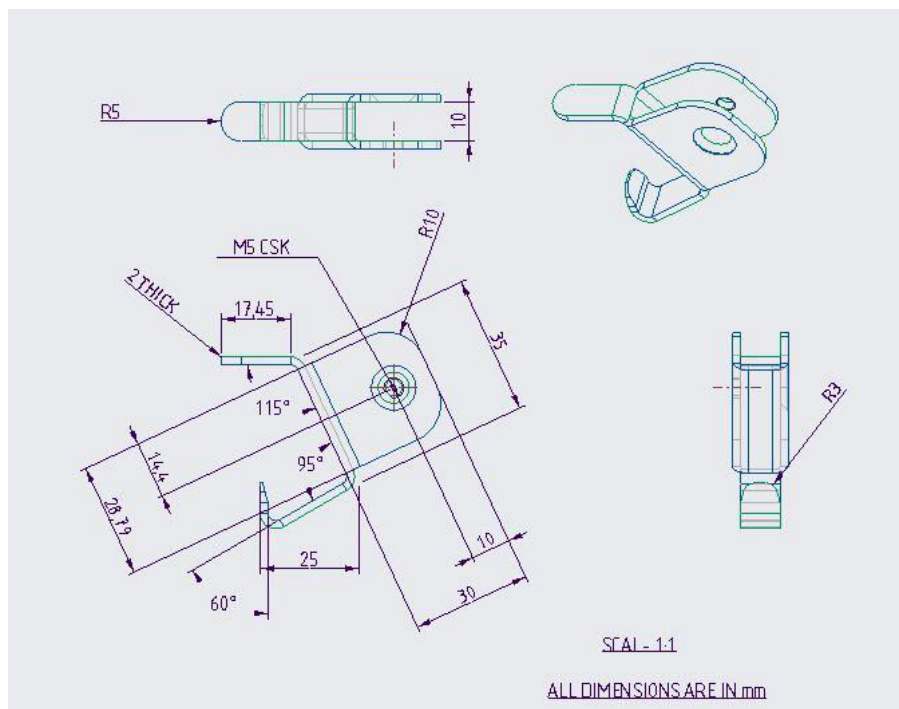


Fig.4.Details of Can opener

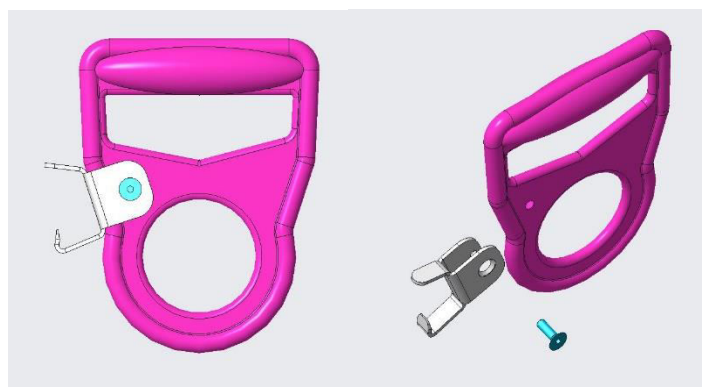


Fig.5.Assembled view of the Can lifter-cum-opener

III. FABRICATION AND ASSEMBLY

The can lifter was manufactured using a 3D printer as per the designed dimensions. CoLIDO X3045 Duo 3D printer shown in figure 6 was used for manufacturing the Can lifter. The part modeled in the CREO modeling software was converted into STL file format. The STL file must next be processed by software known as a "slicer," which breaks the model up into a number of thin layers and generates a G-code file with instructions specific to the 3D printer (FDM printers). Then, 3D printing client software can print this G-code file (which loads the G-code and uses it to instruct the 3D printer during the 3D printing process). Individual parts were manufactured using the 3D Printer as shown in figure 7 and finished for final assembly. The can opener was manufactured using the sheet metal bending operation from the stainless steel plates. The can lifter produced by the 3D Printer and can opener produced using the sheet metal bending operation were assembled as shown in the assembly view.

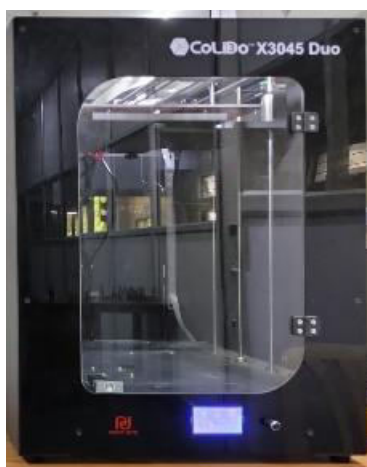


Fig. 6. CoLIDO X3045 Duo 3D printer

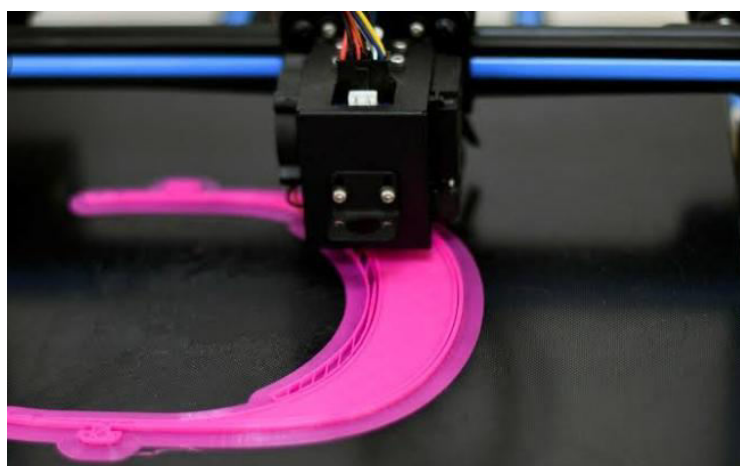


Fig. 7. 3D Printing of part Modeled

IV. WORKING

The functioning of the device was checked using simulation and also in actual practice. Simulated views are shown in figures 8 & 9. As the design of the can lifter is done for the regular weight of the bubble top can with water considering the safety factors the device was able to lift the weight with comfort and with less effort. Also, the can opener edges were made to penetrate through the gap between the can and the cap with ease and it can open with less effort. The device was tested for its functioning by using it on several cans and it was working fine.



Fig. 8. 3D Simulation of Can lifting



Fig. 9. 3D Simulation of Can Opening

V. CONCLUSION

The difficulty in handling and opening bubble top water cans at homes and offices was present for a long time. An effort to design and develop a dual-purpose can lifter-cum-opener is taken in the present work. A novel 3D printed can lifter with the combination of sheet metal opener forms the device. The customized 3D printed can lifter was modeled in CREO software and fabricated using a Fusion Deposition Model 3D printer. The can opener was also modeled in the software and fabricated from stainless steel sheet metal bending operation. Both the parts were assembled together to form the device. The device is compact and user-friendly. It is easy to handle the device effortlessly. The device was tested using it in several bubble top cans and it performed as expected without any deficiency. In conclusion, the can lifter-cum-opener device fulfilled the requirements and performed the intended function.

REFERENCES

- [1] Tuan NoraihanAzila Tuan Rahim, Abdul Manaf Abdullah and HazizanMdAkil, "Recent Developments in Fused Deposition Modeling-Based 3D Printing of Polymers and Their Composites", Polymer Reviews, Vol. 59, No. 4, pp. 589-624, 2019
- [2] S.C. Daminabo, S. Goel, S.A. Grammatikos, H.Y. Nezhad and V.K. Thakur, "Fused deposition modeling-based additive manufacturing (3D printing): techniques for polymer material systems", Materials Today Chemistry, Vol. 16, 2020
- [3] Chadha, A., UIHaq, M.I., Raina, A., Singh, R.R., Penumarti, N.B. and Bishnoi, M.S, "Effect of fused deposition modelling process parameters on mechanical properties of 3D printed parts", World Journal of Engineering, Vol. 16 No. 4, pp. 550-559, 2019



- [4] Mwema, F.M and Akinlabi, E.T, “Basics of Fused Deposition Modelling (FDM)”, In: Fused Deposition Modeling. SpringerBriefs in Applied Sciences and Technology Book Series, pp. 1-15, 2020.
- [5] Kristiawan, Ruben Bayu, Imaduddin, Fitriani, Ariawan, Dody, Ubaidillah, and Arifin, Zainal, "A review on the fused deposition modeling (FDM) 3D printing: Filament processing, materials, and printing parameters", Open Engineering, vol. 11, no. 1, pp. 639-649, 2021
- [6] LaleganiDezaki, M., MohdAriffin, M.K.A. and Hatami, S, "An overview of fused deposition modelling (FDM): research, development and process optimisation", Rapid Prototyping Journal, Vol. 27 No. 3, pp. 562-582, 2021



INNO  SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN  INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details