IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

DESIGN AND FABRICATIONOF PROTOTYPE FOR GEAR BUG BY USING CO_2 LASER CUTTING

[1]P. Varalakshmi, [2]S. Nithin, [3]L.Rakesh, [4]D. Rahul Nayak

[1]Assistant Professor, [2]UGC Scholar, [3]UGC Scholar, [4]UGC Scholar

[1]Mechanical Engineering

[1]Guru Nanak Institute Of Technology, Ibrahimpatnam, India

Abstract : This mini project centres around the design and fabrication of a Gear Bug prototype using CO_2 laser cutting technology. The aim is to leverage the precision and efficiency of CO_2 laser cutting for crafting intricate components essential for the assembly of the Gear Bug. Employing Computer-Aided Design (CAD) software, detailed 2D and 3D models are created, ensuring a compact, functional, and easily assembled prototype. This research explores the potential of CO_2 laser cutting in streamlining the fabrication process for small-scale mechanical devices like the Gear Bug.

INTRODUCTION

Gear Bug is a versatile and essential tool for anyone who wants to be prepared for anything. The laser cut wooden gear bug mechanical toy is a fun and educational toy that can be enjoyed by people of all ages. It is made out of wood that has been cut into intricate shapes using a laser cutter. The gears are then assembled to create a toy that moves in a variety of ways.

Gear bug toys are often designed to be educational and can teach children about gears and how they work. They can also be used to teach children about physics and engineering concepts. Gear bug toys are also popular as collectibles and can be displayed as works of art.

Here is a brief introduction to the laser cut wooden gear bug mechanical toy:

History: The laser cut wooden gear bug mechanical toy was invented in the early 2000s. It was inspired by the traditional wooden gear toy, but the laser cutter made it possible to create more intricate and complex designs.

Design: The laser cut wooden gear bug mechanical toy is typically made out of a single piece of wood. The gears are cut out using a laser cutter and then assembled using glue or screws. The toy is often finished with a coat of paint or varnish.

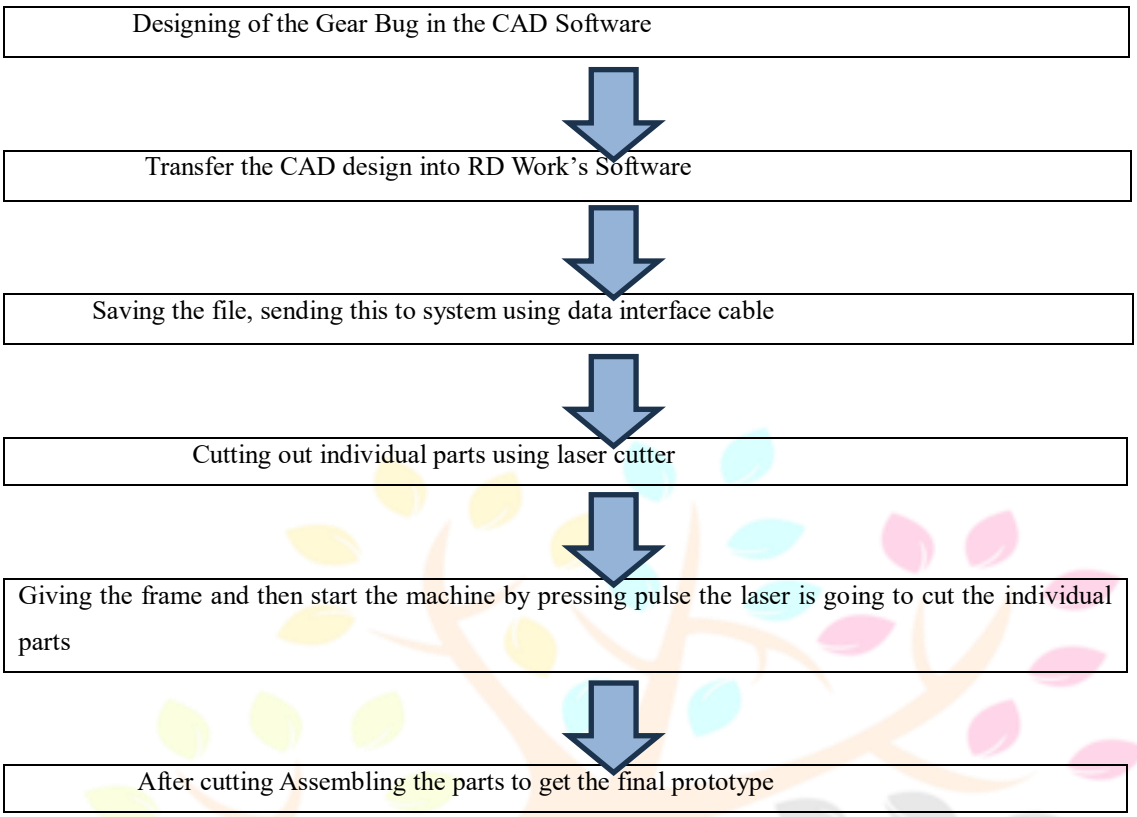
How it works: The laser cut wooden gear bug mechanical toy works by using gears to transfer motion. The gears are meshing together in such a way that when one gear turns, it causes the other gears to turn. This creates a chain reaction that causes the toy to move.

Benefits: The laser cut wooden gear bug mechanical toy has a number of benefits, including:

- It is educational and can teach children about gears and how they work.
- It can be used to teach children about physics and engineering concepts.
- It is popular as a collectible and can be displayed as a work of art.
- It is often made from beautiful hardwoods and has intricate designs.

RESEARCH METHODOLOGY

Methodology below shows the sequence activities for the project involving information gathering, material selection and analysis of the data achieved.



Experimentation Procedure

Design the Gear Bug: Use a CAD program to design the Gear Bug

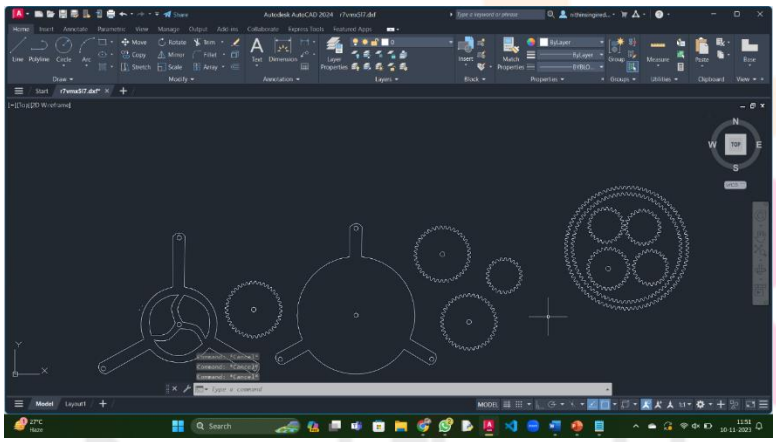


Fig: Using dimensions design the Gear Bug in Computer Aided Design (CAD) in Auto Cad Software

Transfer the CAD design into RD WORK'S SOFTWARE

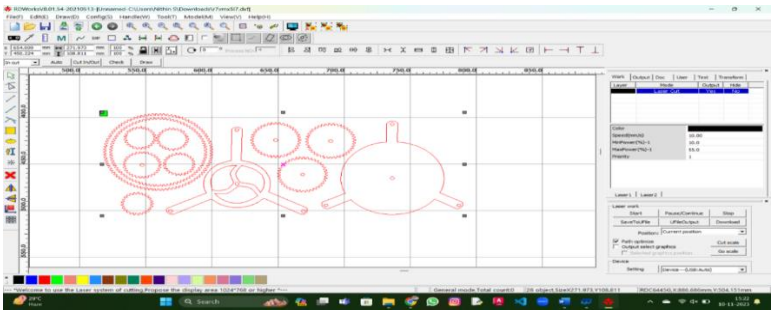


Fig: Here we are going to set all the settings in the software

Saving the file, sending this file to the system using data interface cable connected to the machine

Fig: Loading the file in to the machine

Cut out the individual parts use a laser cutter to cut out the individual parts.

Fig: Cutting all the individual parts using the laser cutter

Giving the frame, then we are going to set laser at the origin, then we have to start by pressing the pulse and then the machine will start and laser is going to cut the material.

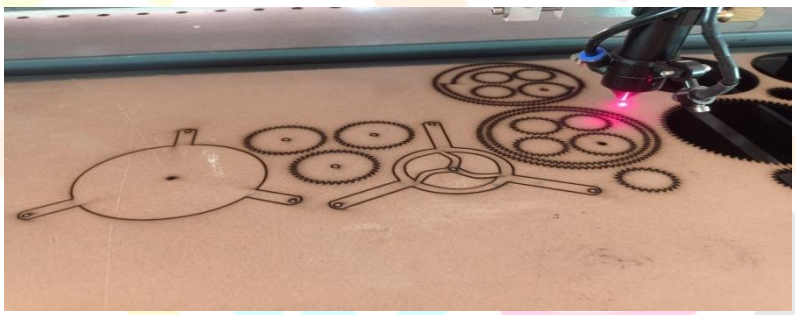


Fig: Framing the machine and starting the machine we get final product after assembling.

RESULTS AND DISCUSSION

Gear bug mechanical toys are a fun and educational way to learn about gears and how they work. They are also a great way to learn about the use of CAD software and laser cutters. Gear bug toys are made out of wood that has been cut into intricate shapes using a laser cutter. The gears are then assembled to create a toy that moves in a variety of ways. Gear bug toys can be designed to be very simple or very complex. They can also be designed to move in a variety of ways.

Fig: Gear bug

From this we can learn about the gears and how they work. Gear bug toys are often used to teach children about gears and how they work. They can also be used to teach children about physics and engineering concepts. Gear bug toys are also popular as collectibles and can be displayed as works of art.

There are a number of benefits to experimenting with gear bug mechanical toys. Some of the benefits include:

- They are a fun and educational way to learn about gears and how they work.
- They can be used to teach children about physics and engineering concepts.
- They can be designed to be very simple or very complex.
- They can be designed to move in a variety of ways.

I. Acknowledgment

. We owe our immense thanks to **Mrs. P. VARALAKSHMI** our project guide, Assistant Professor in department of Mechanical Engineering, Guru Nanak Institute of Technology for the sustained interest, constructive criticism, and constant encouragement at every stage of this Endeavour.

. We extend our deep sense of graduate to **Dr. B. VIJAYA KUMAR**, Professor & Head of the Mechanical Department for his masterly supervision and valuable suggestions for the successful completion of our project.

. We wish to express our candid gratitude to **Dr. S. SREENATHA REDDY**, Principal and the Management of the Guru Nanak Institute of Technology for providing us the best amenities which enabled us to complete our project in the stipulated time.

. Finally, yet importantly, we are very thankful to our parents, friends, and other faculty of Mechanical Engineering department for their constant support in completion of this project.

References

1. Naresh, Pankaj Khatak. 2003. “Theory of Machines and Mechanisms” (3rd ed.). New York: Oxford University Press.
2. J. Paulo Davim, Oliveira Carlos. 2019. “A new method for designing laser cut wooden gear bug mechanical toys”. Journal of Mechanical Design, 141(11), 111410
3. V. Senthilkumar. 2020.“The effects of playing with laser cut wooden gear bug mechanical toys on children's understanding of gears”. International Journal of Technology and Design Education, 30(1): 131-146
4. H.A. Eltawahni, A.G. Olani. 2019 “Design of Machine Element”. Third Edition, Mc Graw Hill publications, 3. Rd edition, New Delhi, Helical Gears, pp. 649-669
5. D.A. Belforte, J.M. Jafferson. 2015. “A Study on Common Failures of Gears”. IJIRT, 2, pp. 1-7
6. Jiri George Drobny.2003. “Transmission Error on Spur Gear”. International
7. Sankar S, Raj M. S, Nataraj M. 2003. “Profile Modification for Increasing the Tooth Strength in Spur”
8. https://www.researchgate.net/publication.
9. https://iopscience.iop.og/article.
10. https://www.bbc.co.uk/bitesize/guides/ztjpb82/revision/3.
11. https://www.sciencedirect.com/topics/engineering.
12. https://www.en.wikepedia.org.
13. Dickinson Rich, Louise .(1942).2017 , We Took to the Woods, JB Lippincott Co, p. 93, LCCN 42024308, OCLC 405243, archived from the original on March 16.
14. https://doi.org/10.3390/jmmp/7060202.
15. https://doi.org/10.3390/jmmp7060201.
16. https://doi.org/10.3390/jmmp7060199.
17. Wang P Y and Fong Z H. 2005. “Mathematical Model of Face-Milling Spiral Bevel Gear with Modified Radial Motion” (MRM) Correction Mathematical and Computer Modelling 41, pp. 1307-23
18. Rosic B., Marinković A. 2003.: “Planetary gear transmission as a tribosystem”: Efficiency calculation and simulation, ÖTG Jahres Symposium, Wien, November.

19. https://researchgate.net/publication.
20. https://image.slidesharecdn.com/mechanical-221130160147-e4536482/75/types-of-gears-10-2048.jpg?cb=1669824619.
21. Dobreva. 2013. A.: "Theoretical Investigation of the Energy Efficiency of Planetary Gear Trains". Mechanisms and Machine Science, No 13, pp 289-298,
22. R Keith Mobley. 2001, in Plant Engineer's Handbook.
23. Heinz Heisler. 2002. MSc., BSc., F.I.M.I., M.S.O.E., M.I.R.T.E., M.C.I.T., M.I.L.T., in Advanced Vehicle Technology (Second Edition).
24. J.I. Pedrero, ... M.B. Sánchez. 2014. in International Gear Conference 2014: 26th–28th August 2014, Lyon.
25. M. Inalpolat, ... A. Kahraman. 2014. in International Gear Conference 2014: 26th–28th August 2014, Lyon.
26. Colin H Simmons. 2009. I. Eng, FIED, Mem Ecoengineering Standards Consultant, ... Neil Phelps IEng MIED, MIE Practicing mechanical design engineer, in Manual of Engineering Drawing (Third Edition).