

Study on paper cutting machine using Geneva Mechanism-An Overview

Dr.T.Ramakrishnan

*Department of Mechanical Engineering
Sri Eshwar College of Engineering*

Mr.Yashwanth E

*Department of Mechanical Engineering
Sri Eshwar College of Engineering*

Mr.Ruthra vel C

*Department of Mechanical Engineering
Sri Eshwar College of Engineering*

Mr.Vigneshwaren A

*Department of Mechanical Engineering
Sri Eshwar College of Engineering*

Mr.Nithish R

*Department of Mechanical Engineering
Sri Eshwar College of Engineering*

Abstract- The layout and fabrication of the paper slicing system benefits greatly by reducing paper usage, but is ineffective when it comes to getting sheets with dimension in compliance with industry standards. The phasing mechanism adds increments to non-stop movement to the sliced result. This is known as the indexing Mechanism because the paper is moved from its original location to locations that are evenly distributed over time. then the paper slicing is executed by hand and by the crank and lever mechanism Since the lever functions as a secondary crankshaft, the cutters might be at the low point of their former strength, providing a leverage disadvantage rather than an advantage. To this end, this idea, we intend to develop the most efficient mark-processor of all papers, known as the Geneva mechanism. This will expand the most paper markings on every print run through this process as well as decrease the weight of paper cutting guides, this machine minimizes the amount of paper used. This technique is useful for both printing and refining, and taking after which deskbound students and office work environments will be spared, colleges, will benefit, will be avoided, and the problems and also will avoid are to no longer arising with each, paper printing will be prevented from human error, and shops are kept away, and new jobs and the methods are all preserved, expanded.

Keywords – Intermittent, Geneva mechanism, Speed Control, efficient

I. INTRODUCTION

While the needs of society constantly change, peoples' usage of paper is currently coinciding with their desires. We introduce a paper-slicing mechanism via the Geneva, which provides finer control over the supply of papers. to support our clients with a system in which they receive the paper that fits their wants and needs, we will be able to respond more quickly to their needs will be supported According to the Geneva scale, we will use the scale of paper

instead of the usual linear measure on a scale of sorts. We can automate the motion process and thereby free people up to use less effort in the factory. It may be difficult to come up with an alternative or special approach to get a greater amount of power. to a predefined want or need, needs, which must meet the predefined standards of accuracy. The three rules of highly productive data visualization are: do more with less, discover more with less, and perform better with what you already have. The use of the Geneva mechanism to document the automatic paper slicing system here serves as the main material's input. This paper cutter is exceptionally precise enough to get right to the job. To examine the mechanical and wear properties of the natural fiber composite [12] and MMC, various measurements were performed [12-24]. All motion-dependent studies, as well as the working principles, were consulted in this study, and motion-dependent information was examined.

II. GENEVA MECHANISM

2.1 Geneva mechanism preferred:

the most important step in mechanical design entails making a selection (goals, purposes, or options). Also to synthesize a mechanism that accomplishes a chosen, increasing, or transforming every mechanism. The primary function of the 4-bar is not to produce preferred directions. So, go ahead and introduce the earliest of all of the overlapping, random, and limited-duration mechanisms (Geneva Mechanism). They cost less and perform better, relying on how heavy the traffic is and how much space they require, are using similar overall characteristics, they feature optimized performance[1].

2.2 The geometry of Geneva Mechanism:

In the design of four-holed wheels, the slots are 90 degrees away from each other. The input force should be applied at a vertical angle of 90 degrees. when you've locked in all the necessary degrees of freedom, all you need to know is which way to go. Although the Geneva force wheel piece helps to accomplish smooth motion, the pin creates only a small rotation on the move that is small compared to the rest of the wheel's revolutions, the overall effect is not large because of this, due to the insignificant rotations created by the pins [2].

2.3 Intermittent motion :

With the layout and evaluation of the paper slicer revealed by Vijay et al [2], it provided a contrast, class, the role, the speed, and the jerk, supplied by the proposed designs, to contrast, a comparison of the proposed by the classifications and the classical wheel arrangement versus the ideas in [2] views. With its characteristic feature of a Geneva motion with associated tools, this gear was an assessment by kinematics was needed to ascertain intermittent movement. This assessment was completed with the help of their lucrative elements in mind, specifically. The method of operation and methodology of the paper-slicing system are suitable for maintaining consistent and constant paper sizes are implemented using the Geneva rulers and shears.

2.4 Kinematic Analysis of the Combined Geneva Mechanism:

The evaluation and synthesis of the Geneva mechanism with elliptical crank have been reviewed through Han Jiguang Yu Kang[3] it is been analyzed that for each inner and outside Geneva mechanism, the kinematics coefficient of the Geneva mechanism can be consistent if the groove wide variety of the Geneva wheel can be consistent. The elliptical crank the user due to the fact the force crank of the Geneva wheel is ok to the mechanism which capabilities a variable duration and a variable pace alongside the elliptical transferring crank. Therefore the kinematics coefficient of the Geneva mechanism is frequently changed. The internal Geneva and the outer Geneva have almost equal shape types. Minor arc in the left of the ellipse is hired to force the outer Geneva and consequently, the proper important arc is hired to force the internal Geneva. Therefore, we will use the uniform kinematic characteristic to explain the internal and outer Geneva.

2.5 Modeling and Finite Element Analysis of Geneva Mechanism:

The evaluation and modeling of the Geneva mechanism become studied through Georgata and Elena[4] the paper provides a few elements theoretical and sensible primarily based totally on the finite detail evaluation and modeling of the Geneva mechanism with 4 slots, the usage of the CATIA image program. This form of mechanism is an instance of intermittent gearing that interprets infinite rotation into an intermittent rotation. It includes extrade intervals of movement and relaxation without reversing the course. Also, it offers a few layout parameters with specifying a Geneva mechanism that is going to be described exactly like a wide variety of using cranks, a wide variety of slots, wheel diameter, pin diameter, and so forth. Finite detail evaluation (FEA) is frequently used for developing a finite detail version (preprocessing). The paper specializes with inside the modeling and finite detail evaluation of the Geneva mechanism with 4 slots. This approach has the electricity to differ the shape of the Geneva mechanism with converting any kinematic properties.

2.6 Principle and Working of Geneva Wheel:

The Geneva force can be a sort of rigging shape that performs out a sporadic rotational improvement. The transferring force wheel consists of a stick that comes towards touch with a place of the selected wheel which actions it through one level. By various every slot duration in the Geneva wheel, we manipulate the timing at every level of the conveyor motion by neglecting the use of sensors. Multiple slot wheels may be designed, however, there's a fundamental criterion that must be maintained in designing this is any wide variety of Slotted maybe with inside the Geneva wheel is that the pin has to go into and depart the slots radically. Have little put on prompting protracted lifestyles expectancy [5].

2.7 Four-bar linkage & Design optimization:

Horne and Nelson [6] of their paper on Analysis of the Four-Bar Linkage offers evaluation that a 4-bar mechanism is a fundamental 1-DOF (diploma of freedom) mechanism. A 4-bar is made by choosing 4 hyperlink lengths and becoming a member of the hyperlinks with revolute joints to make a loop. Wide types of paths are feasible through arbitrarily deciding on a few quantities at the coupler curve. These one-of-a-kind curves are frequently acquired through building a bodily version of the mechanism and viewing the path of assorted factors without certain mathematical evaluation. Engineering layout technique the usage of a mathematical method of layout trouble to support/assist with inside the choice of the top-of-the-line layout amongst many options mechanism is called layout optimization.

2.8 Advantage of Using Conveyor Belt:

The mechanism used for the conveyer belt is an outside Geneva mechanism. This mechanism offers out the manufacturing of jerks or immediately alternates in acceleration. The mechanism has numerous packages in lots of industries particularly the automation/car enterprise. Modern-day movie projectors use a version of this mechanism to electricity a motor that is used for immediate forwarding. In quick, the Geneva mechanism converts non-stop rotatory movement of the force wheel to intermittent rotatory movement of the tools. The maximum critical benefit with inside the conveyor belt the usage of Geneva mechanism is that we will manipulate the velocity and course of the belt by simply adjusting the duration of the rod connected to the servo motor being used. Hence the usage of the Geneva mechanism in the conveyor belt enables particularly in saving extra power and manipulate the velocity of conveyor belt and making the manufacturing and dealing with comfortable. [7]

2.9 Modern tool usage / Design software:

The Determination of angular speed and acceleration of Geneva wheel and additionally to decide the shipping time of the item to cowl the whole conveyor. In this challenge, we put together 3-d modeling of the Geneva Operated Roller Conveyor through the usage of CATIA V5 R20 Software. In destiny, the entire strain evaluation of the challenge version may be finished. This evaluation may be finished with the assist of a software program known as ANSYS. Here we over include the zero parametric software program with fundamentals of engineering knowledge [8].

3.0 Automat:

In the Force evaluation of the Geneva wheel and face cam in automat, pushed the automat the usage of unmarried motor for one of a kind operations. There are 3 one of a kind forms of actions that can be managed through 3 one of a kind cams. Here they recognition on major components they're Geneva wheel and Face cam which can be used for his or their respective operations. Due to this, there's a pressure that is generated inside the Geneva wheel is in most and minimal role in the Cutting mechanism through giving feed via Geneva mechanism. By the usage of unmarried electricity supply, the product or versions may be operated automat [9].

3.1 Cutting Mechanism by Giving Feed:

Designing a mechanism for slicing is finished through the intermittent feed. This intermittent feed is given through non-stop rotation of the round disk in the Geneva mechanism. We have designed a belt force with the assist of Geneva mechanism that is used for giving feed and offers clean operation and clean motion of the feed at required time c programming language. The feed from the Geneva force becomes reduce through the usage of slotted lever mechanism which becomes designed the usage of slider-crank mechanism [10].

IV.CONCLUSION

Paper slicing device design and evaluation The use of the Geneva method can be very useful for small-scale industries. There is a system based entirely on paper slicing, but it has drawbacks such as large duration, low cost, and the need for skilled people to operate. It also requires electric input. But we have a mechanism in place to solve this flaw with a short duration and a low fee. We will get the same length of feed with this version at the same c programming language of the time. The feed duration can be adjusted by changing the strength of the slots in the Geneva wheel, and the direction duration of the slider can be improved by increasing the radius of the crank and the duration of the slot at the slider. The main aim of this method is to reduce the time required for paper slicing while ignoring the time required for paper labeling. Our challenge can help us achieve this aim.

REFERENCES

- [1] Ajay S. Parmar, Amar Singh, Avinash Singh, Intermittent Paper Cutting Mechanism by Giving Feed through Geneva Wheel, Vol-4, 2017.
- [2] Vijay Kumar U, Ghanshyam Kumar, Dhareesh Bansod, Deepak Sahu, Rishabh Bendre, and Aakanksha Suryawanshi, Design and Analysis of Paper Cutting Machine work on the Geneva Mechanism, IJARIII, 2(2), 2016, 35-43.
- [3] Han Jiguag Yu Kang, Analysis and Synthesis of Geneva Mechanism with Elliptic Crank, International Journal of Hybrid Information Technology, 8(8), 2015,253-260.

- [4] Haraga and Elena Ionita, Aspects Theoretical and Practical based on the Finite Element Analysis and Modeling of Geneva Mechanism, IJASTR, 1(2), 2015, 20-40.
- [5] T.K.Aravindhnan, S.Dinesh Kumar, D.Gokul Raj, Ashish Kumar, Design & Fabrication of Mini-Conveyor Using Geneva Mechanism, IJCRT, Volume 6, 2018, 165-169.
- [6] Hrones J. A. and Nelson G.L., Analysis of the Four-Bar Linkage, IJARIE, 1(5), 1951, 15-20.
- [7] S.V. Mukkavar, Aarya Mulay, Shubham Mathur, Abhishek Kakani, Atharv Khutale, Avinash Nair, Mini-Conveyor Using Geneva Mechanism, Volume 7 IJARSE, 2018,1096-1098.
- [8] Mr. M. V. Ingalkar¹, Mr. A. R. Sonekar², Mr. Y. D. Bansod³, Design, Cad Modeling & Fabrication of Geneva Operated Roller Conveyor, Volume-46,2017,108-112.
- [9]Madhoo G, Muhammed Sameer, Mohsin Ali, Ashwin C Gowda, Force Analysis of Geneva Wheel and Face Cam Used In Automat, ISSN: 2248-9622, Volume 4,2014
- [10] P.Kalisindhur, Y.Karthik, T.Vijay, Y.Sasikanth, and G.Sri Harsha, Cutting mechanism by giving feed through Geneva Mechanism, IJSET,2(4), 2015, 1172-1175.
- [11] E.A. Sadek, J.L. Lloyd, M.R. Smith, A new design of Geneva drive to reduce shock loading, Mechanism and Machine Theory 25 (1990) 589–595.
- [12] Jih-Lian Haa, Rong-Fong Fung, Dynamic modeling and identification of a slider-crank mechanism, 2006 1019–1044
- [13] T Ramakrishnan, M Sathesh Babu, S Balasubramani, K Manickaraj, R Jeyakumar., 2021.Effect of Fiber Orientation and Mechanical Properties of Natural Fiber Reinforced Polymer Composites-A Review.*paideumajournal*.14 (3), pp.17-23.
- [14] Jeyakumar R, Balasubramanian K, Ramamoorthi R, Ramakrishnan T.,2021,Development Of Compact Electro Gear Pump For Airborne Applications. *paideumajournal*.14 (3), pp.50-57.
- [15] Ramakrishnan, T. and Sampath, P.S., 2017. Dry sliding wear characteristics of new short agave angustifolia marginata (AAM) fiber-reinforced polymer matrix composite material. *Journal of Biobased Materials and Bioenergy*, 11(5), pp.391-399.
- [16] Thirumalaisamy, R. and SUBRAMANI, S.P., 2018. Investigation of physico-mechanical and moisture absorption characteristics of raw and alkali treated new agave angustifolia marginata (AAM) fiber. *Materials Science*, 24(1), pp.53-58.
- [17] Jeyakumar, R., Sampath, P.S., Ramamoorthi, R. and Ramakrishnan, T., 2017. Structural, morphological and mechanical behaviour of glass fibre reinforced epoxy nanoclay composites. *The International Journal of Advanced Manufacturing Technology*, 93(1), pp.527-535.
- [18] Ramakrishnan, T. and Sampath, P.S., 2017. Experimental investigation of mechanical properties of untreated new Agave Angustifolia Marginata fiber reinforced epoxy polymer matrix composite material. *Journal of Advances in Chemistry*, 13(4), pp.6120-6126.
- [19] Ramakrishnan, T., Sampath, P.S. and Ramamoorthi, R., 2016. Investigation of mechanical properties and morphological study of the alkali treated agave angustifolia marginata fiber reinforced epoxy polymer composites. *Asian Journal of Research in Social Sciences and Humanities*, 6(9), pp.461-472.
- [20] Sathish, K., Ramakrishnan, T. and Sathishkumar, S., 2016. Optimization of turning parameters to improve surface finish of 16 Mn Cr 5 material. *Advances in Natural and Applied Sciences*, 10(6 SE), pp.151-157.

- [21] Ramakrishnan, T., Sathish, K., Sampath, P.S. and Anandkumar, S., 2016. Experimental investigation and optimization of surface roughness of AISI 52100 alloy steel material by using Taguchi method. *Advances in Natural and Applied Sciences*, 10(6 SE), pp.130-138.
- [22] Ramakrishnan, T. and Sampath, P.S., 2016. Thermogravimetric Analysis (TGA) and the Effect of Moisture Absorption on the Mechanical Properties of New Agave Angustifolia Marginata 3 Fiber (AAMF) Reinforced Epoxy Polymer Composite Material. *International Journal of Printing, Packaging & Allied Sciences*, 4(5), pp.3245-3256.
- [23] Balaji, N., **Balasubramani, S.**, Ramakrishnan, T. and Sureshbabu, Y., 2020. Experimental Investigation of Chemical and Tensile Properties of Sansevieria Cylindrica Fiber Composites. In *Materials Science Forum* (Vol. 979, pp. 58-62). Trans Tech Publications Ltd
- [24] Ganeshkumar, S., Thirunavukkarasu, V., Sureshkumar, R., Venkatesh, S. and Ramakrishnan, T., 2019. Investigation of wear behaviour of silicon carbide tool inserts and titanium nitride coated tool inserts in machining of en8 steel. *International Journal of Mechanical Engineering and Technology*, 10(01), pp.1862-1873.