DESIGN & FABRICATION OF MINI-CONVEYOR USING GENEVA MECHANISM

T.K.Aravindhan, S.Dinesh kumar , D.Gokul Raj, Ashish kumar ,Mr.A.Gokul karthik

UG student ,Department of Mechanical engineering,

Assistant professor , Department of Mechanical engineering,

Sri Shakthi institute of engineering and technology,Coimbatore-62.

ABSTRACT: The Geneva drive is a sort of rigging structure that plays out a sporadic rotational improvement. The moving drive wheel includes a stick that comes toward contact with a space of the chose wheel which moves it by one stage. By varying each slot length in the geneva wheel we control the timing at each stage of the conveyor movement by neglecting the usage of sensors.

Keywords: Geneva mechanism, Conveyor belt , Roller.

INTRODUCTION

The Geneva drive or Maltese cross is a mechanical assembly system that makes a comprehension of a steady transform into a broken rotating improvement. The moving drive wheel has a stick that undertakings toward an opening of the chose wheel moving it by one stage. The drive wheel likewise has a raised round blocking circle that secures the chose wheel position between steps. Geneva Mechanisms are broadly utilized as a bit of movie film projectors to irregularly drive film through a film gateway having a projection opening. The film is moved or progressed by a Geneva Mechanism (for the most part called a "Maltese Cross") until the point that the minute that a photograph outline is in strategy with the projection opening. The measure of spaces radially sorted out around a Geneva Mechanism's star wheel is variable, and might be any entire number more detectable than 2. As the measure of straight openings is changed, particular highlights of the structure, for example, partition sizes, the speed and navigate of the unusual advancement, and the powers or loads related with the drive stick and star wheel, and to the heap (film) all waver too. Geneva instrument has different applications, for example, in watches, projector, and so on. Regardless, we utilized Geneva fragment for changing over rotational improvement into a sporadic advancement in advance line. Geneva system can be utilized as a bit of material managing in an industry. The proposed thought will help in advance line where different laborers are utilized for the material overseeing reason it additionally diminish the cost and separating time need of more number of expert will be totally disposed of as just two specialists can did the total development.

LITERATURE SURVEY:

1.J.J.Lee,K.F.Huang., says about " Geometry analysis and optimal design of Geneva mechanisms with curved slots" in 2004.A systematic procedure is proposed for the design of Geneva mechanisms with curved slots to evaluate the combined kinematics and structural performance of the mechanism.

2.E.A. Sadek ,J.L. Lloyd, M.R. Smith ., says about " A new design of Geneva drive to reduce shock loading , Mechanism and Machine Theory" in 1990 . The authors propose a modifiction to the basic geometry which reduces the shock loading thereby making the mechanism suitable for high speed applications

3.J. Lee and B. Jansays about "Mechanism and Machine theory" in 1979. The Main topics are design theory and methodology , Haptics and Human-machine-interfaces;Mechatronics and micromachines ; Mechanisms,Mechanical transmissions and machines ; Kinematics, Dynamics and Control of Mechanical systems ; Application to bio-engineeringand Molecular chemistry.

4.ErvinKreyzing., says about "Differential Geometry" in 1959.An introductory textbook on the Differential Geometry of curves and surfaces in three dimensional Euclidean space , presented in its simplest , most essential form. But with many explanatory details , figures and examples , and in a manner that conveys the theoretical and practical importance of the different concepts, methods and results involved.

WORKING

The basic structure of a four slot Geneva wheel . The system consists of a constantly rotating disk coupled with a slotted disk, which gives rise to the desired discrete motion. A rotation of 2p radians of the former causes 2p/N radians of rotation of the latter, where N is the number of slots available on the slotted disk. Thus, one complete rotation of the slotted wheel requires N complete rotations of the other disk, thereby also increasing he otal time period. The conversion mechanism of this disk system is as follows.Pinwheel W rotates constantly about axis A and as shown below, has a pin 'a' attached to it. This pin 'a' engages into the slots 's' of the Geneva Wheel G (a basic 4-slot Geneva mechanism is shown here) and rotates it as long as it is engaged with the slot. While the wheel W rotates continuously, the Geneva wheel G has a discrete rotation about axis 'b'. Wheel G has a rotation time period of t when it is moving along with disk W and n idlingtime period, when the pin 'a' is not inside one of the slots 's'and is moving freely. The three quarter wheel 'L' is placed inorder to prevent any unintentional rotation of wheel G hileitis idling. For a four slot Geneva mechanism, the rotation timeperiod. By varying the number of slots on G, one can varythe time period and the angular displacement of the same. Ifthis system is now coupled with some optical system like amicromirror (through a rack and pinion kind of arrangement),then it can be used to deflect light rays in different directions(by discretely positioning the moving mirror by using thediscrete angular positions of the Geneva wheel) thereby givingrise to an optical switching technique.Multiple slot wheels canbe designed. The basic criterion that has to be maintained indesigning any number of slotted Geneva wheel is that, the pinhas to enter and leave the slots radially.
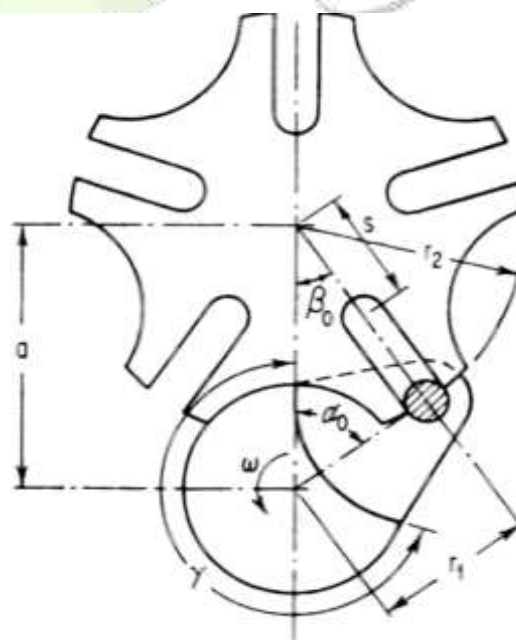

FIG. 1.1:GENEVA MECHANISM

CALCULATIONS:

30 RPM CALCAULTION DC

MOTOR30 RPM CALCULATION DC MOTOR

SPEED   = 30 RPM

VOLTAGE   = 12 VOLT

WATTS   = 18 WATT

Electrical (electric) power equation

Power $P = I \times V$

Where

V = 12

W = 18

I=18/12

I=1.5 A

H.P = .02414

TORQUE OF THE MOTOR

Torque = (PX60) / (2X3.14 X N)

Torque = (18X60) / (2X3.14X30)

Torque = 5.72 Nm

Torque = 5.72 x 10^3 Nm

The shaft is made of MS and its allowable shear stress = 42 MPa

Torque = 3.14 x fs x d^3 / 16

5.72 x 10^3 = 3.14 x 42 x d^3 / 16

D = 8.85 mm

The nearest standard size is d = 9 mm.

CAD MODELLING

CAD modelling is used by many designers to create elaborate computerized models of objects. In this project we use SOLIDWORKS software for preparation of 3D solid Models.
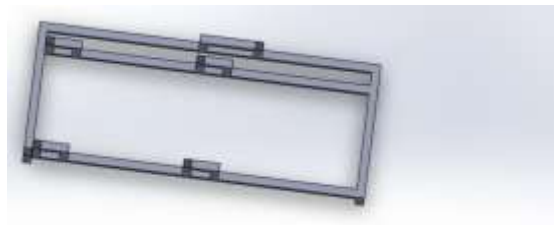

Fig1.2:Geneva wheel

Fig1.3:Roller

Fig1.4:Frame

COMPARISION BETWEEN SINGLE SPEED AND MULTI SPEED CONVEYOR

A)SPEED

Belt transports have turned out to be a magnificent answer for the vehicle of crude mineral materials and soil .Today, they are by and large the most financially savvy answer for dealing with mass material mass streams over short and medium passing on distances.In request to adjust the filling level, the belt speed ought to be controlled as per the heap. Accordingly, vitality utilization should diminish which gives the feeling that a lessening of the vitality utilization by up to 30 % is conceivable, if, by controlling the passing on speed.

B)OPERATED IN BOTH DIRECTIONS

The Conveyor can be moved in both the bearings. To alter the course of the pole we have to change either field or armature supply. In the event that both are changed in the meantime, the heading stays same.

ADVANTAGES:-

- Available in a wide assortment of sizes.
- Maintains great control of its heap consistently.
- Have little wear prompting a long life expectancy.
- Low cost.
- Saves Man Power.
- Saves time.
- Time postponement can be accomplished effortlessly.
- Convey the material at standard interim of time.
- Easy setup in an industry.
- Does not require stepper engine.

DISADVANTAGES:

- Very hard to change timing once configuration is picked.
- The Geneva isn't an adaptable instrument.

- The proportion of abide period to movement is additionally settled. Once the no of abides per unrest has been chosen.

- All Geneva increasing speed bends begin and end with limited quickening and deceleration.

APPLICATION:

- Modern film projectors may likewise utilize an electronically controlled ordering instrument or stepper engine, which takes into account quick sending the film.

- Geneva wheels having the type of the determined wheel were likewise utilized as a part of mechanical watches, yet not in a drive, rather to restrict the strain of the spring, with the end goal that it would work just in the range where its versatile power is about straight.

- Geneva drive incorporate the pen change component in plotters, computerized inspecting gadgets

- Indexing tables in sequential construction systems, instrument changers for CNC machines, et cetera.

- The Iron Ring Clock utilizes a Geneva instrument to give discontinuous movement to one of its rings.

- Stepper

- Mechanical observes

- Plotters

- CNC Machine

CONCLUSION& FUTURE SCOPE:-

- We have effectively ascertained the precise speed and quickening of the Geneva wheel. For the planned Genera wheel the and roller transport the time required by the material to cross the whole belt is figured precisely. The whole displaying of the undertaking is finished with the assistance of CATIA V5R20.

- In expansion to this. The venture work has given us an incredible opportunity and experience, to utilize our constrained information. We picked up a ton of functional information with respect to, arranging, buying, gathering and machining while at the same time doing this extend work. We feel that the venture work is great answer for connect the doors amongst establishments and enterprises.

- We are glad that we have finished the work with restricted time effectively. "The Geneva Operated Roller Conveyor" is working with attractive condition. We have done to our capacity and expertise influencing mama to work, let us include

- The proposed idea wills a couple of more lines about our impression venture work. Help underway line where numerous laborers are utilized for the material taking care of reason it likewise lessen the cost and sifting time prerequisite of more number of specialist will be totally dispensed with as just two laborers can did the entire activity. The venture objective initially is to pass on the material taking care of at normal interim of time.

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