Fabrication of Gearless Power Transmission

Rahul M[1] Ranjith M[2] Shankar Babu K V[3] Suhas Naidu G V[4] Yogeesha H C[5]
[1,2,3,4,5]Department of Mechanical Engineering
[1,2,3,4,5]Nagarjuna College of Engineering And Technology, Bangalore, India

Abstract— It is a link mechanism of slider and kinematic chain principle. Transmits power at any angle without utilising gears, Transmits the power between two shafts whose axes are at 90 degree through bent links, three links slide relatively according to the motion given to input shaft. Due to this, the rotational motion of input shaft is converted into sliding motion of links which is then converted to rotational motion of the output shaft.

Keywords: Transmission System, Gearless Transmission, Elbow Mechanism, Orbital Transmission

I. INTRODUCTION

New machine and techniques are being developed continuously to manufacture various products at cheaper rates and high quality. The project "GEARLESS TRANSMISSION" being compact and portable equipment, which is skilful and is having something, practices in the transmitting power at right angle without any gears being manufactured. This project gives us knowledge, experience, skill and new ideas of the manufacturing. It is a working project and having guarantee of the success.

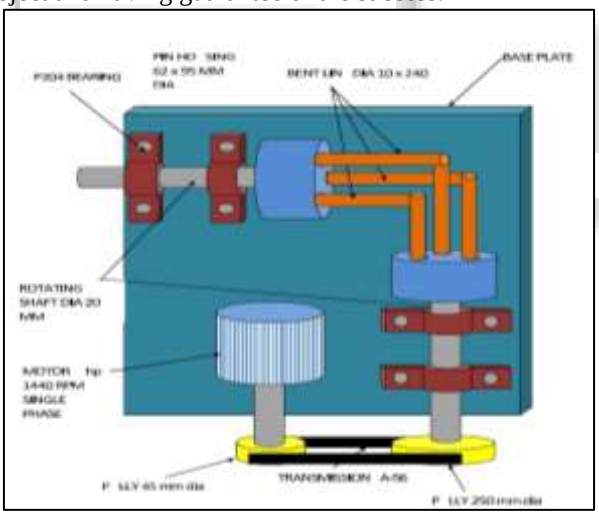


Fig. 1: Figure of gearless transmission

The El-bow Mechanism transmits the I/P power towards the O/P side such a way that the angular Forces produced in the slacks are simply transmitted with the help of pins which takes up the I/P power and the right angle drive is transferred towards the O/P slack and pin assembly. Hence very little friction plays while the power is being transmitted; the Hunting and back lash are absent. Therefore, it is appreciated that efficiency as high as 90-92% are possible in gear less transmition mechanism.

El-bow mechanism is an ingenious link mechanism of slider and kinematic chain principle. This is also called as "gearless transmission mechanism" this mechanism is very useful for transmitting motion at right angles. However in certain industrial application "gearless transmission at right angle" can also work at obtuse or accurate angle plane can be compared to worm and worm gear or bevel and pinion gear which are invariably used in the industry for numerous application.The main feature for mechanism comparatively high efficiency between the input and the output power shafts with regards to the gear efficiencies.

II. LITERATURE SURVEY

A. *R. Somraj et al*

Analyzed the Design and Fabrication of Gearless Transmission For Skew Shafts.3 Nos. of L-pin rods were used. Overall mechanism is considered to be running on 0.25 HP motor with 140 RPM and Torque of 1238 N-mm. Design of Hub is done by Considering a hub of internal diameter is 32mm and outer diameter is 92mm, length is 82mm. Design of shaft was done by taking maximum tensile stress of 60 N/mm2 and maximum shear stress of 40 N/mm2. Diameter of elbow rods was 8mm. It Was Concluded that given arrangement can be used for any set of diameters with any profile of shafts *A review paper on design and analysis of gearless transmission mechanism…* 35

B. *Neeraj Patil*

Researched on Gearless Transmission Mechanism and its Applications, link of C-45 was used. Links bent at required angle slide inside the holes in the hub Mechanism can transmit at any angle 0 to 180.The mechanism is studied and a possible go-kart transmission layout is fabricated and few future applications are suggested. Into This weight of model along with rider Assumed 1500 N. Kart was loaded with 4 Nos. of tires each with 375 N of load. Co- efficient of friction between road and tire was Considered 0.7. Tire of radius 0.1778m Taken. Torque required to move Was 46.67 N-m with Torque on each link 15.55 N-m Tangential force of 311.15N was acting on links. Diameter of each link was 10mm. After study of the mechanism it was concluded that this mechanism is mainly applicable to low cost applications where torque is low to medium. With future development in low friction materials (graphene coating) and stronger composite materials, the efficiency and capacity of this mechanism can be increased. Also if instead of bent links, bolted links or links held by universal joints are used then transmission is possible even when angle changes on the go.

C. *Ashish Kumar*

Performed study on Multi Angular Gearless Drive. The mechanism was loaded with 3 Nos. of L-pins. Parts of mechanism were modeled on Solid Works and the analysis of the mechanism was carried out on ANSYS. The study of mechanism was carried with 0.63 Moment of Inertia (Provided by Solid Works). Behavior of system is plotted on different charts i.e. Velocity vs. Time, Acceleration vs. Time, Angular Acceleration vs. Time, Separation Distance vs. Time. From this it was concluded that the final design thus obtained is capable of transmitting torque and power at varied angles depending on the angular limitation of the hooks joint.

With further research and advanced analysis in the design wide-ranging applications of the drive can be discovered.

D. Solanki Nehal

Studied Design and Analysis of Gearless Transmission through Elbow Mechanism which can be used into the replacement of the bevel gears. 4 Nos. of L-pins was used into this fabricated model. With input of 1HP motor. Links of 10mm diameter were used of S.S, M.S material. Shafts are rotating with speed of 1440 RPM and 4947.066 N.mm of Torque. Stimulation is done by the ANSYS 16.2 and analysis of mechanism was done at 50,100,150,200 RPM for both the material. It is been concluded from that analysis that the 36

Yasarkhan, S.Raihan, P.Pankil, P.Hiren and Devendra Patel

E. Shiv Pratap Yadav

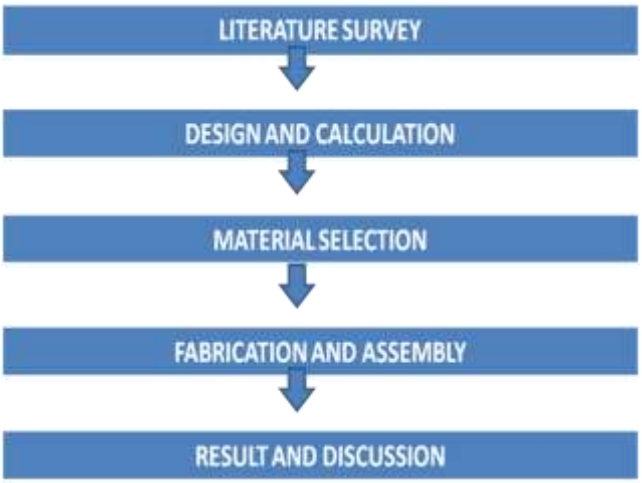
Performed Real time Study for Design. Analysis and Fabrication of Gearless Power Transmission by using Elbow Mechanism. They used 3 Nos. Of elbow rods inclined to the 90^0.Modeling and rendering of mechanism is done into the CATIA V5 and the analysis was carried on ANSYS. The mechanism was working between 80 to 100 RPM. after this it was concluded that It has a high scope in future to replace the cumbersome usage of gears which will be replaced simple, elegant usage of the shafts that will change the overall cost management of the industries using gear technology presently to gain more profits.

III. OBJECTIVES OF THE RESEARCH WORK

1) The main objective of the project is to, validate and obtain the most optimal design for the gearless power transmission.
2) The second most important objective is to discover its scope and applications
3) To obtain the easy and working models for the agricultural preposes
4) Using the engineering methods and link mechanisms for the agricultural development

IV. MATERIALS & METHODOLOGY

SR NO	PART NAME	MAT	QTY
1	FRAME	MS	1
2	MOTOR	STD	1
3	SHAFT	MS	2
4	HOUSING	MS	2
5	BENT LINK	MS	3
6	PULLEY	CI	2
7	PEDESTAL BEARING	CI	4
8	ANGLE ROD	MS	1
9	NUT BOLT WASHER	MS	10
10	WELDING ROD	-	
11	COLOUR	-	



V. RESULTS AND DISCUSSIONS

The final design thus obtain is capable of transmitting torque and power at an angle of 90º . With further research and advanced analysis in the design wide-ranging application of the drive can be discovered. The model works correctly as per the design in the 2D diagram given.

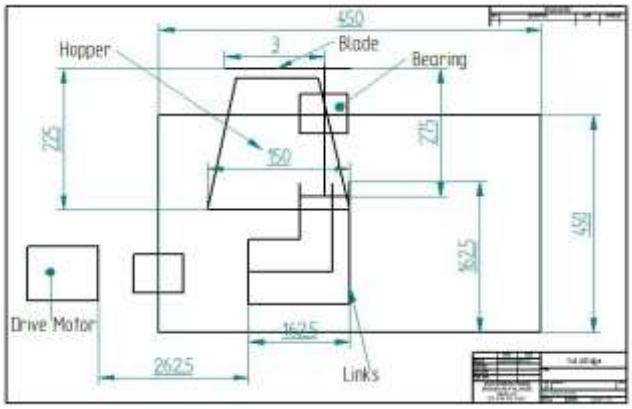


Fig. 2: 2D diagram of model in top view

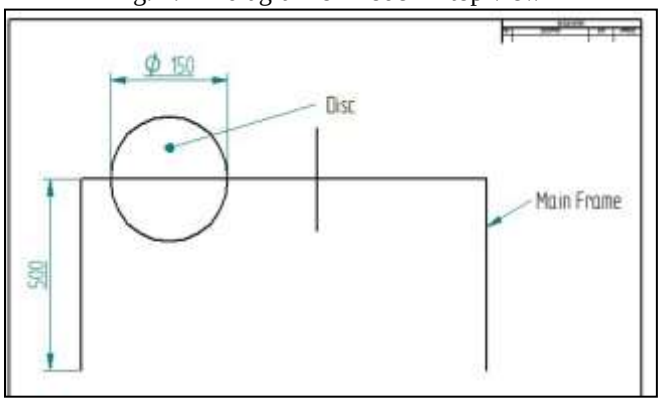


Fig. 3: 2D diagram of model in front view

The application in the model is chaff cutter, a blade is attached to the drive shaft that has a torque to cutting the grass.

VI. CONCLUSION

This projects which looks very simple & easy to construct was actually very difficult to conceive & imagine without seeing an actual one in practice.

We find that while acceptable analysis for existing mechanism can often be made quite easily we cannot without insight & imagination make effective synthesis of new mechanism hence we are mould to present this our project gearless transmission at 90*(El-bow mechanism) which we have managed to successfully device after long & hard input in conceiving its working principle.

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