

“Research Paper on Gearless Power Transmission by Using Elbow Mechanism”

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ABSTRACT— Gearless transmission mechanism transmits power from input to output shaft by means of sliding links that form revolute pair with the hub. Links bent at required angle slide inside the holes in the hub. Thus, as the holes in input hub rotate; it pushes the links and in turn output hub is rotated. This mechanism can be used as a replacement for bevel gears in low cost, low torque application. It can transmit at any angle 0 to 180 degree. In this paper the mechanism is studied and a possible go-kart transmission layout is fabricated and few future applications are suggested.

Keywords: Gearless Transmission, Elbow Transmission, Universal Joint, Power Transmission.

I. Introduction:

Today we are leaving in the technological era. Due to the advancement in the technology various fields are developed in the sector. Therefore to build the bridge of gap between knowledge and industry, the subject called project is included in the syllabus of Engineering. In shortly project can be defined as,

P: Planning before carrying out work

R: Raw material required for work

O: Organization of the work

J: Joint efforts put together in the work

E: Estimate of material required for work

C: Costing of work

T: Techniques of performing of work

Engineer is constantly conformed to the challenges of bringing ideas and design in to reality. New machine and techniques are being developed continuously to manufacture various products at cheaper rates and high quality. The project “GEARLESS POWER TRANSMISSION BY USING ELBOW MECHANISM” being compact and portable equipment, which is skilful and is having more practice in the transmitting power at all angle without any gears being manufactured. The parts can be easily made and price is also less. The Cylinder-piston Mechanism transmits the input power towards the output side such a way that the angular Forces produced in the slacks are simply transmitted with the help of Lego coupling mechanism which takes up the I/P power and the angle drive is transferred towards the O/P slack and Cylinder-piston assembly. Hence very little

friction plays while the power is being transmitted. Therefore, it is appreciated that efficiency as high 90-92% is possible in Universal Hobson Mechanism.

In today’s world energy is the prime requirement in each and every field. As the world is progressing towards the 22nd century every bit of energy becomes crucial because there sources that we have for producing energy is very limited and soon will be getting finished. A Hobson's joint or Hobson's coupling is a type of right-angle constant velocity joint, rods bent 360° are able to transmit torque around a corner because they are all free to turning

their mounting holes in both legs of the coupling .Angel between in eisa piston-based engine typically fed by steam or compressed air to drive a flywheel or mechanical load. It is based on a mechanism known as a Hobson's joint. Although not commonly used today for practical purposes, it is still built by hob by is for its uniqueness. This mechanism is also termed as Gearless transmission mechanism .The purpose of this mechanism is to transmit the input power to output side at full angle (360°).This mechanism is very useful for transmitting the motion at full angles .The main feature for this mechanism is comparatively a high efficiency between input and output power shafts with regards to gear efficiency. This system demonstrates efficient gearless transmission of power at right angle .This is a ves gear manufacturing time and costs along with teeth matching and gear placement is The elbow mechanism i s an efficient design of gearless transmission technique and the kinematics system that allows for efficient power/motion transmission at full angle.

Literature Survey:

Patel Harshil K et al - estimated the design stress of the shaft and housing of the transmission setup for proper and smooth working of the shaft by selecting the desired factor of safety.

Thalanki G Vamsi Krishan et al - Analysis and simulation of the Gearless transmission mechanism. The system will be analyzed in the software of the Solid Works package to observe the response of the bars to the elbow and also of the cube (together with the axis). Motion analysis is performed by operating the mechanism at 15 rpm and higher speeds, the reaction forces and the reaction moment are plotted against the 5-second clock execution using the rear processor. Theoretical calculations are performed to obtain the allowed voltage using the values of the design data. As a result, the response of the elbow bar and the cube is examined to find the allowed speed of the mechanism. Stainless steel elbows of 7.55 mm diameter were used. It is concluded that for a smooth and safe operation of the mechanism, it must be kept below 140 rpm. With this study, it is concluded that the gearless transmission mechanism is able to operate up to 120 rpm under normal conditions. Further fatigue analysis for the gearless transmission mechanism is recommended.

Puneet Pawar et al - Shows the gearless power transmission arrangement used for skew shafts. 3 Bend links were used in the elbow mechanism. While working on experimental it brings that to put forward the process used for any set of diameters with any profile of shafts for skew shafts of any angle but the shaft's must be having the rotational motion about his own axis, transmission of motion is very smooth and used only for the same R.P.M. of driving shaft and driven shaft to make use of pins for suitable joints for revolute pair.

R. Ranjith Kumar et al – Although this transmission is an old one many mechanics are skeptical about its operation, however it is not only practicable but has proved satisfactory for various applications when the drive is for shafts which are permanently located at given angle. Although this illustration shows a right angle transmission this drive can be applied also to shafts located at intermediate angle between (0 and 90 degree) respectively. In making this transmission, it is essential to have the holes for a given rod located accurately in the same holes must be equally spaced in radial and circumferential directions, be parallel to each rod should be bent to at angle at which the shaft are to be located. If the holes drilled in the ends of the shafts have “blind” or Savitribai Phule Pune University, Pune Suman Ramesh Tulsiani Technical Campus Faculty of Engineering B.E (Mechanical) 7 closed ends, there ought to be a small vent at the bottom of each rod hole for the escape of air compressed by the pumping action of the rods.

Methodology: -

For the development of our Final year Project we search for Problem and we observed the Hobson Mechanism of power transmission which is best way of gearless transmission but the main problem with this mechanism is that this

mechanism is only transmit power at 90degree in only perpendicular direction Due to this we can work on this project and we make an Universal Hobson Mechanism which transfer power at 360degree at various angle and it not loss the any type of energy in the process for the development of project we will follow the methods as follows.

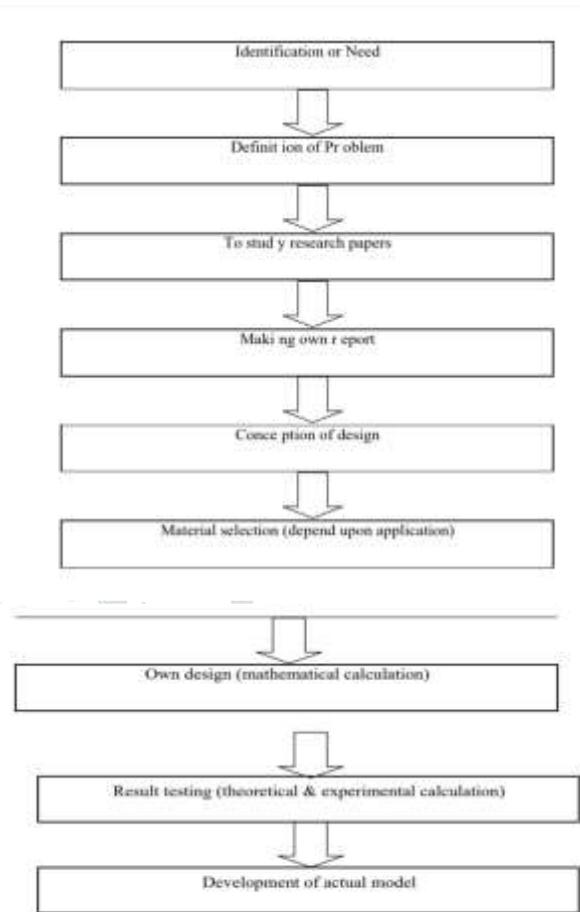


Fig.4.1 Flow Process Chart

Methodology should contain detailed information regarding following things in subtitle:

Material:-

4.2 Table :- material

Sr. No	Parts name	Size(in mm)	Material	Quantity	Cost(Rs)
1,	Circular Disk	Ø85mm	Nylon	04	400/-
2,	Column	40x15	M.S	02	600/-
3,	Circular Bars	Ø10	Steel	06	450/-
4,	Driving, Driven shaft	Ø12mm	M.S	02	100/-
5,	Plywood	18x24 inch	-	01	400/-
Total					

Working Principle:-

The Gearless transmission or El-bow mechanism is a device for transmitting Motions at any fixed angle between the driving and driven shaft. The synthesis of this mechanism would reveal that it comprises of a number of pins would be between 3 to 8 the more the pins the smoother the operation.

These pins slide inside hollow cylinders thus forming a sliding pair. Our mechanism has 3 such sliding pairs. These cylinders are placed in a Hollow pipe and are fastened at 120° to each other. This whole assembly is mounted on brackets wooden table. Power is supplied by an electric motor. The working of the mechanism is understood by the diagram. An unused form of transmission of power on shaft located at an angle. Motion is transmitted from driving to the driven shaft through the rods which are bent to conform to the angles between the shafts. These rods are located at in the holes equally spaced around a circle and they are free to slide in & out as the shaft revolves. This type of drive is especially suitable where quite operation at high speed is essential but only recommended for high duty. The operation of this transmission will be apparent by the action of one rod. During a revolution. If we assume that driving shaft "A" is revolving as indicated by arrow the driven shaft B will rotate counter clockwise. As shaft A turns through half revolution C shown in the inner and most effective driving position slides out of both shafts A & B. The first half revolution and rod "C" then will be at the top then during The remaining half this rod "C" slide in wards until it again reaches to inner most position shown in Fig. in the meanwhile the other rods have of course passed through the same cycle of movements all rods are successively sliding inwards and outwards. Although this transmission is an old one, many mechanisms are doubtful about operation. However it has proved to be satisfactory or various applications when the drive is used for shafts which are permanently located at a given angle. This illustration shows a right angle transmission drive.

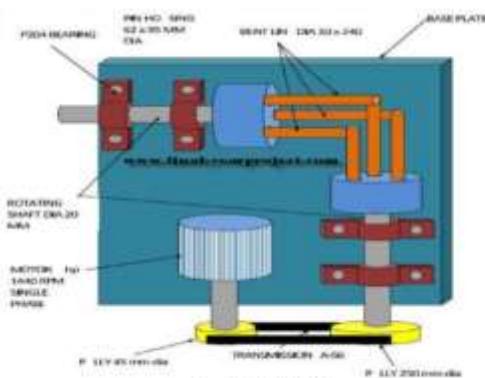


Fig.1.2.1 Block diagram

Motion is transmitted from driving shaft through the pins, which are bent to conform the angle between two shafts. These pins are located in the holes which are equally spaced around the circle and they are free to slide in and out as the shafts revolve. This type of drive is especially suitable where operation at high speed is essential, but it is usually recommended for light duty. The operation of this transmission will be easy by the action of fine feed during a revolution. If we assume that driving shaft is revolving in clockwise direction, then the driven shaft will rotate counter clockwise. As effective driving position slides out two pins during the first half of revolution and the third pin will be at the top. Thus when the input shaft will rotate the pins will slide inward and outward causing the output shaft to rotate in the given angle. One application thus proved successful, it

was on especially multi spindle drilling machine for drilling meter cases. This transmission was used to replace universal joints consisting of forked ends. In making this transmission it is essential to have the holes for given pins located accurately in the same relative position in each slack. All holes must be equally spaced in the radial and circumferential direction. If the holes drilled in the end of the slack having blind or closed ends, they should have a small vent at end of pins. These holes are useful for oiling to avoid blinds holes. The working of the mechanism can be easily understood by the figure. Motion is transmitted from driving to drive shaft through the pins which are bent to conform the angles between the shafts. These pins are located in the cylinders equally spaced around the periphery of the supporting plate. These pin are free to slide in and out as the shaft revolve this type of drive is especially suitable for quite operations at high speed. But it is only recommended for light duty.

Our work proposes a setup for angular transmission of power using rigid links. The set up consists of similar disks with drilled holes on the periphery. They are attached to the driven and the driver shafts. An angular link is made to freely slide inside the holes. The link is inserted into one side into the driver and the other in the driven shaft. Thus the power can be transmitted flawlessly. The angle of transmission depends on the angle at which the links are bent. This is the simplest way to transmit rotation between intersecting shafts. Driving and driven shafts rotate regularly. More power can be transmitted through this proposed model. Also there is no friction loss in the moving parts of the transmission system in this model. It is more economy and efficient. By angular transmission we can drive the wheel.

Result and Discussion:

we perform this experiment practically by using a motor of 700r.p.m and take the reading of outlet shaft there are some deflection are occur but this are negligible so they do not harm our efficiency so much A. Accuracy of GPS coordinates

there's no GPRS property available, like in tunnels and remote areas.

Power transmitted by motor $P = 700\text{r.p.m}$

Power output from Driven shaft $P_o = 682\text{r.p.m}$ Wastage of power is = 0.15-18%

Deflection occur is 0.15-18%

Efficiency of mechanism Is 99.95%

Conclusion & Future Scope:

The model works correctly as per the design. With the help of this system, we can efficiently reduce the cost in power transmission. Further advancement in this technology can be made. For future enhancements, Analysis of the mechanism with higher no of elbow rods is recommended. Torque capacity can be increase. Flexible bent links can be

used. Has a bright future in automation and robotics. Can be used in automobile industry in near future.

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