



DESIGN, FABRICATION & ANALYSIS OF A GEARLESS POWER TRANSMISSION MECHANISM FOR SKEW SHAFTS

Hawaldar¹, Rekha Fartiyal², Ram Naresh Yadav¹

¹Dept. of Mechanical Engineering

Shri Ram College of Engineering and Management (SRCEM) Palwal Haryana

²Dept. of Mechanical Engineering Vivekanand Institute of Technology and Science Ghaziabad

Abstract: The main aim of this review paper is to give detail study about the gearless power transmission mechanism at right angle (90^0) with the help of L-shape rod (EL-BO ROD) of uniform diameter,

Dimension (Identical rod). The mechanism is very important defining application in replacement of gear. It is mainly based on the theoretical, analytical and Finite Element Method (or FEA). Figuring of various parameters such as number of pins, material, dimension difference of component, speed and torque. Gearless power transmission for skew shafts minimize the losses, costs and save the time and space. This system countenance the changing in the orientation of shaft during motion which is very interesting and bewitching about this mechanism. Odd pins or links like 3, 5, 7, 9...must be used in this system and each links are fixed in the drilled hole at both ends of the shafts due to which motion is transferred. Functionally the system is very smooth and work effectively with a very minimum amount of power losses.

Keywords: *Driving Shaft, Driven Shaft, Bearing, Elbow Rod, Supporting Frame and mechanism*

Introduction: Current era of engineering requires speed on each and every field. Hence rapidness and quick working is the most important. Now days for achieving rapidness,

various machines and equipment's are manufactured. Gears are costly to manufacture. Its need to increase the efficiency of transmission which cannot be done using geared transmission.

Gearless transmission mechanism is capable of transmitting power at any angle without any gears being manufactured. So here we introduced a mechanism which is very important defining application in replacement of gear. It is mainly based on the theoretical, analytical and Finite Element method. Figuring of various parameters such as number of pins, material,

For Correspondence:

rohit.chauhan1603@gmail.com

Received on: March 2018

Accepted after revision: April 2018

Downloaded from: www.johronline.com

DOI:

dimension difference of component, speed and torque. Gearless power transmission for skew shafts minimize the losses, costs and save the time and space.

This system countenance the changing in the orientation of shaft during motion which is very interesting and bewitching about this mechanism. Odd pins or links like 3, 5, 7, 9.....must be used in this system and each links are fixed in the drilled hole at both ends of the shafts due to which motion is transferred. Functionally the system is very smooth and work effectively with a very minimum amount of power losses. Also during analysis of mechanism and working it is seen that this gearless transmission can be used for both intersecting shafts and skew shafts but here we introduced a solution for skew shafts so main attention is towards the skew shafts.

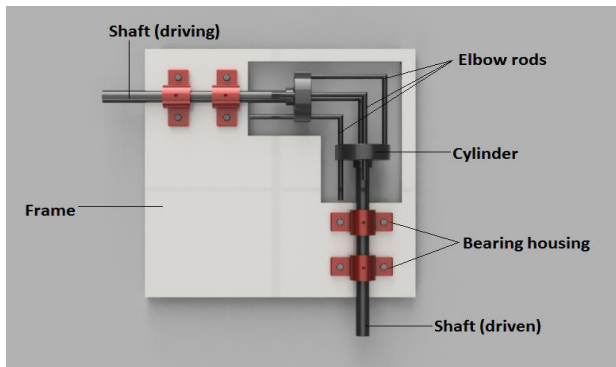


Fig 1: General layout of mechanism

Working: The gearless power transmission or EL-Bow power transmission mechanism is a mechanism possesses single degree of freedom used for transmitting the motion at any definite angle between the two shafts. The synthesis of this mechanism would divulge that it comprises of a number of pins would be in between 3 to 8, the more the pins the smoother the operation. This odd number of pins skid inside the hollow cylinders thus forms a sliding/skidding pair. Our mechanism deals with 3 such sliding pair. The two ends of the shaft possesses two identical flange each flange have 3 cylindrical holes at 120° to each other.

This entire assembly is mounted on the wooden board having dimension $500\text{mm} \times 350\text{mm}$. The input power is given by an electric motor. The working of such mechanism can understand by the diagram shown below. The unused form of

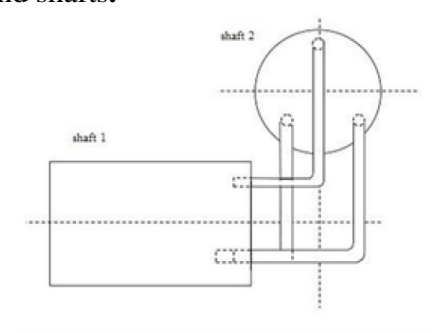
power transmission on shaft located at an angle. The motion is transmitted from driving to the driven shafts through the rod which are bent to conform to the angles between the shafts. These rods are located in cylindrical holes equally spaced around a circle and they are free to slide in & out as the shafts revolve. This type of power transmission is generally suitable where quite operation at high speed is essential but only recommended for high duty.

Proper position of two ends of shafts is required to slide each rod in the definite direction. The rod dimension is design based on the power transmission criteria.

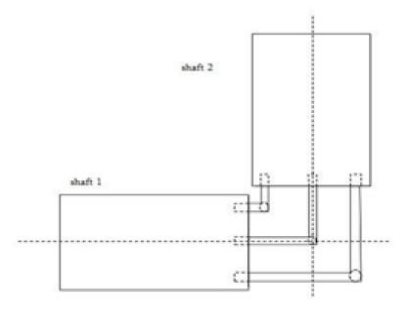


Fig 2: Working of gearless power transmission

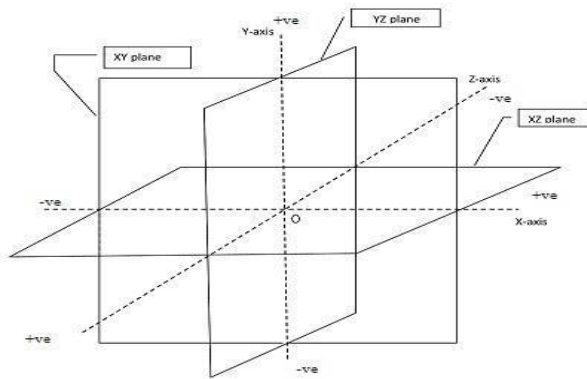
Different types of views of mechanism: Views of the mechanism are shown in Figure given below. These views show the arrangement of links and shafts.



(a)



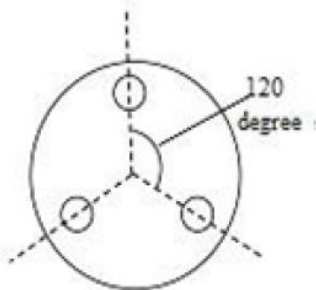
(c)



(b) View of planes

TABLE: PIN ARRANGEMENT

No. of pins	Angle between consecutive hole(degree)	Is value of angle with any integral equal to 180 degree	Value of integral
2(even)	180	Yes	1
3(odd)	120	No	No integral
4(even)	90	Yes	2
5(odd)	72	No	No integral
6(even)	60	Yes	3
7(odd)	51.43	No	No integral
8(even)	45	Yes	4
9(odd)	40	No	No integral



Details of Material

S.No.	Part's Name	Material	Dimension (mm)	Quantity
1	Frame	Wood	500x350	1
2	Circular Disk	MS	Dia150x70	2
3	Shaft	Silver Steel	Dia20x400	2
4	Bent Link	BMS	Dia10x150	3
5	Bearing	CI	UCP 204	4
6	Nut & Bolt	MS	-----	8

Conclusion: After long wordily it is mentioned that the projected mechanism used for any set of diameter with skew (or any profile of shaft) of any angle but the shaft must be possesses the rotational motion about its own axis, power transmission is much smooth and worthy and applicable for the same revolution per minute of both driving and driven shaft by engaging links or given links for harmonious joints for revolute pair.

Functions of some successful mechanical devices is smoothly however fly they are made while some other does this only by virtue of an accurate construction & fitting of their moving parts.

The mechanism looks very simple and easy to fabricate, actually very tough to conceptualize and envisage without observing a real one in practice. Firstly study on the desirable motion and we have done that everything.

We ascertain that while satisfactory analytic thinking for existing mechanism can often be Made quite easily we cannot without insight & imagination make effective synthesis of new mechanism hence we are cast to present this project gear less transmission mechanism at 90° which we get managed to successfully device after hard input and long work in conceiving its working principle.

References

1. Prof R. Somraj, B. Sailesh , “Design and Fabrication of Gearless Power Transmission For Skew Shafts”, *International Research Journal of Engineering and Technology (IRJET)* , Volume: 04 Issue: 04 | Apr -2017
2. Shiv Pratap Singh Yadav, Sandeep G M, Rudra Naik, G C Keerthi Prakash, Gaurav Kulkarni, Hemanth Kumar S, Thalanki G Vamsi Krishna, “Design, Analysis and Fabrication of Gearless Power Transmission by using Elbow Mechanism” *International Journal of Engineering Research & Technology (IJERT)* Vol. 6 Issue 04, April-2017
3. Prof. B. Naveen Bardiya, T. karthik, L Bhaskara Rao “Analysis and Simulation of Gearless Transmission Mechanism”, *International Journal Of Core Engineering & Management (IJCEM)* ,Volume 1, Issue 6, September 2014, Page.no: 136-142.

4. Gearless transmission for speed reduction through rolling motion induced by wobbling motion, US patent no. 6,113,511, September 5, 2000.
5. PSG Design data Book. Solid Works Corporation, 2002. Solid Works Student Workbook.
<http://www.Solidworks.com/education.>,
Document No: SWSWBENG0402.