GEARLESS TRANSMISSION THROUGH ELBOW MECHANISM

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Abstract:

The transmission of power with minimum losses is the main criterion for calculating the efficiency of the machine. Most machines use gear transmission from inlet to outlet but have the most power loss due to friction. An investigation in this field has brought new ideas to transmit power using different mechanisms. This document studies and trains the new mechanism by replacing the bevel gear with a 90° elbow that is used to transmit power. This transmission system indicates that there is the possibility of transmitting power at a right angle without gears efficiently. In this work, the power is transmitted with six elbows connected radially at an angle of 60° to the center of the axis.

Keywords—Gearless mechanism, Skew shaft, Component of the model and its operation, Design of Shaft, Hub, Elbow.

I. INTRODUCTION

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 the resources that we have for producing energy is very limited and soon will be getting finished.

To transmit motion and power from one shaft to another which are not parallel and co-planar bevel gearing are generally employed. Thus, there are some little disadvantages associated with bevel gearing stated as complexity in manufacturing, high cost of replacement. To overcome all these heavy work, we have a mechanism which transmits motion between the 2 non-parallel (intersecting) and co-planar shafts. The mechanism comes to known as Gearless elbow mechanism. It consists of elbow rods, hub and shaft. Gearless elbow mechanism works on the principle of slider and kinematic chain principle.

II. LITERATURE REVIEW

AtishLahuPatilet al [1] explained and did the gearless elbow mechanism setup with three elbow rods with obtuse angle of 120° for transmission of power in the wood cutting machine.

Amit Kumar and Mukesh Kumar [2] have designed the link mechanism from the input shaft to output shaft to achieve perfect rolling and sliding pair of the mechanism.

Jagushte G. S et al [3] 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.

Navneet Baradiya et al. [4] 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.

Amit kumar et al. [5] 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.

III. WORKING PRINCIPLES

The Gearless or El-bow transmission mechanism is an equipment for power transmission at any desired angle between the drive shaft and the impeller. The creation of this mechanism would reveal that it contains a number of connections between 3 and 8, the more links there are, the smoother the operation will be. These connections slide into the housing to form a sliding and sliding pair. This mechanism has 3 of those sliding pairs. These cylinders are placed in a hollow tube and fixed at 60 ° from each other. This experimental configuration is mounted on a wooden table. Power is supplied by an electric motor. The operation of this transmission will appear from the action of an auction during a single revolution. If the drive shaft rotates clockwise, the driven shaft will rotate counterclockwise. When the input shaft rotates through the semi-rotational bend bars shown in the innermost and most effective driving position, it flows away from the input and output shafts.

Elbow mechanism with a right-angle configuration, in the same way that the configuration can be flexible to differentiate any angle (0°-90°). It is important to have the holes for a given rod positioned precisely in ithe holes must be equi-spaced in the radial and circumferential direction, being parallel to each rod must be bent at an angle with which the axis will be located. If the punched holes at the ends of the shafts have "blind" or closed ends, there must be a small opening at the bottom of each hole in the rod for the exit of the compressed air from the pumping action of the rods. These holes are useful for greasing to avoid blind holes. Trees can have a light or an enlarged shoulder. This transmission is positioned centrally and in line with the axis of each axis and with the condition that with a circular groove in each rod or a transverse pin to allow rotation of the shaft around the rod simply active as a retaining device for the shipping and handling purpose.

IV. COMPONENTS OF MODEL AND OPERATIONS

This section shows different views of the layout and components used for layout, which is necessary for understanding the correct layout and operation of the layout.

A. View of planes

Here in the below diagram, the plans are shown in 3D, which helps us to understand the mechanism and movement of the axes and the connection used.
B. View of the shaft

shows a different view of the axis arrangement that is polarized and the angle between them is 90 degrees, which helps us to understand the layout of the axes.

C. Views of setup

Different views of the setups are shown in Figure (a) Front view. (b) Side view (c) Top view. These views show the arrangement of links and shafts.
D. Views of the Pins

Here different views of the pins according to the setup are shown (a) Front view (b) Side view (c) Top view. These pins are used to transmit energy when there is no change in the orientation of the axes during movement.

V. METHODOLOGY
1. Study of research papers.
2. Design of shaft, rod and bend links.
3. SolidWorks simulation feature is used to find out stress
4. Fabrication of shaft, rod and elbow.
5. Mounting of shaft on wood board/iron board.
6. Assemble the all part.
7. Evaluating design moment and force and calculation.
8. Compare the actual result with model and suitable application.

VI. CONCLUSION
The gearless power transmission is best and running ideas of the technology. It has a good scope in future to replace the heavy usage of gears which will be replaced simple, stylish usage of the shafts that will reduce the overall cost management of the industries using gear technology presently to gain more profits. During the work in the experimental configuration and after a long discussion it is observed that the proposed layout is used for any series of diameters with any axis profile for oblique axes of any angle, but the axis must have the rotation movement only from the shaft, the motion transmission is very smooth and desirable and is used only for the same RPM regime of the driven shaft and the driven shaft through the use of pins or types of data connections for joints suitable for the revolutionary torque.

VII. REFERENCES
2) PSG Design data book by Dr. P. Mahadevan.
4) Gearless transmission for speed reduction through rolling motion induced by wobbing motion, US patent no. 6,113,511, September 5, 2000.


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