

Designing and Fabrication of Gear less Power Transmission System

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Abstract— This paper represents real time study of gearless transmission mechanism. Today’s world 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 are manufactured by man. This transmission system is to be analyses in UniGraphics software to study reaction of elbow rods and hub and then the fabrication of mechanism is carried out. The Fabrication model analysis of the hub dimension and focus on speed of rotating object is being presented in this paper. The project Gearless Transmission is being compact and portable equipment, which is skilful and is having something precise in transmitting power at right angle without any gears being manufactured.

Key words: Elbow Rods, Gearless Power Transmission, Unigraphics, Hub

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. For transmitting motion and power from one shaft to another which are non parallel or intersecting and co- planar bevel gearing are generally employed. But there are some inherent disadvantages associated with bevel gearing stated as complexity in manufacturing, high cost of replacement. To overcome all these difficulties we have a mechanism which transmits motion between the two non-parallel (intersecting) and co-planar shafts. The mechanism is known as Gearless elbow mechanism is equipment consisting of elbow rods, hub and shaft. Gearless elbow mechanism works on the principle of slider and kinematic chain principle [1].

This time world requires speed on each and every engineers field are confronted to the challenges of efficient transmission of power. Gearless transmission is an ingenious link mechanism of slider and kinematic chain principle. It is also known as ELBOW mechanism. This project is the equipment useful to improve the quality of gear being manufactured and can be made in very less time. The component is exceptionally cornering or transmitting movements at right points. However in certain mechanical application gearless transmission at right angle can likewise work at insensitive or exact edge plane can be contrasted with worm and worm rigging or slant and pinion gear which are constantly utilized as a part of the business for various application. Similarly high proficiency between the info and the yield power shafts as to the rigging efficiencies [2].

II. OBJECTIVE

The objective of this project is to understand and implementation of elbow mechanism for the transmission of

power from one shaft to another shaft which are in right angle without the usage of gears.

To analysis the revolution speeds at specific hub dimension on the basis of fabrication model.

III. LITERATURE SURVEY

A. Skew Shaft

The term “shaft”, used in this standards has a wide meaning and serves for specifications of all outer elements of the part , including those elements , which do not have cylindrical shapes And “skew” means non parallel and non-intersecting so the shafts which are non-parallel and nonintersecting are known as skew shafts. Gears: Gears are used for transmitting power from one part of the machine to another. Gears are usually made of metal and have high strength as they have to run at high speed and transfer power efficiently.

Functions of gears are:

- Increase speed
- Increase force
- Change direction.

Types of gears used for transmission of power at Right Angle:

- Bevel & Pinion Gear
- Worm & Worm Gear
- Hypoid gears

B. Elbow Mechanism

The Elbow Mechanism is the mechanism which is used to transmit power though strong shafts which are bend at 90°. In this the power is given to the outer plate and the outer plate rotates through which the L – shaped shafts and through which the power is transmitted to other plate which is present at an angle of 90°. Hence very little friction plays while the power is being transmitted [1]

IV. METHODOLOGY

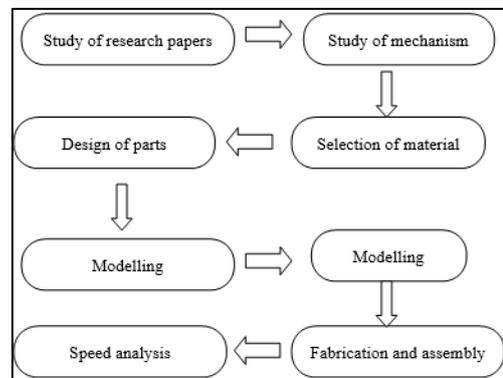


Fig. 1: Methodology

A. Parts Specification and Material Properties

Body	Diameter (mm)	Length (mm)
Elbow rods	8	300

Hub	120	10
Shaft	20	300

Table 1: Parts specification

Body	Body material
Elbow rods	Stainless Steel
Hub	Copper alloy
Shaft	Mild steel
Bearing	Mild steel
Wooden board	Wood

Table 2: Parts specification

B. Development

Body	Body material
Elbow rods	Stainless Steel
Hub	Copper alloy
Shaft	Mild steel
Bearing	Mild steel
Wooden board	Wood

Table 3: Development

- The basic design of parts and assembly in UniGraphics.
- The following figure shows the isometric view of the rendered picture from the UniGraphics Software model.

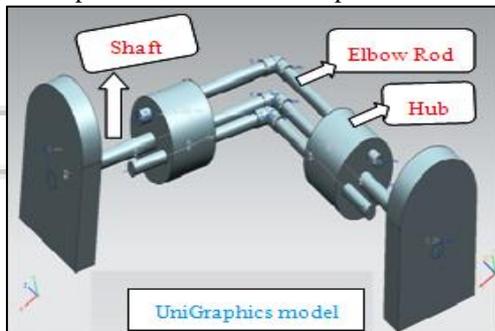


Fig. 2: Model of 3 rod mechanism

C. Collecting of all the different materials

- Shafts, Elbow rods and hub are required and are being used here to transmit the power from one position to the other.
- Carpentry items use of bushes and other items for connecting the wooden pieces along with the shafts for proper power transmission.
- The motor being used here is of power.

D. Assembly

- First the base plate was fitted with the supports under it.
- Then motor and shaft assembly separately was fixed to the base plate.
- Now comes the main part of the picture- the discs with the L-shaped frames was coupled with the
- Shafts
- Finally the shaft assembly on the other side was also been attached.
- Total assembly was done and some painting work is done for good visual appearance.
- Finished product was obtained.



Fig. 2: preparation of Base plate



Fig. 3: Fabricated model of Gearless Transmission system

V. ANALYSIS

After finishing the working model we use motor (1/4 hp) to rotate the shaft and hub we can see speed of shaft in tachometer which are following figure3.



Fig. 3: Measure the speed of shaft with tachometer

A. Theoretical calculation & result

$$\text{Power of motor (P)} = 0.25 \text{ H.P} = 746 \times 0.25 = 186.5 \text{ N-m/s} = 186.5 \text{ Watt}$$

$$P = 2 \times \pi \times N \times T / 60$$

$$\text{Where, } N = \text{Rpm of motor} = T = \text{Torque}$$

$$\text{Torque transmitted: } T = \frac{P \times 60}{2 \times \pi \times N}$$

$$T = (186.5 \times 60) / (2 \times 3.14 \times 60)$$

$$T = 29.69 \text{ Nm}$$

The final design thus obtained is capable of transmitting torque and power at right angle with three elbow rods and hub.

VI. ADVANTAGES AND LIMITATIONS

The gearless power transmission system was mainly made in order to reduce the usage of gears which are complex in design and to reduce the wear conditions that occur in gear over a period of time which would require high cost of manufacturing for the replacement of the gear. This mechanism is simple, cost effective, and efficient compared to gears. Still the design has some of the cons that make infeasible in operations where sudden loads are applied and

also it needs to have the starting torque low for the functioning of the mechanism.

VII. CONCLUSION

The gearless power transmission is one of the budding ideas of the technology. 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.

This projects which looks very simple & easy to construct was actually very difficult to conceive & imagine without seeing an actual one in practice. Motions demands to be studied first & we have done that very thing. 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 gear less transmission at 90 degree (El-bow mechanism) which we have managed to successfully device after long & hard input in conceiving its working principle.

VIII. FUTURE SCOPE

- Working on stress concentration is recommended
- Working on aluminium as a prime material is Recommended.
- Fatigue analysis is recommended
- Analysis of the mechanism with higher no of elbow rods is recommended.

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