

Design, Analysis and Fabrication of Gearless Power Transmission by using Elbow Mechanism

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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 analysed in solid works software to study reaction of elbow rods and hub and then the fabrication of mechanism is carried out. The ANSYS analysis of the hubs 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.

Keywords— *Elbow rods, Gearless power transmission, CATIA V5, ANSYS*

I. INTRODUCTION

Today's 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.

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 90° without the usage of gears. In this the power to the motor is being provided with the help of a 6V battery.

III. LITERATURE SURVEY

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 non-intersecting 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

Elbow mechanism: The Elbow Mechanism is the mechanism which is used to transmit power through 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.

IV. METHODOLOGY

- Literature survey
- Basic rough sketch
- CATIA design
- Analysis
- Procurement of the components
- Fabrication
- Assembly

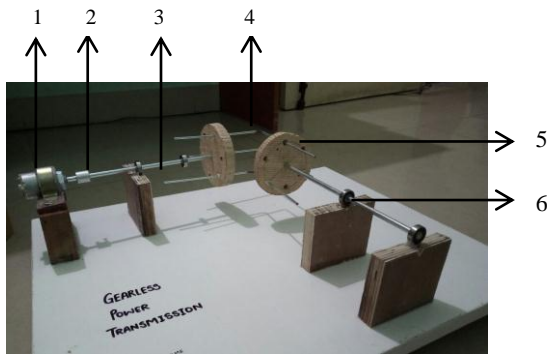


Fig 1: Fully assembled working model.

- | | |
|----------|--------------------|
| 1. Motor | 2. Shaft connector |
| 3. Shaft | 4. Elbow link |
| 5. Hub | 6. Bearing |

V. DEVELOPMENT

1. The basic design of parts and assembly in CATIA.
2. The following figure shows the isometric view of the rendered picture from the CATIA model.

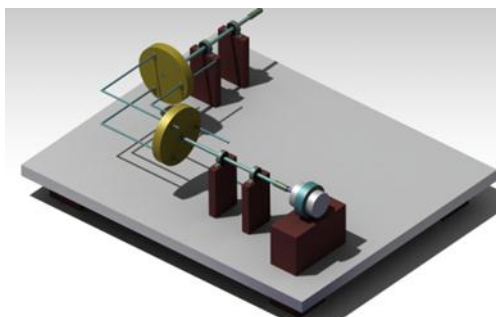


Fig 2: Rendered picture of the model (CATIA V5)

3. Collecting of all the different materials.
 - Shafts of particular length 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.
 - Motor
 - The motor being used here is of power.
4. 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.

V. ANALYSIS

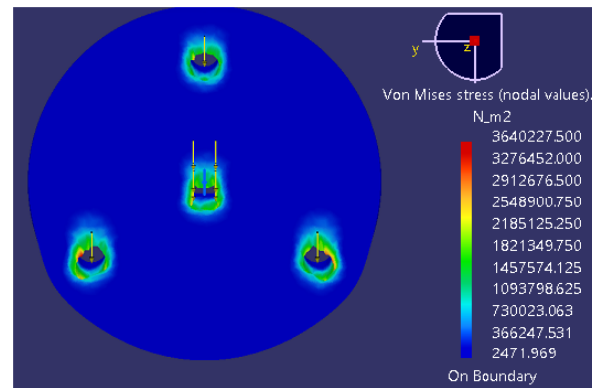


Fig 3: Stress analysis of hub (CATIA V5)

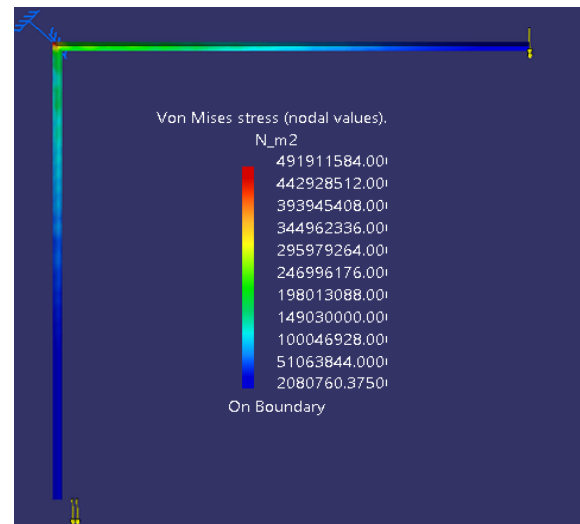


Fig 4: Stress analysis of elbow link (CATIA V5)

VII. RESULT

The above design was fully fabricated and designed to work under the range of 80 rpm to 100 rpm. This under FE analysis showed the working to be precise and apt to the calculations performed and the stress distribution obtained.

VIII. 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.

IX. 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

X. REFERENCES

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