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DESIGN OF PLANETARY GEAR TO USE IT FOR LAPPING OF WEDGE OF GATE VLAVE AND ITS BENEFITS OVER OTHER GEAR MECHANISM

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ABSTRACT

Planetary gears (PLG's) work as the name implies: the sun wheel is in the center and driven by the motor. It confers its motion onto three rotary planetary wheels which form a stage. They are arranged on the bearing bolt of a planetary carrier. The last planetary carrier in each case is rigidly connected to the drive shaft and so provides power transmission. On the outside the planetary gear wheels also rotate in a gearbox with internal gearing, the so-called hollow wheel.

Obejctives

Gear Operating Applications Aims at Two Basic Objectives

- To increase power transmission.
- To increase efficiency of system.

KEYWORDS: Planetary Gear, Lapping

INTRODUCTION

A gear or cogwheel is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part to transmit torque, in most cases with teeth on the one gear being of identical shape, and often also with that shape on the other gear. Two or more gears working in a sequence (train) are called a gear train or, in many cases, a transmission; such gear arrangements can produce a mechanical advantage through a gear ratio and thus may be considered a simple machine. Geared devices can change the speed, torque, and direction of a power source. The most common situation is for a gear to mesh with another gear; however, a gear can also mesh with a non-rotating toothed part, called a rack, thereby producing translation instead of rotation.

DESIGNING A PLANETARY GEAR

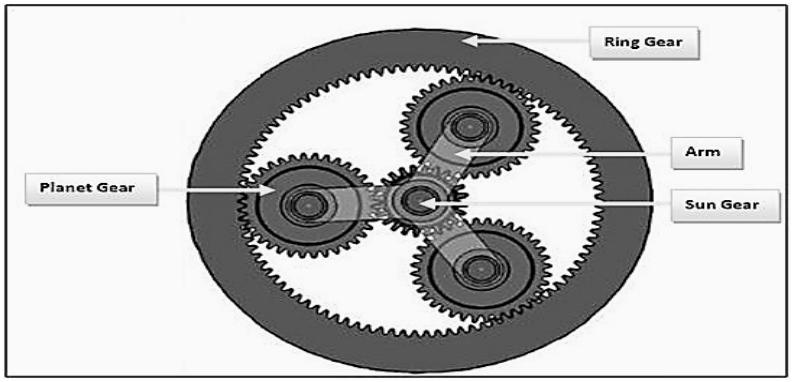

Figure 1: Showing Positions of Different Gear as Required

There are many other ways to use gears. One specialized gear train is called a **planetary gear train**.

CALCULATIONS REQUIRED FOR DESIGN

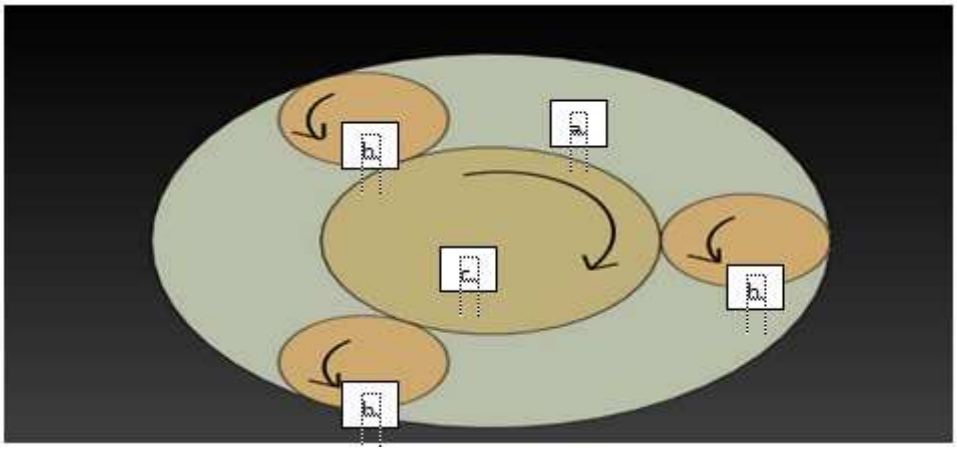

Figure 2: Showing Different Gear Movements

Let

Nc = + 20

Nb = - 100

Na = - 20

Where Na, Nb, Nc are rpm for gear a, b and c respectively

Then using following relation we get

$$\frac{Nc - Na}{Nb - Na} = \frac{-Tb}{Tc}$$

$$\frac{20 + 20}{-100 + 20} = \frac{-Tb}{72}$$

Tb = 36

Tc=72

$$\frac{1}{2} = \frac{Tb}{72}$$

Tb = 36

Ta=Tb + Tc

So Ta=144mm

Where Ta, Tb and Tc are no of turns of gear a, b and c respectively

Let m=4 and pressure angle = 20 degThenTa=144, Tb = 36,Tc=72

Da=m Ta =576mm and Db = m Tb =144mm also Dc = m Tc =288mm

Checking

Da=Dc+2Db So576=288 + 2(144) =288 + 288 and Da= 576

Where Da, Db and Dc are the diameters of gear a, b and c respectively

So the sun gear or Centre gear is given power with the help of motor ultimately it led to transmission of power to planet gears and led to their movement also.

Drawing Dimensions in Detail

Figure 3: Showing Actual Drawing Top View

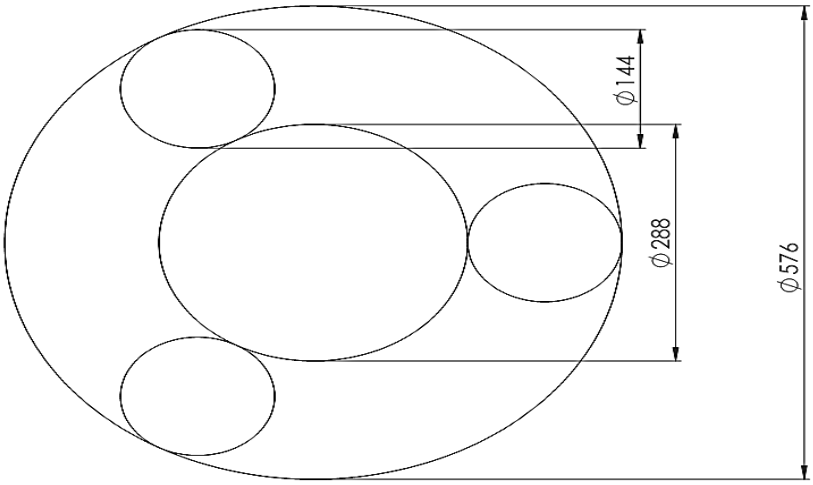

Figure 4: Showing Actual Drawing with Dimensions

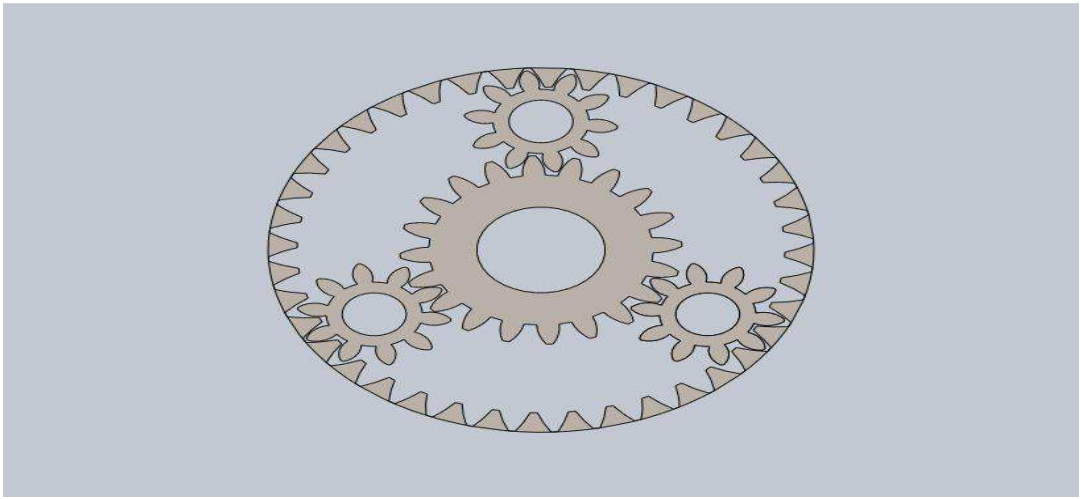

Figure 5: Actual Drawing Being Made in 3d Model

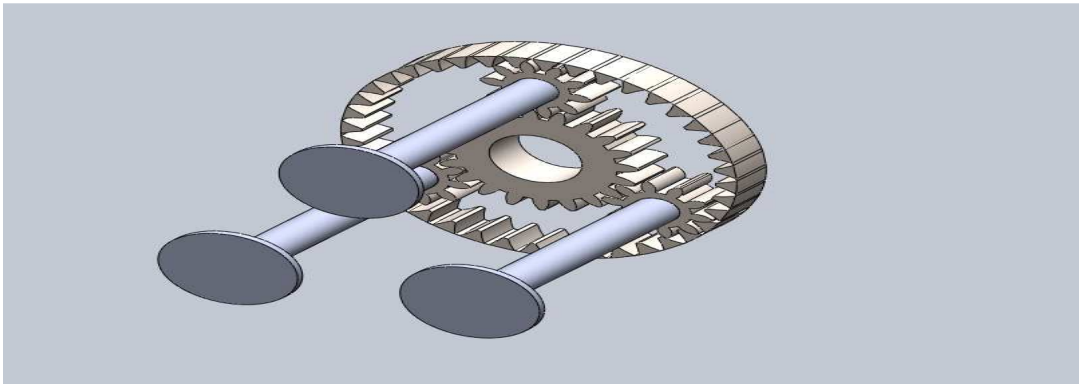

Figure 6: Actual Drawing Isometric View after Assembly (Mechanism for Lapping)

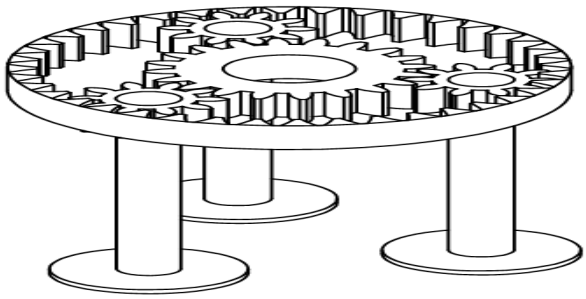

Figure 7: Actual Drawing view 2 after assembly in drawing format (mechanism for lapping)

USE OF DESIGN IN INDUSTRY

Figure 8: Actual View1 of Machine Where Planetary Gear Assembly is to be Used

Figure 9: Actual View2 of Machine Where Planetary Gear Assembly is to be Used

CONCLUSIONS

- Centre gear sun rotating at rpm of 20 led to other gears rpm up to 100.
- Design is suitable to be used for power transmission with greater efficiency
- Mechanism for lapping of wedge of wedge type gate valve with highly efficient performance.

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