

Design and Manufacture a mechanical motion rectifier incorporating a planetary gearbox

Aaron Ryan, Rhys Reynolds, Micheal Ambrose, Tristian Regan

Aim of the Project

The Aim of the project is to Design and Manufacture a mechanical motion rectifier that is to be incorporated into a Planetary gearbox.

Background

To find out a solid background for this project brief, the team got down to researching various different topics that are relevant to the project. These topics include: History

- How they work
- Efficiency
- Various designs
- Used for
- Cost

Planetary gears, which can supply a lot of speed reduction and torque in a small package, have operating characteristics beyond those of fixed-axis gear trains. The most basic form of planetary gearing involves three sets of gears with different degrees of freedom. Planet gears rotate around axes that revolve around a sun gear, which spins in place.

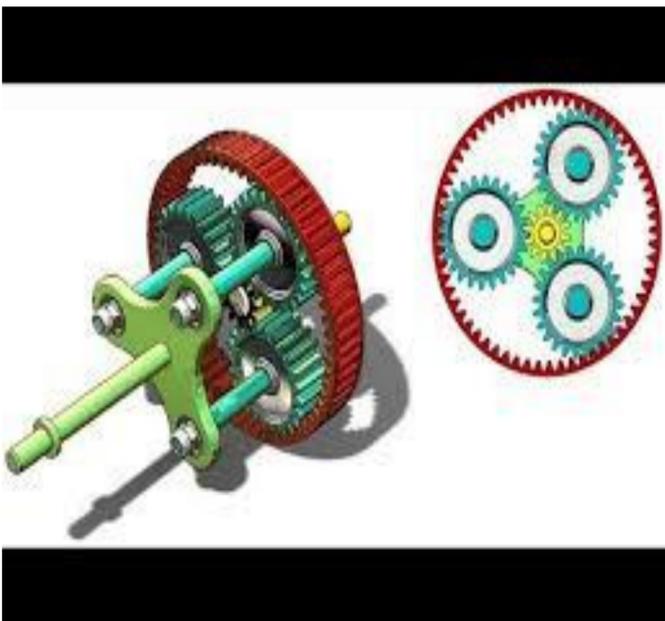


Figure 1. Arrangement of the planetary gearbox

Cost



Figure 2. inside view of planetary gearbox

- The machining costs and hours required to make the parts must be kept minimal.
- The materials selected for the project must be analysed for price per amount needed.
- A certain amount of the cost then needs to be set aside for specialized parts that can't be made in the workshop such as one-way bearings
- Due to limited access to the workshops, we sourced the parts rather than machining them, which saved time and money.

Manufacture

One Way Bearing

- One-way bearings are needed to only allow the centre or planetary carrier of the planetary gear system rotate in only one direction.
- There is only a need for 2 one-way bearings.



Figure 3. One-Way bearing

Planetary gear system

- This system incorporates 6 parts that need to be designed and manufactured,
- Planet gears (3)
- Ring gear
- Sun gear
- Planetary carrier
- Machining the parts will need specialized tooling.
- The gears need to be machined precisely and exactly the same to allow a perfect gear mesh.
- The internal gear or ring gear will need to be machined using a specialized tool
- The inside one way bearing was purchased off a machine parts dealer.
- We took measurements for the outside plate, which was then cut out by a steel fabricator.
- We then had all the parts and we were ready to start assembling the project.



Figure 4. assembly of the planetary gearbox

Conclusion

From completing this project, we believe that the project fits the aim of the brief, and works as a mechanical motion rectifier through a planetary gearbox. This mechanical motion rectifier has the potential to work efficiently while harvesting energy in whatever system it may be incorporated within. Although they are expensive gearboxes with many parts in them, we believe as a team that they are the most efficient gearboxes on the market and will start to be introduced more and more in industry within the coming years.



Figure 5. Mechanical motion rectifier within a Planetary gearbox

References

<https://www.machinedesign.com/mechanical-motion-systems/article/21834331/the-world-of-planetary-gears>