

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN OF A GEARBOX

M/991

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DESIGN OF A GEARBOX

by

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SUMMARY

Author's Name: Andreas Papandreou

Work title: Design of a Gearbox

The purpose of this project was to design a gearbox having 6 forward speeds and one reverse, driven by an engine giving 120kW of power. The gearbox to be designed was a sequential gearbox to fit on small racing cars. In order to design such a gearbox I had to check what gearboxes have been already designed from other engineers and decide about what type of a gearbox to design. I decided to design a sequential type gearbox, that I named "in line gearbox", able to work under racing purposes. I started reading information about gearboxes, ratios, bearings and many other things that are related to this subject and I made the calculations and drawings of a gearbox as I imagined it. Finally I came out with a racing gearbox having a strange gear selection, that is the gears are in line. That was also one of my objectives, to make a gearbox where the driver can change gears easy and very fast and I believe that I have achieved this at a great degree.

ACKNOWLEDGMENTS

I would like to thank a lot my project supervisor Dr. Lazaros Lazaris for his advises concerning my project.

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PROJECT INFORMATION

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PROJECT NUMBER: M/991

TITLE: " DESIGN OF A GEARBOX"

OBJECTIVES:

- **Carry out a survey on power transmission methods with emphasis on gear systems.**
- **Design a gearbox having 6 forward speeds and one reverse.**
- **The input speed of the gearbox is 5000 rpm.**
- **The maximum power of the engine 120 kW at 5000 rpm.**
- **Select appropriate gear wheels with suitable numbers of teeth to provide other speeds.**
- **Specify the output torque at each speed.**
- **Suggest possible uses of the gearbox.**
- **Provide detailed drawings of the gearbox components.**

Student: Andreas Papandreou

Supervisor: Dr.Lazaros Lazaris

Power Transmission Methods

In modern engineering there are many ways to transmit power and motion from one point to another. An engineer therefore has many options from which he has to choose the best one or the better one for his needs. Now in our days the most common ways for transmitting power and motion is the use of belts and the use of gears. The most important way for transmitting power and motion is by means of gears.

The use of gears has some advantages over other types of transmitting motion. Some of these advantages are mentioned below:

1. Reduction of slipping to a minimum.
2. Requires almost no maintenance (except for lubrication)
3. Climate conditions do not affect them.
4. Gears are compact components.
5. Variety of speeds can be achieved using gears.

Gears are mechanical devices that transmit mechanical power and motion. They are widely used for speed reduction or increase, torque multiplication, resolution and accuracy enhancement for positioning systems. Motion produced by gears in other words is a combination of sliding and rolling. The teeth of gears must be of sufficient strength to do the job required and must be designed so that they always mesh correctly and thus give a smooth transmission.

Usually gears are classified into 3 groups:

1. Gears, which transmit power between, parallel shafts that lie in the same plane. In this group, helical gears, herringbone and spur gears are included. (Figure 1).