

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN AND MANUFACTURE OF A
DEMOSTRATION MODEL GEARBOX

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DESIGN AND MANUFACTURE OF A
DEMONSTRATION MODEL GEARBOX

by

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Project Report
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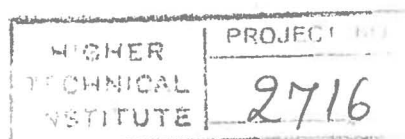
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Project Supervisor : Dr. L. Lazari



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SUMMARY

TITLE :

**DESIGN AND MANUFACTURE OF A
DEMONSTRATION MODEL GEARBOX**

WRITTEN BY :

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This project is a procedure where the candidate gets familiar with Gear Generation.

The following objectives must be satisfied :

1. Design of a simple model gearbox. Primarily the design is the calculations for manufacturing the gears on a gear generation machine.
2. Produce engineering drawings of the Gearbox.
3. Manufacture the gearwheels.
The Shaping Machine was decided that will be appropriate for the needs of this project.
4. Assumable the gearbox and test.

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INTRODUCTION

The purpose of this project, was to design and construct a demonstration model gearbox.

To understand the importance of mechanical systems for varying the speed consider the case of a car gearbox which the demonstration model gearbox is based on.

The purpose of the car gearbox is to vary the speed of a car, meaning the cases where high torque or high speed is needed.

High torque is needed when the car is starting to accelerate from a non moving position or when the certain car is overpassing a slower car.

High speed is needed when the car has reached a certain constant velocity and wants to accelerate in order to reach a higher velocity.

Also we can consider the case of machine tools for understanding the importance of gearboxes for varying the speed. In fact, most machine tools are so constructed that the speed of the cutting tool or of the part being operated upon can be varied, the range or extent of the variation depending upon the type of machine. These changes are desirable in order to cut different kinds of metal at the most efficient speed ; for example, soft brass may be turned, drilled, or planed at a much higher speed than cast iron or steel and by using the fastest speed that is practicable obviously the rate of production is increased.

The most important part of this project was that the gears had to be manufactured by the student on the shaping machine.

A gear is a mechanism which, by means of meshing teeth, transmits or converts motion, changing the angular velocity and torque between two moving systems.

Toothed gearing converts and transmits rotary motion between shafts with parallel, intersecting and non - parallel, non - intersecting (crossed) axes. It also converts rotary motion into translational motion and vice versa.

Furthermore toothed gearing is the most widely used and most important form of mechanical drive.

Gears are used in many fields and under a wide range of conditions, from watches and instruments to the heaviest and most powerful machinery. Peripheral forces from decimals of a gram to thousands of tons, torques up to a thousand ton - metres and power from negligibly small values to tens of thousands of kilowatts are transmitted, using gears of diameter from a fraction of a millimeter to ten and more meters.

In comparison to other mechanical drives, toothed gearing has essential advantages, namely:

- (a) small overall size
- (b) high efficiency
- (c) long service life and high reliability
- (d) constant speed ratio owing to the absence of slipping and
- (e) the possibility of being applied for a wide range of torques, speeds and speed ratios.