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**ISTANBUL GEDIK UNIVERSITY**

**DEPARTMENT OF MECHATRONICS ENGINEERING**

**MCTXXX NAME OF THE COURSE**

**TERM PROJECT REPORT**

**Project Name**

**TEAM NAME**

**123456 Name Surname1 123456 Name Surname2 123456 Name Surname3**

**ABSTRACT**

A summary of your project will be written here. The aim of the project, the method followed, the expected results and the actual results will be summarized. (1-2 Pages)

**Keywords :** Keywords of the Project / Report (Comma, Separated, Format)

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# 1. INTRODUCTION

The objectives of your project will be explained here with details of preliminary information such as why you selected this project and the importance of your project. Before you start working on your project, the information you have obtained from your researches will be written here. What did you pay attention on when you choose your project or what distinguish this project from similar ones? Which methods have been tried before? What materials generally used in similar projects? What are the weaknesses and similarities at those projects? What usage areas may your project have in daily life and/or industry? Academic and industrial literature reviews are presented in this section with references [1].

**References are presented in square brackets in the text. Details are on the last page.**

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Figure 1. XXXX



Figure 2. YYYY

# 2. METHOD AND MATERIALS

In this section, project design will be explained. What did you pay attention on, in the mechanical, electronic, software and control subsystems design of your project?

The names and quantities of the materials you use in your project will be shown here as a table. The costs of materials will be listed in the Cost analysis section and some comments will be done on the cost of the project.

## 2.1 Materials

Table 1 . Materials

|  |  |  |
| --- | --- | --- |
| **Part** | **Material** | **Specification and Number** |
| Shaft | carbon fiber | 40 dia shaft of 450cm x115 dia shaft of 20 cm x1 |
|  |  |  |
| Gears | steel | 110 dia with 40 dia center slot x142.5 dia with 15 dia center slot x1 |
| Rotor | Aluminum alloy | Large sheet to be cut machined and formed to specification |
| Generator |  | RICHUAN alternator |
| Cover plate | Aluminum | 200 dia 5 cm thick aluminum plate with 57 dia offset hole |
| Housing | Aluminum | 200 dia with 278 cm length with slots machined to fit parts |
| tower | Steel | 200 top dia 313.37 base dia and length 1700 cm |

## 2.2 Cost Analysis

Table 2. Table of Bill of Materials

|  |
| --- |
| **Bill of Material** |
| Product :Wind Turbine  | Date:      |
|

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item #** | **Part #** | **Qty** | **Cost** | **Material** | **Source** |
| 1 | Cover plate | 1 | £ 6 | Aluminum | Amazon.co.uk |
| 2 | Housing | 1 | £ 25 | Aluminum | Amazon.co.uk |
| 3 | Generator | 1 | £ 250 | steel | Alibaba.com |
| 4 | Tower | 1 | £ 300 | Steel | Dennis plaza Famagusta North, Cyprus |
| 5 | Shafts | 2 | £ 60 | carbon fiber | Aliexpress.com |
| 6 | Rotor | 4 | £ 40 | Aluminum alloy | Ebay.com |
|  | Gears | 2 |  | steel | Ebay.com |

**Total Cost :** £ 985 |

## Electronics Design

The electronic design of your project will be described here. The circuit drawings will be added as Figures and the Figures will be explained.

## 2.4 Mechanical Design

The mechanical design of your project will be described here. The technical drawings will be added as a figure and the Figures will be explained.



Figure 3. Profile View of the Rotor

Example sentence: Although the design is the same in basic principle, the difference in wing design is shown in Figure 3. All tables and figures are cited in the text.



Figure 4. Rotor Design

## 2.5 Control and Software

Closed Loop Control Circuit and Flowchart of the Code will be displayed and detailly explained here. Special points of the code will be highlighted and generally explained.

# 3. ANALYSES

If there are mechanical and / or electronic calculations used in your project, all will be described here.

|  |
| --- |
| **Parameters:** *d* – diameter of plastic pipe *[m]* *D* – wing spread of rotor *[m]* *e* – pipe spacing *[m]* *h* – height of blades / tubes *[m]* *v* – wind speed *[m/s]* *F –* diameter of end plates *[m]*  |

Basic equations:

The maximum power of the rotor is estimated according to Betz’s law

𝑃𝑠= 1/2 𝜌∙𝐴∙ 𝑣3∙; =0.36∙ ℎ∙ 𝐷∙𝑣3. [W] **(3.1)**

ρ=1.2 kg/m3 is the air density, 𝐴=ℎ∙𝐷 the sweep area of the rotor blade and Cp=0.593 the Betz coefficient. However, there are aerodynamic and mechanical losses in the order of 50%. Our rotor shaft power equation then becomes

𝑃𝑠=0.18∙ ℎ∙ 𝐷∙𝑣3. [W] **(3.2)**

The rotational speed is defined as

𝑛=(602𝜋⁄)∙𝜔 , [rpm] **(3.3)**

where 𝜔=𝜆∙𝑣/𝑟 is the angular velocity in units of radians per second, 𝑟=𝐷/2 the radius of the rotor and λ = 1 the tip-speed ratio. Furthermore, the torque at the rotor shaft is given as

# 4. RESULTS AND DISCUSSION

General summary of your project will be repeated. Your results **will** be compared with **your DESIRED** results. The overall evaluation of the finished project will be done and its strengths and weaknesses will be **underlined**.

For the future studies you are expected to comment on: What would you do or don’t do if you do this project AGAIN? What advices would you give to whom they want do the same project? What more could be done to improve your project in the future?

# REFERENCES

[1] The references you have used in your report will be listed.

[2] References will be listed as numbered with square brackets [] when used in the text.

[3] References will be written on this list in **Harvard** style. Harvard referencing style is available on the department's website.