EE564 DESIGN OF ELECTRICAL MACHINES

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PROJECT 3 - TRACTION MOTOR DESIGN

INTRODUCTION

In this project, traction asynchronous squirrel cage induction motor (with copper rotor-bars) is designed. Then, designed motor will be analyzed with FEM program. Specificitions of the generator as follows,

- Rated Power Output: 1280 kW
- Line-to-line voltage: 1350 V
- Number of poles: 6
- Rated Speed: 1520 rpm (72 km/h) (driven with 78 Hz inverter)
- Rated Motor Torque: 7843 Nm
- Cooling: Forced Air Cooling
- Insulating Class: 200C
- Train Wheel Diameter: 1210 mm
- Maximum Speed: 140 km/h
- Gear Ratio: 4.82
- Intended duty cycle :S1, direct on-line drive
- 3 phase

Design steps at below will be followed at this design.

1. Starting values
2. Main dimensions D and l'
3. Air Gap
4. Winding Selection Qs, Qr and kw
5. Air-gap flux density Bs # # ==========>>>>>>>>>>>>>>>>>>>>>>>>>>>> procedure koyulacak

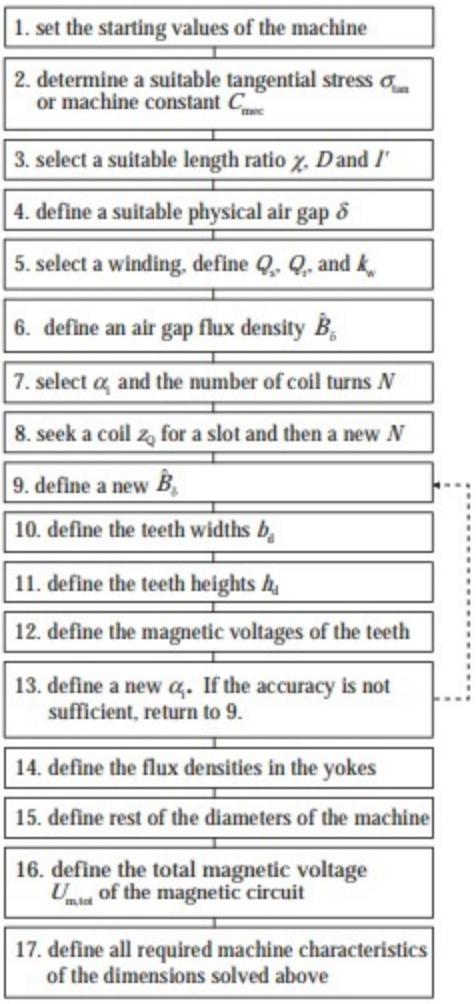

Figure Design process of a rotating electrical machine in brief. This chart was originally intended for induction motor design but may also be applied to other rotating-field machine types. The factor α_i behaves in a different way, especially in surface permanent magnet machines. The relative magnet width may be used as an initial value for α_i in PMSMs with rotor surface magnets of uniform thickness

Starting Values

For this design, I aimed premium efficiency class because motor consumes high energy. It saturates %95.8 efficiency for high energy motors. Then target efficiency is chosen %96.

```
Prated = 1280; %kW
Vl_l = 1350; %V
Npole = 6;
n_rated = 1520; %rpm
T_rated = 7843; %Nm
f_rated = 78; %Hz
v_rated = 74; %km/h

eff_des = 96; % %
```

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