SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEB201 DC Machines and Transformers

II YEAR / III SEMESTER

Unit 3 – Testing of DC Machines

Topic 1: Losses & Efficiency in DC Machines

What We'll Discuss

TOPIC OUTLINE

Losses of DC Machine

Power Flow diagram

Efficiency of a DC Motor

Assessment

Losses of DC Machines

1

Copper Losses

Armature Copper Loss

Field Copper Loss

2

Iron Losses

Hysteresis Loss

Eddy Current Loss

3

Mechanical Losses

Friction Loss

Windage Loss

Losses of DC Machines

Copper losses

- Armature copper loss = $I_a^2R_a$
- Field copper loss = If2Rf

Iron losses (Core losses)

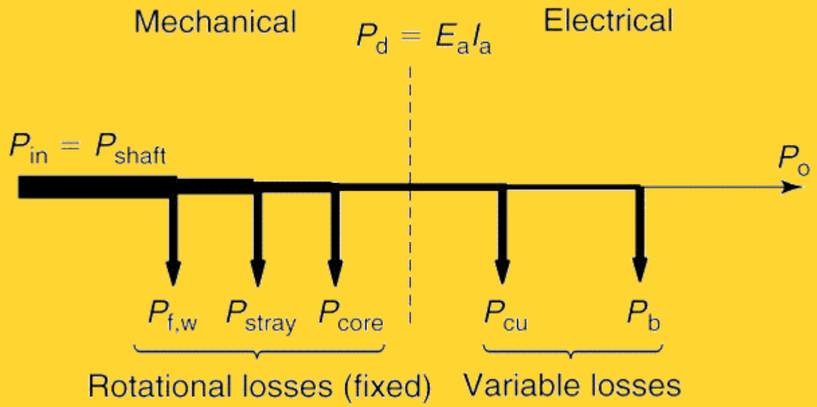
- Hysteresis loss

Steinmetz formula:
Wh=ηBmax1.6fV (watts)
where, η = Steinmetz hysteresis constant
V = volume of the core in m3

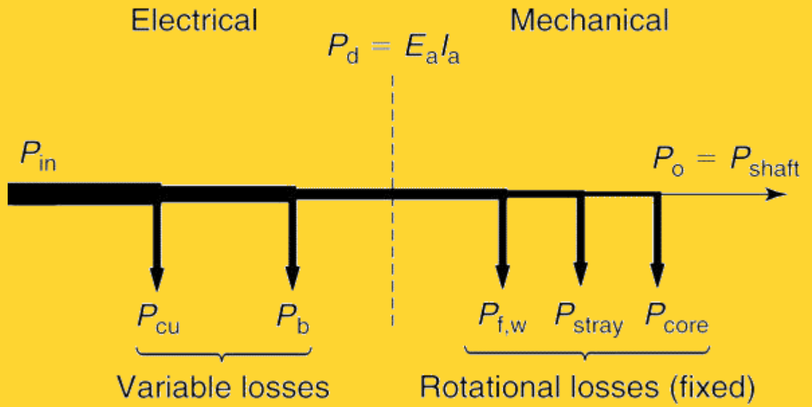
- Eddy current loss

Power Flow Diagram

Power Flow of a DC Generator



Power Flow of a DC Motor



Efficiency of DC Motor

Overall Efficiency of DC Motor

$$\eta_c = \frac{P_{out}}{P_{in}} = \frac{VI - I_a{}^2 R_a - W_c}{VI}$$

Condition of Maximum Efficiency of DC Motor

Copper Loss = Core Loss

RECALL

1. List the Various types of Losses in DC Motor

THANK YOU