

Course Objectives/Course Outline
Spokane Community College

Course Title: DC Generators and Motors

Prefix and Course Number: ELMT 132

Course Learning Outcomes:

By the end of this course, a student should be able to:

- identify by appearance and function the principle parts of DC motors and generators
- describe the characteristics of the type of DC motors and generators
- tear down and reassemble a DC generator

*Two, three, and four credit class content will be determined from input provided by faculty from individual programs which have specific electrical requirements.

Course Outline:

- I. DC Generator Theory of Operation
 - A. Definition
 - B. Electromagnetic-Induction
 1. Conductor
 2. Magnetic field
 3. Relative motion
 - C. Polarity
 1. Fleming's left-hand rule
 2. Reverse polarity
 - D. Loop
 - E. Commutator action
 - F. Average voltage out
 - G. Prime mover
 - H. Motor action
 - I. Armature losses
 1. I^2R (copper losses)
 2. Eddy currents
 3. Hysteresis
 - J. Armature reaction
 1. Brush shift
 2. Interpoles
 3. Compensating windings
 - K. Ripple
- II. DC Generator Construction
 - A. Commutator
 - B. Brush rigging & brushes
 - C. Field windings
 - D. Pole pieces
 - E. Armature
 - F. Frame

III. DC Generator types and characteristics

- A. Permanent magnetic field
- B. Electromagnetic field
 - 1. Separately-excited
 - 2. Self-excited
 - a) Shunt
 - b) Series
 - c) Compound
 - (1) Differential
 - (2) Cumulative
 - (a) Under-compounded
 - (b) Flat-compounded
 - (c) Over-compounded

IV. DC Motor Theory of Operation

- A. Definition
- B. Construction
- C. Motor Action
 - 1. Right Hand Rule
- D. Torque Calculation
- E. AC Requirements
- F. Generator Action-CEMF
- G. Armature Reaction

V. DC Motor Types and Characteristics

- A. Permanent magnetic field
- B. Electromagnetic field
 - 1. Series
 - 2. Shunt
 - 3. Compound
 - a) Differential
 - b) Cumulative

VI. Tear-down and reassemble DC welders