

Course Objectives/Course Outline
Spokane Community College

I. Course Title: DC Motor Controls

Prefix and Course Number: ELMT 135

Course Learning Outcomes:

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

- differentiate between types of DC controls and their functions
- draw ladder diagrams to JIC Standards

*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. Manual Starting Rheostats
 - A. NEMA definition
 - B. Shunt and Compound Motor Starters
 - 1. 3-point starter
 - 2. 4-point starter
 - C. Series motor starters
 - 1. "No-load protection"
 - 2. "No-voltage" protection
- II. Manual Speed Controllers
 - A. Above-normal speed controller
 - B. Above and below normal speed controller
- III. Drum Controllers
- IV. Automatic Controls
 - A. Relay definition
 - B. Pilot Devices
 - 1. Switches
 - 2. Push -buttons
 - C. Schematics
 - 1. Pictorial
 - 2. Wiring Diagrams
 - 3. Ladder Diagrams
 - D. Magnetic pilot circuits
 - 1. "No-voltage" release
 - 2. "No-voltage" protection

V. Applied DC Motor Control Circuits

- A. Full voltage starting
 - 1. Start-stop
 - 2. Multiple start-stop
 - 3. Reversing
- B. CEMF Acceleration
- C. Current Acceleration
- D. Definite Time Acceleration
 - 1. Hydraulic
 - 2. Pneumatic
 - 3. Solid-state
 - 4. Magnetic flux decay
- E. Reversing with Definite Time Acceleration
- F. Speed Control
- G. Braking
- H. Dynamic Braking
 - 1. Regenerative Braking
 - 2. Plug-Braking
- I. Overload protection
 - 1. Magnetic
 - 2. Thermal
 - a) Bi-metallic
 - b) Melting alloy
- J. Over-speed protection
 - 1. "Field-loss" relay
- K. Over-current Protection
 - 1. Field accelerating relay

VI. Misc. Motor Controls

- A. Lock-out relays
- B. [D] starters

VI. Trouble Shooting Procedures

VII. Electric Car

IX. Electric Forklifts