

quickSTEP

Basics of AC Drives

General Information

Course Code: STR-IA-002-2020B

Length: 1 Hours

Audience

Siemens personnel, distributors, customers, and others interested in learning basic AC drive concepts.

Prerequisites

- Basics of Electricity

Profile

This is an online course that covers basic AC drive concepts only. Specific Siemens drives are not covered.

Objectives

Upon completion of this course, the student shall be able to:

- Explain the concepts of force, torque, angular speed, acceleration, and inertia
- Explain the difference between work and power
- Convert horsepower to kilowatts and vice versa
- Calculate synchronous speed and slip percentage
- Describe the interrelationships for the following factors V/Hz, torque, flux, and working current
- Describe the basic functions of the following AC drive circuits: converter, DC link, and inverter
- Describe the operation of the following AC drive components: IGBT and free-wheeling diode
- Explain how varying the pulse width and frequency of a PWM inverter affects motor speed
- List several ways that an AC drive can stop its associated motor
- Explain the difference between single-quadrant and four-quadrant operation
- Explain the potential advantage of a regenerative AC drive design
- Briefly describe each of the following AC drive control types: linear voltage/frequency, quadratic voltage/frequency, multi-point voltage/frequency, flux current control, vector control
- Explain the difference between AC/AC and DC/AC drive configurations
- Identify various additional circuits and components that are often included in an AC drive configuration
- Describe common ratings for AC drive enclosures
- Explain the concepts of parameters and function blocks as applied to Siemens AC drives
- Explain the function of a PI controller function block in an AC drive

- Describe the characteristics of constant torque, variable torque, and constant horsepower applications

Topics

1. Introduction
 - a. Overview
 - b. Mechanical Basics
 - c. AC Motors
 - d. AC Motors and Drives
2. AC Drive Basics
 - a. Drive Hardware - Part 1
 - b. Drive Hardware - Part 2
 - c. Drive Programming
3. Applications
 - a. Application Concepts