



Electrical Engineering

Industrial automation with MCC and VFD system

Course Introduction

Variable Frequency/speed drives are devices used for varying the speed of driven equipment (such as pumps, blowers, compressors, conveyors etc.) to exactly match the process requirements and achieve energy saving as well.

For an electrical engineer, it is just not sufficient to be satisfied with selecting the right type and size of motor. The knowledge of driven equipment and the application in the process areas, in fact, offer equal opportunities for the energy conservation.

Pumps, fans and compressors are the most commonly found equipment in varied types of industries and commercial use. On an average the power consumed by pumps alone varies between 5-30 % depending on the type of industry & applications. There is tremendous energy saving opportunity for achieving substantial energy savings through variable Frequency drives in these applications.

Motor Control Centers (MCC)

In this training an advanced Motor Control Centers (MCC) and Variable Frequency Drives (VFD) Training automation and communication through communications automation control system . This course is designed to provide professionals with a thorough understanding of MCCs and VFDs, focusing on their design, operation, and integration. Participants will gain practical knowledge and skills essential for managing and optimizing motor control systems and VFD applications in various industrial settings.

To define the operation and construction of AC electrical motors and the electrical drives based on modern state-of-the-art inverter technology, and their characteristics that need to be matched with those of loads.

Target Audience

- Power system protection engineers
- System planners

- Technical staff responsible for Smart Grid integration into power system monitoring and control

Learning Objectives

- Choose the Best Type of Variable Frequency Drive (VFD).
- Identify the operating parameters of the Motor Control Centers and VFD's.
- Identify the reasons for routine maintenance of Motor Control Centers and VFD's.
- Understand the common maintenance tasks carried out on Motor Control Centers and VFD's.
- Demonstrate how to evaluate and interpret performance of Motor Control Centers and VFD's.
- Demonstrate response to abnormal conditions and take action.
- Identify & Correct Drive System Problems.
- Identify & Test Major Drive Components.
- Perform Start-Up of an AC Drive.
- Review maintenance procedures both for motors and drives following well-established industrial procedures as outlined in standards.
- Illustrate with troubleshooting methods for both motors and drives following methodologies that have been developed by manufacturers in order to reduce downtime dramatically.
- Analyze and familiarize on how to utilize single-line drawings and other documentation to successfully perform commissioning, maintenance and troubleshooting.

Course Outline

- **DAY 01**

- Introduction to Motors & Operation & Motor Control Centers MCC:**

- Introduction to power system.
- Power system Voltage levels According to IEC & IEEE.
- Motor control circuits construction .

- Ac Motor Types .
- Idea of Operation AC Motor .
- Medium Voltage AC motor construction .
- AC Motor component:
- Rotor.
- Stator.
- Bearing.
- Coil winding.
- Winding insulation level.
- Electric insulation & Temp.
- Motor Mechanical basics.
- Developing a rotating magnetic field.

Low and medium voltage Motors Control and Starting:

- MV Motor problems of starting.
- Types of Motors start:
- Direct on line.
- Star / Delta System.
- Auto transformer .
- Stator Resistance .
- Rotor Resistance.
- Soft starter .

• Day 02

VFD Characteristics, Operation and Programming:

- Introduction to power electronics.
- Types of electronics switches and converters.
- Difference between various types of VFDs.
- VFD components.
- Rectifier .
- DC link .
- Inverter.
- VFD types.
- VFD effect of Motor Operation.
- Component Identification.
- Variable Frequency drives parameter programming and applications.

• Day 03

VFD Rectifier Parts:

- Power Electronic components.
- Diode.
- Rectifier Configuration.
- 6 pulse rectifier.
- Modern technology 12 , 18 & 24 pulse rectifier.

VFD DC Link Parts:

- Coil and capacitor configuration.
- Effect of DC link .
- Operations of DC link energy and inverters, regeneration or dynamic. slowdown, dynamic breaking, plugging.
- Sizing of capacitor effect .

• Day 04

VFD Inverter Parts:

- Thyristor (SCR), IGBT, MOSFET, GTO operation concept.
- Thyristor (SCR), IGBT, MOSFET, GTO configuration.
- Thyristor (SCR), IGBT, MOSFET, GTO types.
- Inverter configuration.
- Pulse Width Modulation PWM concept.
- Control of frequency.
- Control of voltage.
- V/F ratio control .

• Day 05

VFD Accessories:

- Control Mimic
- Space heaters & Cooling fan
- Control wiring
- LED induction lamp
- Line notching
- Harmonics
- Operator interfaces
- Bypass systems

Confirmed Sessions

FROM	TO	DURATION	FEE\$	LOCATION
May 5, 2025	May 9, 2025	5 days	4250.00 \$	UAE - Dubai
Sept. 1, 2025	Sept. 5, 2025	5 days	4250.00 \$	UAE - Dubai
Dec. 22, 2025	Dec. 26, 2025	5 days	5950.00 \$	USA - Los Angeles