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**Course Name**

# Industrial automation with MCC and VFD system

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**Sector Name**

Electrical Engineering

**Document Type**

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## 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 savings 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 its application in the process areas, in fact, offers equal opportunities for energy conservation.

Pumps, fans, and compressors are the most commonly found equipment in varied types of industries and commercial use. On average, the power consumed by pumps alone varies between 5-30 % depending on the type of industry & applications. There is a 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 Center (MCC) and Variable Frequency Drives (VFD) Training, automation, and

communication through a 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.

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### Target Audience

- ✓ Power system protection engineers
- ✓ System planners
- ✓ Technical staff responsible for Smart Grid integration into power system monitoring and control

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### Learning Objectives

- ✓ Choose the Best Type of Variable Frequency Drive (VFD).
- ✓ Identify the operating parameters of the Motor Control Centers and VFDs.
- ✓ Identify the reasons for routine maintenance of Motor Control Centers and VFDs.
- ✓ Understand the common maintenance tasks carried out on Motor Control Centers and VFDs.
- ✓ Demonstrate how to evaluate and interpret the performance of Motor Control Centers and VFDs.
- ✓ 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 with how to utilize single-line drawings and other documentation to successfully perform commissioning, maintenance, and troubleshooting.

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### Course Outline

#### ✓ DAY 01

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

- ✓ Introduction to power systems.
- ✓ 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 has problems with starting.
- ✓ Types of Motors start:
  - ✓ Direct online.

- ✓ Star / Delta System.
- ✓ Auto transformer.
- ✓ Stator Resistance.
- ✓ Rotor Resistance.
- ✓ Soft starter.

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## Industrial automation with MCC and VFD system

### Course Outline

#### ✓ Day 02

##### **VFD Characteristics, Operation, and Programming:**

- ✓ Introduction to power electronics.
- ✓ Types of electronic 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.

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### Course Outline

#### ✓ 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 the DC link.
- ✓ Operations of DC link energy and inverters, regeneration, or dynamic. slowdown, dynamic breaking, plugging.
- ✓ Sizing of the capacitor effect.

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### Course Outline

#### ✓ 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.

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## Industrial automation with MCC and VFD system

### Course Outline

#### ✓ Day 05

##### **VFD Accessories:**

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

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## Industrial automation with MCC and VFD system

### Confirmed Sessions

| FROM          | TO             | DURATION | FEES       | LOCATION          |
|---------------|----------------|----------|------------|-------------------|
| May 24, 2027  | May 28, 2027   | 5 days   | 4250.00 \$ | UAE , Dubai       |
| Sept. 7, 2026 | Sept. 11, 2026 | 5 days   | 4250.00 \$ | UAE , Dubai       |
| Dec. 28, 2026 | Jan. 1, 2027   | 5 days   | 5950.00 \$ | USA , Los Angeles |
| Jan. 11, 2027 | Jan. 15, 2027  | 5 days   | 4250.00 \$ | UAE , Dubai       |

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