Variable Speed Drives

Course general description:

The continuous advancement of power electronics technology provides significant opportunities for the industry to operate all process control equipment and associated motors with better efficiency and higher reliability than ever before. Variable speed motor drives are widely used in the industry to continually adjust the speed and torque of motors to achieve the required control for automation with the most efficient approach possible

Audience:

The seminar is designed for electrical/electronic engineers and technicians, maintenance personnel, plant technical staff, and supervisors who have some basic knowledge of electrical engineering and wish to expand their knowledge and learn the state-of-the-art in variable speed motor drive technology and the issues associated with it.

Course objectives:

This course is designed to enable participants to:

- Properly Matching A Drive to A Machine
- Choosing the Correct Motor
- Choosing the Best Type of Variable Frequency Drive (VFD)
- Identify & Correct Drive System Problems
- Identify & Test Major Drive Components
- Perform Start-Up of an AC Drive
- Program & Adjust the Drive for Desired Operation

Course duration: 5 days

Course location: Dubai

Course contents:

Day-1

- Evolution of VFD Control
- Modern Types of Variable Frequency Drives (VFD)
- Horsepower Defined
- Torque Defined
- Example Horsepower and Torque Calculations
- Common Types of Mechanical Loads
- Characteristics of Variable Torque and Constant Torque Loads

Day-2

Basic VFD electricity theory
Electrical/Hydraulic Circuit Analogy
Resistance, Voltage, and Current Defined
Examination of Motor Nameplates and NEMA Designations
Locked Rotor Current and Full Load Current
Anatomy of a Motor
Magnetic Poles and Frequency as Related to Motor Speed
Torque Characteristics Motors Operated â€œAcross-the-Lineâ€
Torque Characteristics of Motors Operated on VFDs
Effects VFDs on Motor Operation and Life Expectancy

Day-3

PWM AC VFDs

- Common Types of PWM Drives
- Examination of the Main Power Circuit
- Electronic Component Identification
- The PWM Wave Form
- Voltage and Frequency Relationships and Effects on Motor Performance
- Control of Drive System Torque and Horsepower Output
- Torque Output Comparisons of AC Drives VS. Conventional Means of Speed Control
- Standing Wave (Reflective Wave) Phenomena on Motor Cables
- Disassembly of an AC Drive
- Component Identification
- Various Designs of Drives

Day-4

- Reassemble, Test, Start-Up of AC Drive With Proper Techniques
- Hands-On Programming and Operation of an AC Drive and Motor
- Adjust Minimum and Maximum Speed
- Reset Drive to Factory Defaults
- Adjusting Torque Output

Day-5

- General Drive Programming
- Methods of Speed and Torque Control
- Methods of Proper Drive Selection
- Multi-Motor Drive Systems With Example Problem
- Using VFDs to Eliminate Geared Speed Reducers
- Effects of AC Drives on Geared Speed Reducers
- Replacing Mechanical Speed Changers With VFDs

Methodology:

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions
- 10% Software (if applicable or examples)

Course code: (TEEI002)