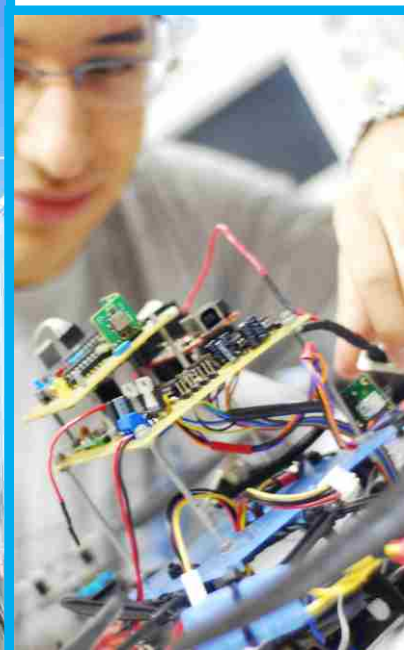


FUNDAMENTALS OF **VARIABLE SPEED DRIVES** for Instrumentation and Control Systems



What You **Will Learn...**

- principles of AC variable speed drives for industrial speed control
- About squirrel cage induction motors
- About the latest developments in power electronic converters used for VSDs
- How to select the correct AC variable speed drive for industrial applications
- About installation and commissioning requirements
- How to identify faults on VSDs and how to rectify them
- About Flux-Vector Control and how it can be used in drive applications
- How to interface the control circuits of VSDs with PLCs/DCSs using Serial Data Communications

Course

STRUCTURE



“I would like to thank the T&P Team of Smartbrains who helped me to get skill set on Electrical System Design. The learning experience was good and placement is excellent”

Zeeshan Ahmad

Ankit Electrotech Engineers Pvt Ltd, Noida

DAY ONE

INTRODUCTION AND OUTLINE OF COURSE OBJECTIVES

INTRODUCTION TO VARIABLE SPEED DRIVES

- The Need for Variable Speed Drives
- Fundamental Principles of Speed Control
- Efficiency, Torque, Inertia, Horsepower/Power Factor
- Torque-Speed Curves
- How the motor produces Torque
- Types of Variable Speed Drives

3-PHASE AC INDUCTION MOTORS

- Basic Construction and Physical Configuration
- Principles of Operation and Performance
- Equivalent Circuit and Fundamental Equations
- Starting, Acceleration, Running and Stopping
- Power, Torque and Thermal Rating

POWER ELECTRONIC CONVERTERS

- Definitions and Basic Principles
- Power Diodes and Thyristors
- Principles of Commutation
- Power Electronic Rectifiers
- Power Electronic Inverters
- Gate Commutated Converters
- Gate Controlled Devices - GTO, FCT, GTR, FET, IGBT

ELECTROMAGNETIC COMPATIBILITY (EMC)

- Sources of Electromagnetic Interference
- Harmonics on the Power Supply side of AC Converters
- The Effect of Harmonic Distortion on other connected Equipment
- Methods of reducing the effect of Supply side Harmonics
- Electric Motor Protection
- Thermal Overload Protection - Current Sensing
- Thermal Overload Protection - Direct Temperature Sensing

PROTECTION OF MOTORS AND CONVERTERS

- AC Frequency Converter Protection
- Fault Diagnostics
- Electric Motor Protection
- Thermal Overload Protection - Current Sensors
- Thermal Overload Protection - Direct Temperature

DAY TWO

CONTROL SYSTEM FOR AC VARIABLE SPEED DRIVES

- The Overall Control System
- Power Supply to the Control System
- DC Bus Charging System
- VSD Control Loops (Open-Loop, Closed-Loop)
- Vector control and its applications
- Current Feedback in AC Variable Speed Drives
- Speed Feedback from the Motor

THE SELECTION OF AC CONVERTERS FOR VARIABLE SPEED DRIVE APPLICATIONS

- The Basic Selection Procedure
- Loadability of Converter Fed induction Motors
- Operation in the Constant Power Region
- The Nature of the Machine Load
- Starting and Stopping VSDs (Motor Braking)

THE SELECTION OF AC CONVERTERS

- How to Calculate Acceleration Torques and Times
- How to Select the correct Motor and Converter for Pump and Fan Loads
- How to Select the correct Motor and Converter for Constant Torque Loads, such as conveyors
- Summary of the Selection Procedure

INSTALLATION AND FAULT FINDING TECHNIQUES

- General Installation and Environmental Requirements
- Power Supply Connections and Earthing
- Where to install the Contactors in the Power Circuit
- Installing AC Converters into Metal Enclosures

SPECIAL TOPICS

- PWM Rectifier for AC Converters
- Soft Switching
- The Matrix Converter

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Our Strategic Objectives

To be recognized by industry and employers as a highly reputable training organization. Provide dynamic leadership, sound management and excellence in training. Continue to improve our services through quality management processes. Invest in and value our people through professional development activities. Grow our business through innovation and to continue to be financially secure. Be influential in the economic development of the industries we serve nation wise

Admission Requirements

- ▶ Duly Filled Application Form
- ▶ 2 Photographs
- ▶ Photo State of Qualifying Examination
- ▶ Address Proof
- ▶ I.D. Proof
- ▶ Latest Resume



Our Mission

“To provide quality training and assessment services and to prepare our students for a fulfilling professional career in their chosen industry. We are committed to upholding our values of providing excellence in training”

Declaration

- ▶ This training program is on AUTONOMOUS basis conducted by SmartBrains.
- ▶ SmartBrains has right to expel any student at any time for misbehavior, poor attendance without refunding the fees.
- ▶ Certification will be issued only after completion of course, submission of all assignments and passing all the examinations.
- ▶ SmartBrains has its own rules and regulations about conducting examinations and assessment of examinations

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