



Centre for Industrial Solution and Advanced Training

# TRAINING PROGRAM ON VARIABLE FREQUENCY DRIVES & SOFT STARTERS (ELECTRICAL DRIVES)

9-10 May 2016, Pune





(Technical- Electrical/Mechanical/Automation/Chemical, Behavioral & Soft Skill, Safety, Business Excellence, Safety & Energy Audit)

# Centre For Industrial Solution and Advanced Training

AN ISO 9001:2008 CERTIFIED

“A complete Training Solution Under One roof”

## Training program on Variable Frequency Drive (VFD/VVVF/AC) & Soft Starters

(Fundamentals; Operation; Maintenance & Parameter Setting)

9-10 May 2016, Pune

### Training Program Objective and Description:

The objective of this program is to provide the participants with information needed to troubleshoot, diagnose, and repair problems commonly found in Electrical Drives beside thoroughly understand the concept of Electrical Drives. Practical hands-on exercises will reinforce material presented in the training sessions. This program will impart information important to proper motor selection, operation and Maintenance, Troubleshooting in detail.

### Learning Outcomes:

Upon completion of this course, the participant should be able to:

- Understand characteristics of AC/DC motors which drive control.
- Know the components and types of variable frequency drives.
- Understand common AC/DC drive applications and how to evaluate them.
- Understand the advantages and benefits of using variable frequency drives.
- Setting of various Drives Parameters & communication. **(Hands on)**
- Understand how to troubleshoot AC drive applications.

### Who Should Attend?

All practicing Engineers, DET,GET, O&M professionals; others who willing to get knowledge regarding VFD/AFD.

### Program Contents to be covered:

1. Overview of **Electrical Drives (AC/DC)**. Objective of the Program.
2. Review of Basics of Electrical Engineering.
  - a. Fundamental of Voltage, Current, Power & Impedance.
  - b. Resistance, Inductance & Capacitance. **Behavior & Applications**
3. Concepts of AC machines: Construction, Working, Speed Control, Characteristics.
4. Basics of various loads and Applications.
5. Torque, Speed and Power. Review and understanding.
6. **Basics of Power Electronics**.
  - a. Review of semiconductor Theory; Controlled and Uncontrolled Switches: Power Diode, Power BJT, MOSFET, IGBT, SCR: ON & OFF strategies.
  - b. DC Link capacitor: Selection and rating.
7. **AC to DC Rectification action**.
  - a. Variation with R, R-L, R-L-E load; About filter application and ripples.
  - b. **Applications**
8. **DC to AC Inverter**



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- a. Inverter function: Series and parallel Inverter.
  - b. Importance of L & C.
  - c.  $120^\circ$  &  $180^\circ$  Mode of operation.
  - d. PWM & SPWM control Strategy.
- 9. Electrical drives (AC/DC)**
- a. Basics and review of Drives: Advantages and various parts.
  - b. Requirement of four quadrant operation of Drives.
  - c. Open and Closed loop control strategies.
  - d. Induction Motor Drive
    - i. Basics and review of three Phase Induction Motor
    - ii. Starting, Braking and Speed control Operation
    - iii. Stator voltage Control; Variable frequency control
    - iv. CSI Controlled AC Drives;
    - v. Rotor Resistance Control; V/f control; Direct torque Control; Vector Control
    - vi. Flux Control methods; Smart Drives & Energy efficient drives.
    - vii. Soft Starting: ZCS & ZVS; Design of control Strategies: Various Comparator Circuits
    - viii. Concept of Load Sharing: Criteria
    - ix. Drive parameters: definitions and parameter setting.
- 10. Installation and commissioning of Electrical Drives.
  - 11. Common problems in Electrical Drives and Troubleshooting
  - 12. Testing, Maintenance & Protection of Drives using various meters.
  - 13. Harmonic Elimination Techniques
  - 14. Communication of drives.
  - 15. Understanding of various drives: Product Specific as required.
  - 16. Case Studies & Discussion on practical problems.
  - 17. Introduction to soft starters.

### Hands ON & Practical's:

- 1. Parameter Setting & Behavior of drive.
- 2. PLC and Drive Communication
- 3. Upload and Download of parameters.
- 4. Copying of Drive parameters.

### Training Facility:

CISAT has International level Training Centre Located in a learning atmosphere at Butibori, Nagpur (Maharashtra Region), India and at Pune (Kothrud). It is equipped with training facility for up to 40 participants fully air conditioned, LCD Projector, Audio-video, White Board and all facility required for natural activities. It also has facility for Lodging and Boarding in a campus.



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CISAT have facilities for practical's on various topics such as,

1. Testing of Electrical Equipment's
2. Electrical Drives
3. PLC (Allen Bradley/Siemens)
4. SCADA (Allen Bradley/Siemens)
5. Instrumentation (Sensors, Transducers, Meters etc)
6. Computer Lab with required software support
7. Electronics KITS for Experiments'.

We have support for various Industries for onsite Training as well Industrial visits as required.

### Registration Details:

#### Registration Details:

**Dates of the program:** 9-10 May 2016, Pune, Maharashtra.

**Participation Fees:** Rs. 15000 + ST, per delegate (Training program includes training material hard/soft copies, tea, Snack & lunch excluding lodging & Boarding)

**Payment:** ECS/NEFT/DD in favor of “SAN Techno Mentors Private Limited.”

Payable at Pune, Maharashtra, India. Account details will be provided for ECS.

**Venue:** *SAN Techno Mentors*, 4, AishwaryaSankul, Next to Joshi Railway Museum, G.A. Kulkarni Path, Kothrud, Pune, INDIA – 411038, Ph: +91 (20) 25455935

*For Registration, please do contact to,*

*We prefer on line Registration through our web [www.cisat.co.in](http://www.cisat.co.in) [cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com)*

1. Mahendra Dhande +91-9168326662; +91-7709012815
2. Mrs Sphoorti Govade; 020-25455935; 020-65000982

Online registration form can be filled available on web page.

[vikas@cisat.co.in](mailto:vikas@cisat.co.in); [cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com); [www.cisat.co.in](http://www.cisat.co.in)

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### List of Few other Training Programs

- A. Safety
  - ❖ Behavior based Safety Leadership Training program.
  - ❖ Electrical Safety
  - ❖ General Safety; Crane Safety
- B. Supervisory Development Training programs
- C. Technical Training programs
  - ❖ Electrical Engineering
    - Fundamentals of Electrical Engineering
    - Operation, maintenance & protection of Electrical Equipments
    - Substation maintenance
    - HT/LT Motor & Transformer: operation, maintenance & protection

Web: [www.cisat.co.in](http://www.cisat.co.in); Email: [vikas@cisat.co.in](mailto:vikas@cisat.co.in); Contact: +91- 7709012815 (Branches: Thane/Pune/Nagpur/Bhilai/Wardha)

**(Your partner for Industrial solution & Empowerment of Human Capital)**



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- PLC, SCADA & DCS
- Process Control & Instrumentation etc.
- ❖ Mechanical Engineering
  - Hydraulics and Pneumatics
  - Welding Technology
  - Bearing O & M
  - Pumps and Compressors etc.
- D. Management Development
  - ❖ Managerial Effectiveness & Leadership Development
  - ❖ Problem solving techniques etc.
- E. Behavioral & Soft skill
  - ❖ Time Management; Business Etiquettes & Communication Skill etc.
- F. Business Excellence
  - ❖ 5S, Six sigma & Quality Circles
  - ❖ Lean Manufacturing; TPM, TQM
  - ❖ Hoshin Planning; A3: A strategic Thinking
- G. **Specially designed customized Training program for operators/GT/GET/DET/ITI employees.**
- H. **Induction programs.**

**Please do call/email for more detailed proposal and implementation.**

We can contribute to undertake following responsibilities:

- Training Needs Analysis
- Training Centre Development
- Training Material Development
- Design of Training Modules
- Courseware Development
- Design of Practical's
- Establishment of Laboratories for Hands on Practice
- Conducting Training Programs
- Mentoring for Career Development and Growth
- Training Software Development

We assure you to fulfill all of Training need at group level with the expertise associated with us. We can work out from Training Need Identification (TNI) to individual analysis report for every employee on various parameters of performance. Please do visit web for more updates.

*We undertake complete Outsourcing of Training for a Plant. Do email [vikas@cisat.co.in](mailto:vikas@cisat.co.in); [www.cisat.co.in](http://www.cisat.co.in)*

With Best Regards & Thanks,

Mrs. Rupali, Director - Business Development.

**Centre For Industrial Solution and Advanced Training**

**Web: [www.cisat.co.in](http://www.cisat.co.in); Email: [cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com) ; Contact: +91- 7709012815**

**“Your Business Partner for Employee Development- Knowledge Always Leads”**

(Technical- Electrical/Mechanical/Automation/Chemical, Behavioral, Soft Skill, Safety, Out Bound training, Business Excellence, Safety Audit, Energy Audit)