



**Centre For Industrial Solution and Advanced Training**

AN ISO 9001:2015 CERTIFIED

Centre for Industrial Solution and Advanced Training

# **TRAINING PROGRAM ON VARIABLE FREQUENCY DRIVES (ELECTRICAL DRIVES)**

**6-7 November 2017, Nagpur**





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

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“A complete Training Solution Under One roof”

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

(Fundamentals; Operation; Maintenance & Parameter Setting)

6-7 November 2017, Nagpur

### Training Program Objective and Description:

The objective of this program is to provide the participants with information needed to install, commission, 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**
  - 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



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- 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.

### 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.
5. Control of Drives
6. Installation & Commissioning

### About Nagpur:

Nagpur, situated in a central part of India is a historical city. It is the second greenest city of India and a winter capital of Maharashtra. Nagpur is famous for its oranges, hence called as Orange City. Lots of places are of interest and visit. It is rich with natural gift and surrounded by Forest, Rivers, Dams and hill station like Chikhaldara. It has three Tiger reserves Pench, Navegaon and Tadoba within a limit of 150 KMs.

Nagpur itself rich in terms of picnic spots like Futala Lake, Gandhisagar Lake, Maharajbagh Zoo, Various historical temples, Fort, botanical Garden, Raman Science Park, etc.



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**Expert:** Trainer having 20+Yrs experience and involved in Installation and commissioning activities of Electrical Drives.

## Registration Details:

**Dates of the program:** 6-7 November 2017 (2 Days).

**Participation fees:** Rs. 18000/- Per participant (GST@18% Extra; Excluding Lodging and Boarding, Including Course Material, Lunch, Snacks & Course Material)

**Payment:** ECS/NEFT/DD in favor of “Centre for Industrial Solution and Advanced Training” Payable at Nagpur, Maharashtra, India. Account No: 0509102000003353  
Bank: IDBI, Wardha- 442001, MS, India; IFSC Code: IBKL0000509; Swift Code IBKLINBB007; MICR Code 000259000.

**Venue:** *KEC, International Training Centre, Butibori, Nagpur, Maharashtra, India*

*For Registration, please do contact to,*

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

1. Mahendra Dhande 09168326662,
2. 00-91-7709012815; [vikas@cisat.co.in](mailto:vikas@cisat.co.in); [cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com);

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Contact for any In-house Training Program at your plant or location.