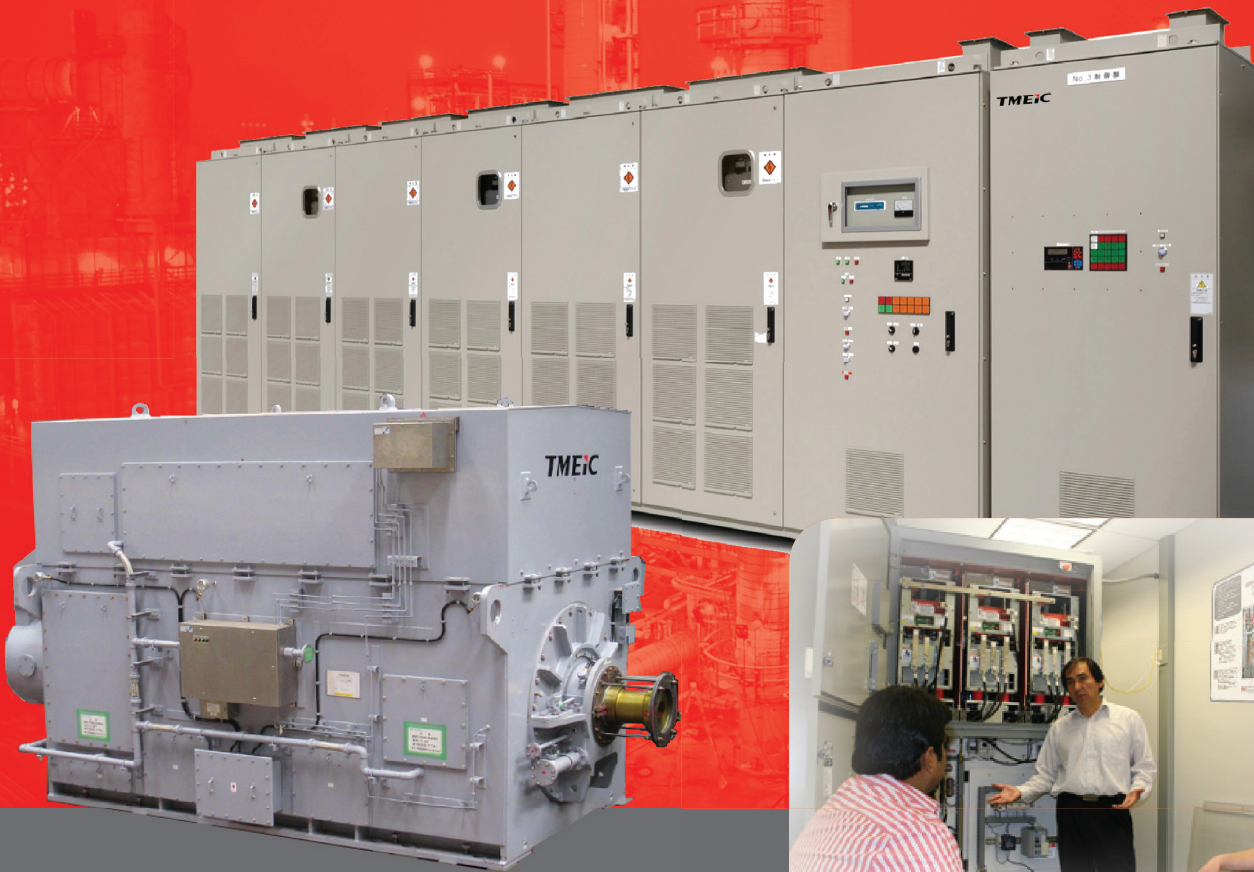


## Lunch & Learn

### Medium Voltage Variable Frequency Drives & Motors



An informal information session for engineers focusing on the real world applications and fundamentals of medium voltage variable frequency drives and motors for industrial applications.

metals

cranes

mining

testing

oil & gas

solar inverters

utilities

cement

## Variable Frequency Drive (VFD) Applications

- 1-A. VFD Applications Overview** 35 min.  
Overall factors in the design of a successful adjustable speed drive system. Load considerations and design requirements for constant and variable torque applications.
- 1-B. Specifying Variable Frequency Drives** 30 min.  
Considerations for specifying Adjustable Speed Drives. How to avoid adding unnecessary costs or missing important requirements. A brief overview of VFD standards will also be discussed.
- 1-C. Designing VFDs for Reliability & Maintainability** 40 min.  
Trends for the voltage source inverter (VSI) applied to very large scale drive equipment. How practices and principles adopted during component selection, design, testing and VFD manufacturing increase reliability. Example field experiences for maintaining the VFD will be presented.
- 1-D. VFDs vs. Mech. Fluid Couplings Comparison** 40 min.  
Complete analysis for both technologies covering efficiency, installation, operation, maintenance, spare parts and life cycle cost of the entire system.
- 1-E. VFD Cooling Systems** 30 min.  
Evaluation of water-cooled vs. air-cooled VFDs. Discussion of issues that can arise due to leaks, materials used, water incompatibility, etc. Application stories from past installations will be presented.
- 1-F. VFD Protection Systems** 40 min.  
A discussion of the goals and protection principles as applied to VFD. How various electrical equipment is protected in a VFD from a system stand point, along with how to specify a protection system for a VFD.

## VFD Considerations

- 3-A. Savings Calculations for VFDs** 15 min.  
Defining energy savings & other financial benefits associated with an adjustable speed drive.
- 3-B. Effects of VFDs on Power Systems** 30 min.  
Overall impact of an Adjustable Speed Drive to the power system's harmonics, power factor and energy demand.
- 3-C. Process Control & VFD Control Interfaces** 10 min.  
Presentation on how drives can improve process controls in various industries and VFD control interfaces available.

## Medium Voltage Motors

- 4-A. MV Motors for Application Engineers** 60 min.  
A comprehensive overview of MV motors covering several aspects such as design, standards, enclosures, construction, accessories and applications.
- 4-B. Starting Strategies for Fixed Speed MV Motors** 45 min.  
A detailed discussion on various methods of starting large MV motors including concepts such as effects on power systems, drive train, application considerations and when to use a VFD will be covered.
- 4-C. MV Induction Motors** 35 min.  
Fundamentals of induction motors. Discussion of the design considerations that go into various applications. Brief introduction to global motor standards.
- 4-D. MV Synchronous Motors** 35 min.  
Fundamentals of Synchronous Motors. Discussion of the design considerations that go into various applications. Brief introduction to global motor standards.

## Power Systems

- 5-A. MV Switchgear** 40 min.  
Overview of the types of electrical switchgear available and how it is commonly applied
- 5-B. MV Substations** 30 min.  
Substation design and practices
- 5-C. Transformers and Reactors** 40 min.  
Fundamentals of transformers and how to pick the correct transformer for VFD applications for drive input and output.

## Fundamentals

- 6-A. Fundamentals of Adjustable Speed Drives** 45 min.  
Fundamentals of Adjustable Speed Drives, basic motor and AC drive theory to give an engineer the understanding of how the motor speed and torque are controlled by adjustable speed drives.
- 6-B. System Diagrams & Basics** 10 min.  
Discussion of the fundamental electrical circuits and symbols used in variable speed drive system one-line diagrams and the basis for drive topologies.
- 6-C. Power System Basics** 40 min.  
Theory behind power systems studies, short circuit calculations and protection, electrical faults, arc flash and circuit coordination.

**TMEiC**  
We drive industry