Gulf Coast Section

ESP Workshop

All courses are subject to change and may be cancelled if minimum participation requirements are not met.

UNDERSTANDING VSD & THEIR IMPACT ON ESPs

Monday and Tuesday, 22-23 April 2013 – 8:00AM to 5:00PM

INSTRUCTORS: Al-Khorayef, Custom Submersible, Magney Grande, GE Oil and Gas, Emerson/Leroy Somer

DAY 1 – VARIABLE SPEED DRIVES		
Concept	**Instructor**	**Estimated Time**
1. Basic Drive Overview a. Definitions b. Topology c. LVD, MVD	Jack Turner/Dick Torbenson	8:00AM-10:00AM
2. Components a. Power Semiconductors b. Inductors c. Capacitors	Jack Turner/Dick Torbenson	
3. Basic Operation a. Converters b. Inverters	Jack Turner/Dick Torbenson	
BREAK		10:00AM-10:30AM
4. The ESP System a. Pump b. Motor c. Cable d. Grounding Considerations	Kenneth Lacey & Sal Grande	10:30AM-12:00PM
5. System Simulation	David Shipp	
6. Load Resonance, Harmonics & Transients	David Shipp	
LUNCH		12:00PM-1:00PM
7. Power Harmonics & Transients	David Shipp	1:00PM-2:30PM
8. ESP Power Filtering, Line Harmonics, Harmonic Mitigation	David Shipp	
9. Line Power Filtering & Phase Shifting	David Shipp	
BREAK		2:30PM-3:00PM
10. Trouble Shooting Your VSD	Jack Turner/Dick Torbenson	3:00PM-5:00PM
11. Preventative Maintenance and Your VSD	Jack Turner/Dick Torbenson	
DAY 2 – APPLICATION, DESIGN AND GENERAL CONSIDERATIONS WHEN USING VSDs		
1. VSD and transformer design for compactness	Mathieu Herieau	8:00AM-10:00AM

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2. Current and regulation loop (control of permanent magnets motor)	Mathieu Herieau	
3. VSD Selection, Area Classification, Environment, Altitude, Rating/Temperature, Alternatives on 6p, 12p, 18p, 24p, Active Front End (Regen) etc)	Thomas Orlowski	
4. KVA Required, Efficiency, Power Factor	Thomas Orlowski	
5. Supply Voltage (Direct Supply, Input Transformers)	Thomas Orlowski	8:00AM-10:00AM
6. Lighting Arrestors	Thomas Orlowski	
7. VSD application for ESP and HPS Systems	Thomas Orlowski	
BREAK		10:00AM-10:30AM
7. Affinity Laws and VSD Application in ESP systems	Jack Turner/Dick Torbenson	
8. Set-up and Operation, Base Frequency	Jack Turner/Dick Torbenson	
9. Controllers (Rocking Start, Back Spin, Gas Slugs, etc.)	Jack Turner/Dick Torbenson	10:30AM-12:00PM
10. Closed Loop (Pressure Mode & Current Mode) Operating Modes, Monitoring and Control	Jack Turner/Dick Torbenson	
LUNCH		12:00PM-1:00PM
11. Hands-On Training	ALL INSTRUCTORS	1:00PM-2:30PM
BREAK		2:30PM-3:00PM
12. Case Studies, Roundtable Discussions, Certificates		ALL INSTRUCTORS
13. Roundtable & Discussion; Presentation of Certificates	3:00PM-CLOSE	1:00PM-2:30PM

About the instructor: **Thomas M. Orlowski** is an Electrical Engineering Manager for APC-AlKhorayef Petroleum Company in Saudi Arabia. He received his M.S. Electrical Engineering from Polytechnic University of Czestochowa, Poland in 1985. He has 27 years of experience in various automation technology industries, joining APC in 1990. His primary responsibility has been Variable Speed Drive systems design, Motor Controller design, field communication system design and ESP Monitoring system software development. He holds patents in cooling system technologies for ESP power systems.

About the instructor: **Kenneth Lacey** is the President/Owner of Custom Submersible and Electrical Services, established in 1991 to provide Power Quality and electrical protection solutions to the Submersible Pump industry. He is a recognized Subject Matter Expert (SME) in the submersible pump industry, a licensed Electrical Contractor (New Mexico and Texas) and a published author. He entered the oilfield electrical industry in 1970 and became a Journeyman electrician 1971. Prior to founding Custom Submersible, Mr. Lacey was an electrical foreman for Amerada Hess. Mr. Lacey is a member of the SPE, IEEE and NFPA.

About the instructor: **Dick Torbenson** is a Product Manager with GE Oil & Gas – Artificial Lift specializing in Variable Speed Drives and drive applications. He holds a Bachelor's Degree in Electrical Engineering from the University of Minnesota and has more than 40 years of experience in the electrical drives industry.

About the instructor: **David Shipp** holds a BSEE in Electrical Engineering from Oregon State University 1972 and is a registered Professional Engineer. He currently is a Principal Engineer within Eaton Corp. and is a Fellow Engineer in IEEE. Mr. Shipp has been involved in oilfield electrical engineering for more than 15 years. He has written over 80 technical papers on power system analysis topics and has received an IAS/IEEE Prize Paper Award.

About the instructor: **Salvatore F. Grande III** is VP Engineering for Magney Grande. He is an inventor and engineer, is a graduate of the United States Air Force Academy who holds a degree in Mechanical Engineering and has worked in the petrochemical industry for over 25 years.

About the instructor: **Mathieu Herieau** is a Product Manager for Leroy Somer Motors & Drives in USA. He received his B.S. Industrial and Electrical Engineering from University of Poitiers, France in 2000. He has 12 years of experience in various industries, joining Leroy Somer in 2000. His primary responsibility has been Variable Speed Drive and transformer systems management for ESP applications.