SKILLSLAB
Training Provider

COURSE BROCHURE

Advanced Ultrasonic Meter Proving & 4-Way Diverter Valve Operation, Maintenance & Troubleshooting

Professional Training Course

Skillslab Training Provider
Skills for Tomorrow's World

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Course Description

Introduction

Accurate hydrocarbon measurement is one of the most critical operational and commercial requirements within the oil and gas industry. Custody transfer transactions, production accounting, pipeline operations, terminal management, and fiscal metering systems rely heavily on measurement accuracy, repeatability, and reliability. Even minor measurement deviations can result in significant financial impacts, contractual disputes, regulatory concerns, and operational inefficiencies.

Ultrasonic metering technology has become a preferred solution for modern custody transfer applications due to its high accuracy, low maintenance requirements, advanced diagnostics, and suitability for large-volume hydrocarbon measurement systems. However, maintaining measurement integrity requires effective meter proving practices, reliable prover systems, and properly functioning four-way diverter valves that ensure accurate flow diversion during proving operations.

The performance of four-way diverter valves, electro-hydraulic operators, hydraulic power units, control systems, and associated instrumentation directly influences proving accuracy, operational reliability, and asset integrity. As oil and gas facilities continue to pursue operational excellence, personnel responsible for metering systems must possess advanced technical competencies in operation, maintenance, troubleshooting, performance verification, and reliability enhancement.

The **Ultrasonic Meters Proving & 4-Way Diverter Valve Operation & Maintenance** program is a comprehensive 15-day technical training course designed to provide participants with practical expertise in ultrasonic meter proving systems, diverter valve operation, electro-hydraulic controls, hydraulic power units, preventive maintenance, troubleshooting methodologies, and operational best practices.

Through technical workshops, engineering case studies, equipment simulations, schematic interpretation exercises, and field-oriented applications, participants will develop the knowledge and practical skills necessary to improve measurement accuracy, strengthen operational reliability, reduce downtime, enhance asset performance, and support world-class custody transfer operations.

custody transfer measurement systems used across oil and gas production facilities, pipelines, terminals, refineries, and export operations.

Measurement integrity remains one of the most significant performance drivers within hydrocarbon operations. Accurate flow measurement directly affects revenue assurance, production accounting, contractual compliance, inventory management, and operational efficiency. As ultrasonic metering systems become increasingly common in custody transfer applications, organizations require highly competent personnel capable of operating, maintaining, testing, and troubleshooting complex proving systems and associated equipment.

This program addresses critical industry challenges including measurement uncertainty, equipment failures, hydraulic control issues, valve performance degradation, maintenance inefficiencies, troubleshooting complexity, and operational downtime. Participants gain practical knowledge of ultrasonic meter proving methodologies, diverter valve mechanics, electro-hydraulic systems, hydraulic power units, switch adjustments, seal integrity verification, and system performance assessment.

The strategic value of the program extends beyond technical competency development. Participants learn to improve operational reliability, enhance maintenance effectiveness, reduce unplanned shutdowns, strengthen asset integrity programs, and support measurement accuracy requirements essential for custody transfer operations. The program also improves decision-making capabilities related to maintenance planning, system diagnostics, equipment upgrades, and operational readiness.

Organizations benefit through improved system availability, enhanced measurement confidence, reduced operational risk, increased equipment reliability, stronger compliance with industry standards, and improved workforce capability. By combining technical theory with practical applications, the program enables participants to contribute directly to operational excellence, asset performance optimization, and long-term business success within the energy sector.

Course Objectives

By the end of this program, participants will be able to:

- Understand ultrasonic meter proving principles and custody transfer measurement requirements.
- Explain Uni-Directional Meter Proving methodologies and performance criteria.
- Compare Uni-Directional, Bidirectional, and Sphere Prover technologies.
- Operate four-way diverter valves safely and efficiently.

- Conduct preventive maintenance on diverter valves and hydraulic systems.
- Diagnose and troubleshoot electrical, hydraulic, and mechanical failures.
- Perform switch and actuator adjustment procedures correctly.
- Evaluate system reliability and performance indicators.
- Improve measurement accuracy and operational efficiency.
- Apply industry best practices for custody transfer proving systems.
- Develop practical troubleshooting and maintenance action plans.

Course Content (15-Day Training Outline)

Module 1: Ultrasonic Meter Proving Fundamentals

Key Topics

- Principles of ultrasonic flow measurement
- Importance of meter proving in custody transfer applications
- Uni-Directional Meter Proving methodology
- Accuracy and repeatability requirements

Practical Applications

- Meter proving analysis
- Accuracy verification exercises
- Prover performance evaluation

Module 2: General Four-Way Diverter Valve Design & Operation

Key Topics

- Diverter valve operational role
- Mechanical operating sequence
- Valve positions and routing functions
- Control room operating interfaces

Practical Applications

Module 3: 4W110A Electro-Hydraulic Operator Fundamentals

Key Topics

- Electrical module components
- Control circuit functionality
- Switch actuator adjustments
- Position indication systems

Practical Applications

- Electrical component identification
- Circuit operation analysis
- Calibration exercises

Module 4: Hydraulic Control System & Manual Override Functions

Key Topics

- Hydraulic manifold operation
- Hydraulic control principles
- Manual override functions
- Hydraulic flow path analysis

Practical Applications

- Hydraulic circuit tracing
- Manual operation exercises
- Startup verification procedures

Module 5: Neilson 15 kW Hydraulic Power Unit (A1362PP01)

Key Topics

- HPU operating principles
- Reservoir filling requirements
- Motor rotation and pressure controls
- Emergency hand pump functions

- Emergency operation scenarios

Module 6: Electrical & Hydraulic Schematic Interpretation

Key Topics

- Electrical schematic interpretation
- Hydraulic schematic analysis
- Engineering symbol identification
- Control and power circuit integration

Practical Applications

- Drawing interpretation workshops
- Circuit tracing exercises
- Component mapping activities

Module 7: Seal Integrity Verification & Valve Performance Assessment

Key Topics

- Seal integrity testing principles
- Pressure analysis methodologies
- Performance assessment techniques
- Safety requirements

Practical Applications

- Seal testing simulations
- Pressure interpretation exercises
- Performance verification activities

Module 8: Preventive Maintenance of Four-Way Diverter Valves

Key Topics

- Inspection requirements
- Lubrication practices

- Maintenance planning workshops
- Inspection exercises
- Component replacement demonstrations

Module 9: Preventive Maintenance of Hydraulic Power Units

Key Topics

- Hydraulic oil management
- Pump and valve evaluations
- Filter maintenance
- Reliability enhancement

Practical Applications

- HPU maintenance exercises
- Condition monitoring activities
- Reliability assessments

Module 10: Switches & Actuator Adjustment Techniques

Key Topics

- Switch functions and adjustments
- Clearance verification
- Actuator calibration
- Performance impacts

Practical Applications

- Switch adjustment workshops
- Clearance measurement exercises
- Functional verification testing

Module 11: Troubleshooting Four-Way Valve & Operator Systems

Key Topics

Practical Applications

- Fault-finding exercises
- Troubleshooting simulations
- Root cause analysis activities

Module 12: Hydraulic Power Unit Troubleshooting

Key Topics

- Pump and motor faults
- Pressure and flow abnormalities
- Air contamination effects
- Failure investigation methods

Practical Applications

- HPU fault analysis
- Diagnostic workshops
- Corrective action planning

Module 13: Operating Procedures & Functional Testing

Key Topics

- Operational readiness
- Startup procedures
- Functional testing
- Documentation requirements

Practical Applications

- Functional testing exercises
- Startup simulations
- Inspection reporting

Module 14: Technical Case Studies & Operational Problem Analysis

- Technical solution evaluation
- Industry best practices

Practical Applications

- Case study workshops
- Problem-solving exercises
- Maintenance reviews

Module 15: Hands-On Simulation & Integrated System Review

Key Topics

- Integrated system review
- Advanced troubleshooting
- Schematic interpretation
- Final assessment

Practical Applications

- Hands-on simulations
- Scenario-based troubleshooting
- Competency assessments

Target Audience

- Instrumentation Engineers
- Measurement Engineers
- Metering Specialists
- Maintenance Engineers
- Reliability Engineers
- Mechanical Engineers
- Electrical Engineers
- Pipeline Engineers
- Operations Supervisors
- Control System Engineers

- Terminal and Export Facility Personnel

Course Requirements

Participants will benefit most if they possess:

- Basic understanding of oil and gas operations.
- Familiarity with industrial instrumentation systems.
- Knowledge of mechanical, electrical, or hydraulic systems.
- Experience in operations, maintenance, reliability, or metering activities.
- Interest in custody transfer measurement systems and asset integrity.

Training Methodology

The program utilizes a highly practical and technical learning approach including:

- Interactive workshops
- Technical case studies
- Group discussions
- Equipment simulations
- Practical exercises
- Scenario-based learning
- Peer learning
- Feedback sessions
- Schematic interpretation workshops
- Troubleshooting laboratories
- Preventive maintenance demonstrations
- Equipment operation simulations
- Technical competency assessments
- Real-world industry applications

Learning Outcomes

Upon successful completion of this program, participants will be able to:

- Explain ultrasonic meter proving methodologies and principles.
- Operate four-way diverter valve systems safely and effectively.

- Diagnose common hydraulic, electrical, and mechanical failures.
- Adjust switch actuators correctly according to manufacturer requirements.
- Improve measurement reliability and proving accuracy.
- Enhance asset integrity and operational readiness.
- Apply industry standards and best practices.
- Reduce downtime through effective troubleshooting techniques.
- Improve maintenance planning and execution.
- Support custody transfer measurement accuracy requirements.
- Contribute to operational excellence and reliability improvement initiatives.

Instructor Profile

This program is delivered by **an internationally certified expert with extensive practical and consulting experience** in custody transfer metering systems, ultrasonic flow measurement, diverter valve technology, electro-hydraulic systems, reliability engineering, maintenance optimization, and oil & gas operational excellence.

Executive Advisory Expertise

- Advising oil and gas organizations on measurement integrity programs.
- Supporting custody transfer system optimization initiatives.
- Enhancing operational reliability and asset performance.

Strategic Consulting Experience

- Metering system assessments and optimization.
- Reliability-centered maintenance programs.
- Asset integrity and performance improvement initiatives.
- Operational excellence consulting.

Government Transformation Experience

- National energy infrastructure projects.
- Hydrocarbon measurement compliance initiatives.
- Technical workforce development programs.

- Reliability and integrity improvement programs.

Practical Implementation Expertise

- Ultrasonic meter proving systems.
- Four-way diverter valve operation and maintenance.
- Electro-hydraulic control systems.
- Hydraulic power unit management.
- Troubleshooting and reliability enhancement programs.

Participants benefit from real-world operational experience, internationally recognized best practices, proven maintenance methodologies, and practical technical expertise that can be immediately applied in field operations, maintenance activities, and custody transfer measurement systems.

Contact Us

For registration inquiries, upcoming dates, or group pricing, please contact us:

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