Turbine Meters
(Instructor-Led Training)

Course Description

This course covers turbine flow meters, their operating theory, and considerations for installation, maintenance and operation.

Course Prerequisites

- GTA Web-Based Training
  - Core WBT
  - Statistics and Uncertainty
  - Gas Properties I
  - Gas Properties II
- GTA Instructor-Led Training
  - Measurement Systems

Course Objectives

Upon completion of this course, the student will have received instruction designed to assist him/her in the following:

- Describe the theory of operation of the various types of turbine meters.
- Describe AGA-7.
- Explain the design features and components of the turbine meter.
- Identify the components of turbine meter runs, and accessories.
- Explain the operation of the turbine meter.
- Interpret the requirements of field/factory proving, and calibration.
- Explain turbine meter maintenance.
- Give a brief explanation of troubleshooting turbine meters.

Course Outline

1. Turbine Meter Theory
2. AGA-7
    a. AGA-7 Guidelines
    b. This Document and AGA 7
    c. Meter Runs
3. Turbine Meter Construction
    a. Label Plates
    b. Body
    c. Nose Cone
    d. Measuring Mechanism
    e. Output and/or Readout Device
4. Piping Installation and Best Practices
    a. Flow Conditioners and Straighteners
    b. VAS – Vane Anti-Swirl
    c. TAS - Tube Bundle Anti-Swirl
    d. NAS – No Anti-Swirl
    e. Strainer or Filters
    f. Over-Range Protection
    g. Bypass and Block Valves
    h. Example Meter Run Startup and Shutdown
    i. Accessory Devices
        i. Temperature Measurement
        ii. Pressure Measurement
        iii. Density Measurement
5. Turbine Meter Operation
    a. Initial Setup
    b. Maintenance and Inspection Frequency
    c. Performance Characteristics
    d. Flow Velocity Pulsations

e. Electrical Interfacing

6. Field/Factory Proving and Calculations
    a. Meter Accuracy (Error or Uncertainty)
    b. Turbine Meter Accuracy Curve
    c. Linearity
    d. Pressure Loss
    e. Determination of Calibration Factor
    f. Presentation of Calibration Data
    g. Calibration Methods
    h. Completing Test Reports
7. Turbine Meter Maintenance
    a. Maintenance Schedule
    b. Field Checks
    c. Visual Inspection
    d. Wear Testing for Rotor Wobble
    e. Bearing Inspection and Routine Inspection
    f. In-Line Inspections and Tests
    g. Spin Time Testing
    h. In-Line Spin Testing
    i. Freestanding Spin Time Testing
    j. Temperature Effects on Spin Time Testing
8. Turbine Meter Troubleshooting
    a. Troubleshooting
    b. No Registration
    c. Totalizer Counts Too High
    d. Totalizer Counts Too Low

Recommended Resources

- GTA Turbine Meters Participant Guide and Instructor Presentation.
- AGA Reports 5, 7, 8.
- Internet sites and textbooks related to turbine meters.