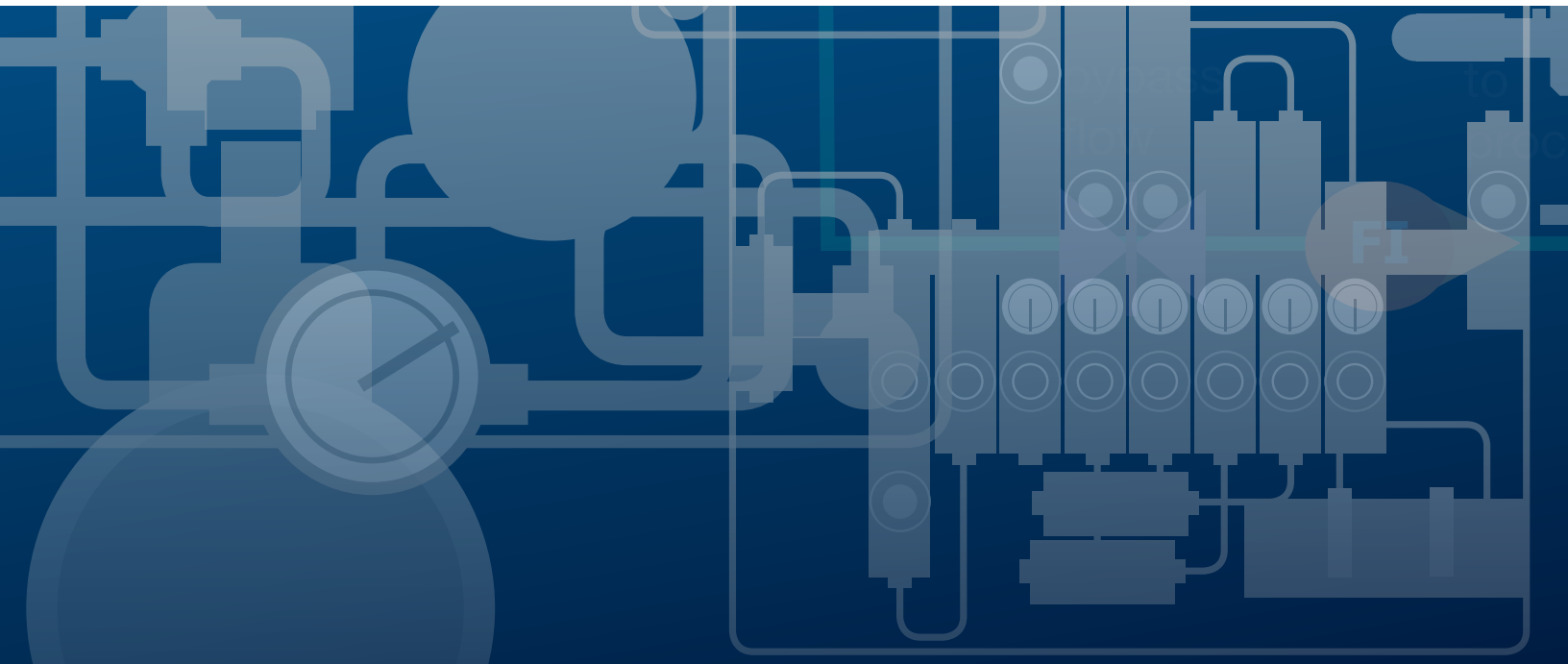
Process Analyzer Sampling System Training (PASS)

Designed for Analytical Instrumentation System Engineers, Technicians and Industry Professionals



Optimize Your Sampling Systems. Avoid Costly Mistakes. Enroll Today.

Swagelok

Optimize Your Process Analyzer Sampling System in Just Five Days

Course Objectives

Here are a few examples of what you will learn:

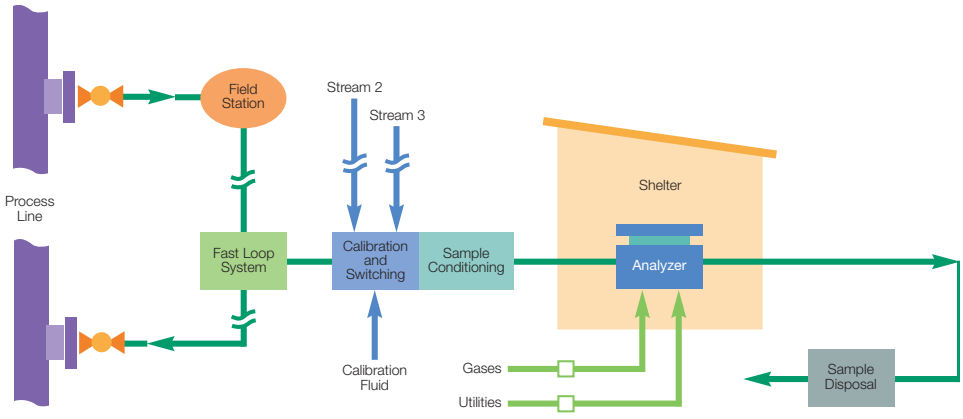
- Read and create sampling system schematics
- Design and build a sampling system
- Diagnose sample transport problems
- Evaluate and determine sample tap location
- Calculate and evaluate sample transport lag (time delay) of liquids and gasses
- Calculate pressure drop in a fast loop or return line
- Calculate gas and liquid flow rates
- Avoid or account for adsorption and permeation
- Predict vapor condensation
- Prevent or control phase preservation
- Vaporize a sample
- Avoid deadlegs in a sampling system
- Techniques of stream switching

Learn more about PASS training at swagelok.com.

Students participate in an interactive exercise, designing and building a sampling system.

If you design, construct, operate or maintain sampling systems, you know how important quality data is. Inaccuracy usually results from problems within the sampling system, not the analyzer. With our hands-on training, we teach you to tell the difference.

You can learn to diagnose and eliminate common sampling system design flaws that result in erroneous data by using engineering principles, formulas, and calculations rather than relying on guesswork. And you don't have to do it alone. You'll design a system in class, and apply what you've learned to your own process analyzer sampling system. Swagelok training teaches you in days what it could take years to learn on your own.



This five-day training course covers aspects of a sample system, from process line and tap through transport lines, stream switching, sample conditioning, analyzer and disposal.

DAY 1

Fundamentals: Classwork and Basic Exercises

I. Basic Performance Criteria and Challenges
- Sample compatibility with analyzer
- Time delay in sampling
- Mixing and contamination, including deadlegs

II. Diagnosing and Fixing Time Delay Problems
- Sample transport time calculations for liquids and gases
- Gas compressibility and time delay

DAY 2

Classwork and Basic Exercises

Group Project: Design a Complete Sampling System

III. Sample Conditioning Techniques
- Proper use of filters and coalescers
- Liquid, vapor, and gas separation devices
- The difference between vapor and liquid concentration

IV. Sample Tap Design
- Understanding process conditions, analyzer characteristics, and sample requirements
- Location and design of process nozzle
- Probe selection and design

DAY 3

Advanced Design Concepts

Group Project: Design a Complete Sampling System

V. Phase Preservation
- How to condense or vaporize a sample (or avoid it)
- How to use phase diagrams
- Design of field stations and fast loops

DAY 4

Advanced Design Work

Group Project: Prepare Group Design Presentations

VI. Advanced Calculations
- How to determine fluid velocity in line segments
- Laminar and turbulent flow (Reynolds Number)
- Effect of temperature and pressure
- Calculating the pressure drop in each line segment

DAY 5

Stream and Calibration Selection

VII. Techniques of Stream Switching
- Avoiding deadlegs and mixing volumes
- Modular sample conditioning systems
- Design and build a modular sampling system

VIII. Group Presentations
- Group presentations and instructor comments

Here's what graduates of this course have to say:

"Amazing topics and great instructor."

"I really liked how well the instructor explained the fundamentals of systems and equipment."

"The class exercises were highly valuable, and the chapters were well-organized."