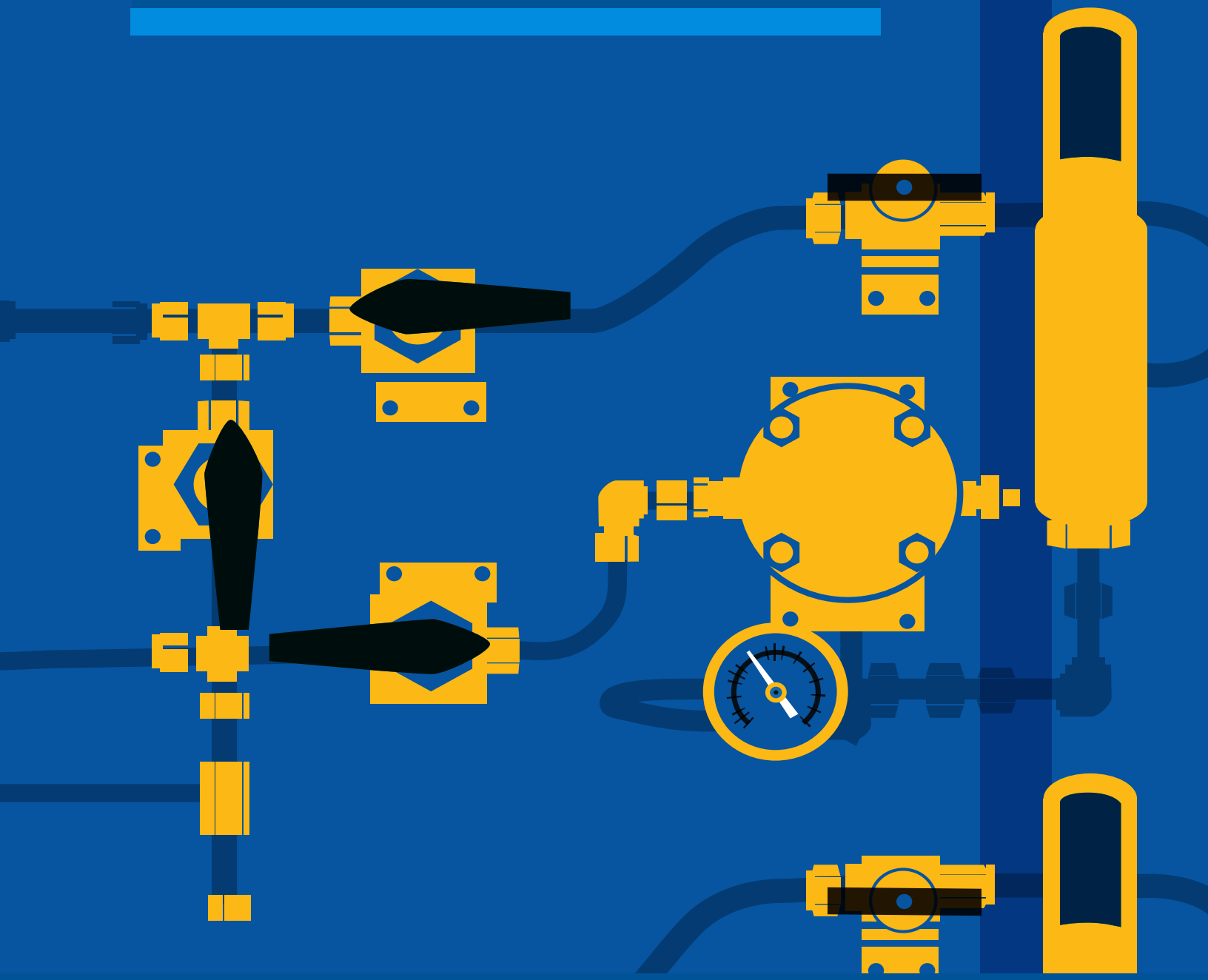
What you don't know about sampling systems could be costing you.



Learn to avoid costly errors with comprehensive, hands-on Process Analyzer Sampling System Training.

Swagelok®

Value beyond the expected℠

Process Analyzer Sampling System Training

You will learn to...

- diagnose sample transport problems
- evaluate and determine sample tap location, select an appropriate probe
- calculate and optimize sample transport lag (or time delay) for liquids and gases
- calculate pressure drop in a fast loop or return line
- calculate flow rate for a gas and liquid
- avoid or account for adsorption and permeation
- predict how much vapor will condense in a sampling system
- prevent or control phase separation
- vaporize a sample, if and when it is appropriate
- avoid deadlegs in a sampling system
- read and create sampling system schematics
- design and build a sampling system
- identify Swagelok fluid system components that address sampling system challenges

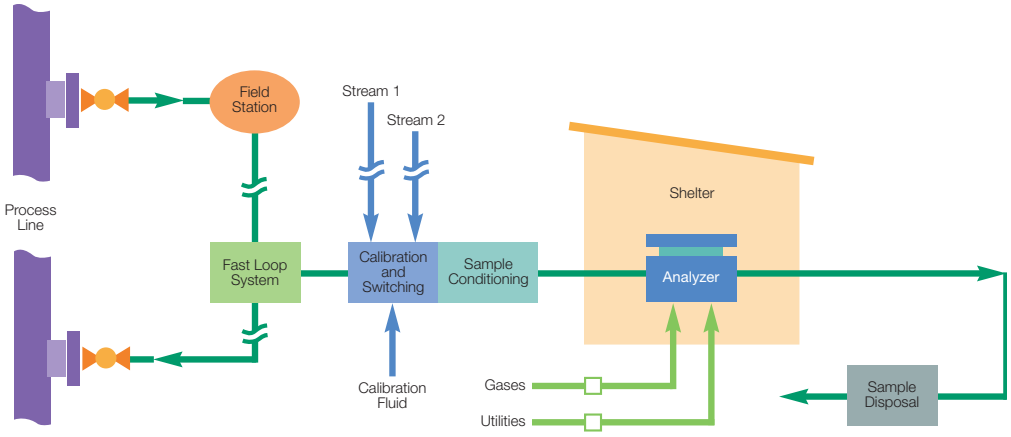
Five Days to the Optimization of Your Process Analyzer Systems

Students participate in an interactive exercise; learning to design and build a NeSSI modular system.

Swagelok has serviced the process analyzer market for more than 60 years. As a global company, we have addressed all kinds of process analyzer sampling system challenges in a range of industries.

To help optimize your own system success, this expertise is now being presented in a five-day course specially developed for technicians, chemists, engineers or anyone involved in the design, building, operation or maintenance of process analyzer sampling systems.

Our experience tells us that, more often than not, inaccurate results from an analyzer indicate a problem with the sampling system itself, not the analyzer. Our goal is to teach you how to tell the difference. This course will show you how to recognize and diagnose common sampling system design flaws. You will learn how to employ formulas, calculations, and engineering principles rather than rely on guesswork or approximations. In the end, you will design, build, and present your own sampling system.



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

Tony Waters

Industry expert, consultant

Waters has 45 years of experience with process analyzers and their sampling systems. He has worked in engineering and marketing roles for an analyzer manufacturer, an end-user, and a systems integrator. He founded three companies to provide specialized analyzer services to the process industries, and is an expert in the application of process analyzers in refineries and chemical plants. Waters is particularly known for his training courses that have been presented in many countries around the world. His presentations are always popular, and have equal appeal to engineers and maintenance technicians.

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

"Whether you're troubleshooting or building a sampling system, these classes can deliver what you need to succeed."

"The material we covered in this class should greatly improve our reliability in sampling systems and analyzers."

"It's amazing that we designed and built a sampling system in a single afternoon."

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

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