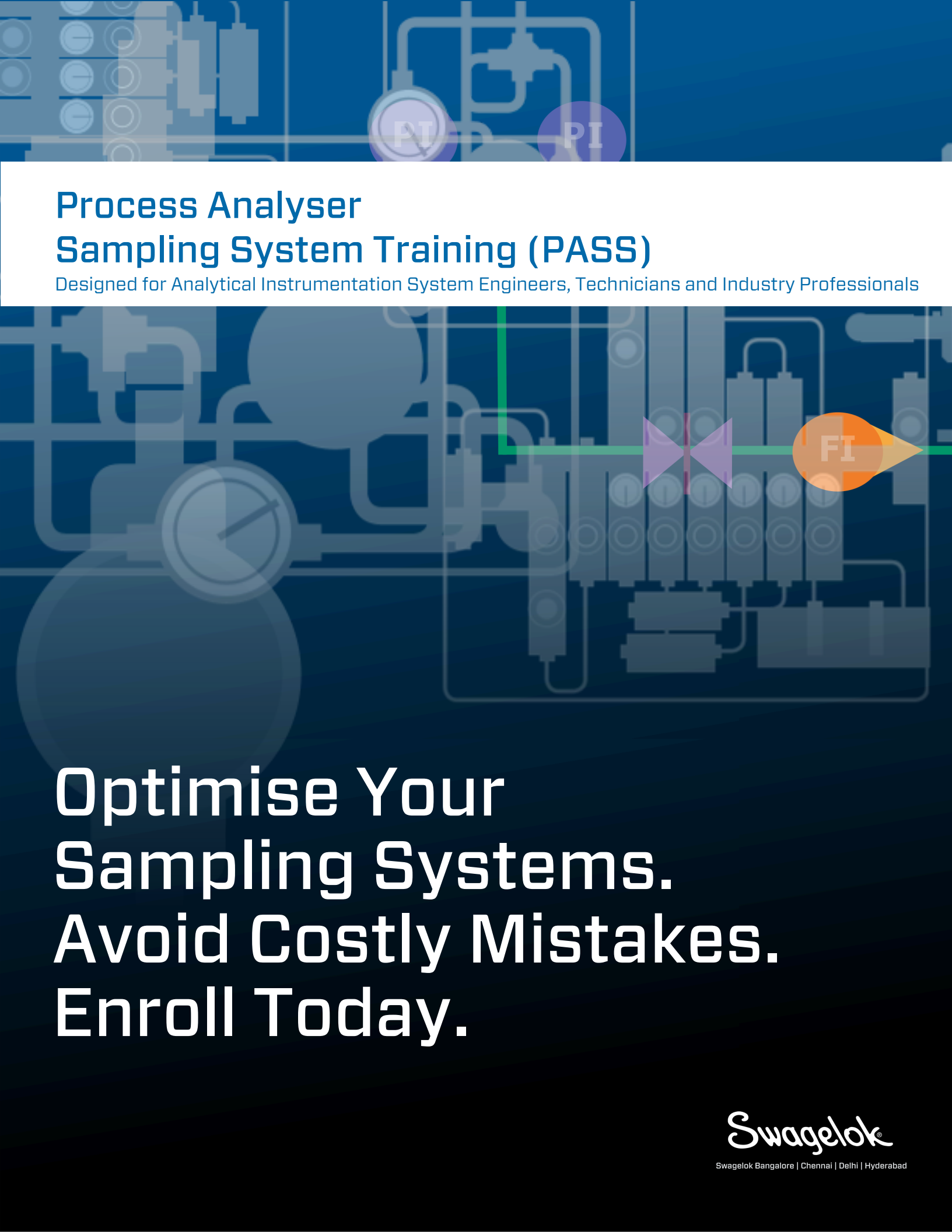




Process Analyser Sampling System Training (PASS)

Designed for Analytical Instrumentation System Engineers, Technicians and Industry Professionals

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

Swagelok®

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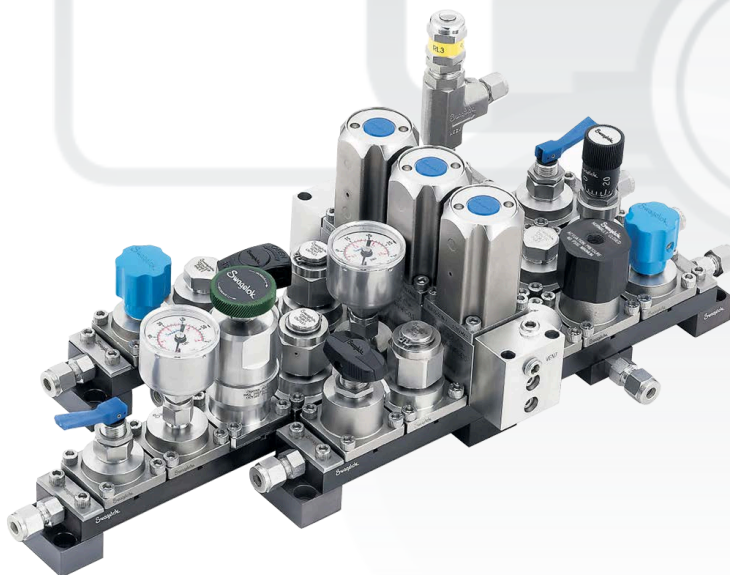
Optimise Your Process Analyser Sampling System in Just Five Days

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 gases
- Calculate pressure drop in a fast loop or return line
- Calculate gas and liquid flow rates
- Avoid or account for adsorption and permeation
- Predict vapour condensation
- Prevent or control phase preservation
- Vaporise a sample
- Avoid deadlegs in a sampling system
- Techniques of stream switching

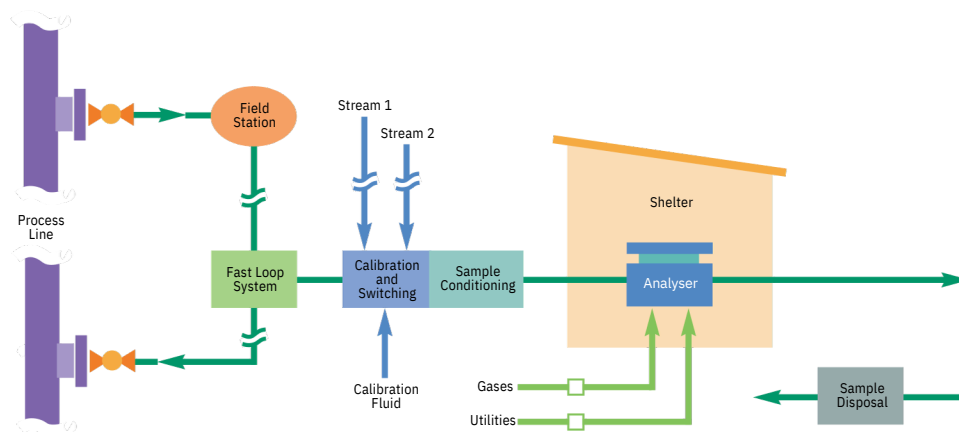
Learn more about PASS training at swagelok.com.



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 analyser. 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 analyser 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, analyser and disposal.

DAY 1

Fundamentals: Classwork and Basic Exercises

- I. Basic Performance Criteria and Challenges
 - Sample compatibility with analyser
 - 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, vapour, and gas separation devices
 - The difference between vapour 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 vaporise 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:

This course was extremely beneficial for me as a young engineer starting out in an analyzer job. It provided a comprehensive design philosophy, allowing attendees to understand why each analyzer sampling system is unique. From sample probe design consideration to sample transport line and eventually sample conditioning and return design – this course has it ALL covered. I was fortunate to be given the opportunity to attend this course 7 years ago and to this date, I am still a strong advocate and would always recommend junior engineers or maintenance personnel to attend this course."

"Process Analyzer Sampling System (PASS) Training has been an invaluable experience. As an engineer involved in designing and implementing conditioning systems, this course provided me with essential insights that are directly applicable to my work. The training was especially useful in teaching the fundamental knowledge required at each engineering step, from the initial design phase to final evaluation. I gained a deeper understanding of the core principles that drive the design of sample conditioning systems. What I found most beneficial was learning a systematic approach to performing calculations and evaluating system designs. The structured methodology taught during the course has enabled me to confidently approach design challenges and ensure accuracy and efficiency in my work. I highly recommend this training to anyone in the engineering and design field looking to enhance their understanding of sample

About the Instructor

Carl Robins

A.I. Technical Authority - ASIAPAC



"With over 35 years of hands-on experience, Carl Robins is a distinguished expert in Analyzer Integration (AI) and a leading technical authority at Swagelok. Throughout his career, he has held pivotal global roles at ABB, Yokogawa, and has contributed to major energy projects across the UK, Middle East, Asia, and the United States.

Carl's strengths include:

- Extensive expertise in sample systems, shelters, and analyzer houses
- Robust background in engineering design, commissioning, and field services
- Exceptional ability to simplify complex technical concepts into practical, application-focused training

As Swagelok's AI Technical Authority, Carl is instrumental in driving innovative solutions, mentoring engineers, and delivering impactful training programs that effectively connect theoretical knowledge with real-world field applications."

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